Fusion Moves for Graph Matching

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Abstract

We contribute to approximate algorithms for the quadratic assignment problem also known as graph matching. Inspired by the success of the fusion moves technique developed for multilabel discrete Markov random fields, we investigate its applicability to graph matching. In particular, we show how fusion moves can be efficiently combined with the dedicated state-of-the-art dual methods that have recently shown superior results in computer vision and bio-imaging applications. As our empirical evaluation on a wide variety of graph matching datasets suggests, fusion moves significantly improve performance of these methods in terms of speed and quality of the obtained solutions. Our method sets a new state-of-the-art with a notable margin with respect to its competitors.

1. Introduction

The *quadratic assignment problem* also known as *graph matching* is one of the most prominent combinatorial problems having numerous applications. In computer vision it is predominantly used for feature matching [47]. The modern approach to this application is *deep graph matching*, see *e.g.* [40, 42, 55], which enjoys constantly growing attention in the community. As follows from the name, deep graph matching combines neural networks with combinatorial matching techniques for inference and joint learning. Whereas most of earlier deep graph matching approaches [17, 24, 51, 52, 53] employed a linear assignment problem (LAP) solver[1] to obtain matchings in their pipeline, the most promising state-of-the-art method [40] uses a fully featured graph matching solver. Being called in a loop on each training iteration, this solver must provide high-quality solutions within a very restricted time budget, typically less than a second. Modern state-of-the-art methods [46, 47, 56] satisfy this requirement only if applied to relatively small problems, with a few dozen feature points at most. Hence, scalability of deep graph matching critically depends on the existence of highly-efficient graph matching solvers.

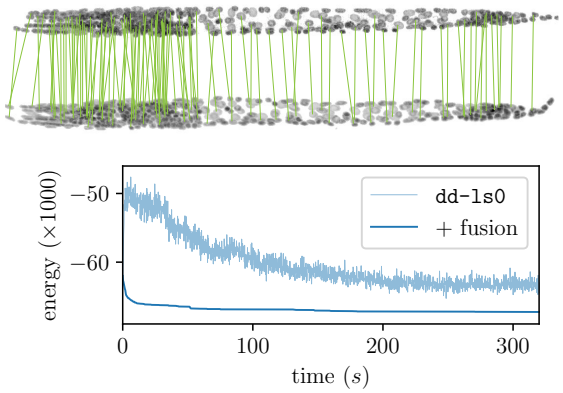

Figure 1. **(Top)** Scalable graph matching is especially important for bio-imaging, where hundreds or even thousands of cells on different images must be matched to each other. An instance from the `pairs` dataset (see Sec. 6), only each 5th matching is shown. **(bottom)** Convergence of the state-of-the-art method `dd-ls0` [47] (see Sec. 6) without and with fusion moves. Note that fusion moves attain much better energy in notably shorter time.

In this work we address this problem by introducing a new graph matching technique, which notably improves the state-of-the-art in terms of speed and attained accuracy. In particular, it provides highly accurate solutions for problems with more than 500 features in less than a second.

Related work. First formulated in 1957 [6], the graph matching problem plays a central role in combinatorial optimization. Due to its importance, nearly all possible optimization techniques were put to the test for it, see the surveys [10, 12, 38] and references therein.

As usual for NP-hard problems, no single method can efficiently address all graph matching instances. Different applications require different methods, and we concentrate

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[1] A polynomial subclass of graph matching without quadratic costs.

here on problem instances specific to computer vision. Traditionally, within this community primal heuristics[2] [1, 14, 19, 25, 35, 36, 50, 54, 57, 58] were used predominantly, since demand for low computation times usually dominates the need for optimality guarantees. These also include methods that build upon spectral relaxations [35, 36, 50, 57], or convex-to-concave path-following procedures [7, 15, 58]. However, recent works [46, 47, 56] have shown that Lagrange duality-based methods attain significantly better accuracy, especially as problem size and complexity grow. It is important to note that in operations research such Lagrange dual methods for graph matching are known at least since the 90s [2, 22, 30], and are widely used in branch-and-bound solvers. Although they address similar relaxations as [46, 56], their iteration complexity is an order of magnitude higher than those of [46, 56]. This makes them prohibitively expensive for use in typical computer vision applications.

While branch-and-bound remains the main tool to obtain exact solutions, it has an exponential worst-case complexity and is often too expensive. Hence, dual methods like [46, 47] use simple primal heuristics with low computational cost that can be called after each dual iteration. Improving such heuristics to obtain high-quality primal solutions already after few dual iterations would allow to outperform the purely primal methods not only in accuracy but also in runtime.

Fusion moves, as introduced by [34], is a primal heuristic proposed for maximum a posteriori inference in Markov random fields, known also as *discrete labeling* or *energy minimization problem*, see *e.g.* [43]. For brevity we will refer to it as the *MRF problem*.

In its most common setting the fusion moves method tries to improve a current approximate primal assignment by merging it with another assignment proposal. The merging constitutes a comparatively small two-label MRF problem, for which efficient exact and approximate techniques exist. As noted in [34], success of the method significantly depends on the *quality* and *diversity* of proposals. A number of ways of generating generic proposals for MRF problems and (approximate) solvers for the corresponding auxiliary problem have been evaluated by [29]. They also considered several instances of the graph matching problem treated as MRF. However, they found fusion moves with their, typically infeasible, proposals to be inferior to other methods. A similar negative result was reported by [47] with a simple but low quality local search-based proposal generator.

In operations research fusion moves is known since 1997 as *optimized crossover* or *recombination*, when it was proposed to address the independent set problem [3]. However, for the quadratic assignment problem it was reported as being inefficient, when used as a building block of a greedy genetic algorithm [4]. This was attributed to the lack of diversity of the solution population resulting from this method.

[2] A common name for algorithms missing optimality guarantees.

Contribution. We show how to use fusion moves to efficiently solve graph matching problems, and provide a theoretical rationale that efficient proposals for fusion moves must be feasible, *i.e.* satisfy the uniqueness constraints of the graph matching problem. We ensure *quality* of our proposals by generating them based on reparametrized costs improved in the course of dual optimization, and enforce *diversity* of proposals by making use of either *oscillating* dual updates, as in the dual subgradient method, or our proposed efficient *randomized* greedy algorithm. Altogether, our method combines the accuracy of dual solvers with the speed of dedicated primal heuristics. We demonstrate the superior performance of our technique on multiple datasets. Our code and datasets we used are available at https://vislearn.github.io/libmpopt/iccv2021.

The supplement, referred to as §A1–§A7 contains detailed proofs, dataset, experiment and algorithm descriptions.

2. Preliminaries

Graph matching problem. Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be an undirected graph, where $\mathcal{V}$ is the finite set of *nodes* and $\mathcal{E} \subseteq \binom{\mathcal{V}}{2}$ the set of *edges*. For convenience we denote edges $\{u, v\} \in \mathcal{E}$ simply by uv. Let $\mathcal{L}$ be a finite set of *labels*. We associate with each node $u \in \mathcal{V}$ a subset of labels $\mathcal{L}_u \subseteq \mathcal{L}$, and a *unary cost function* $\theta_u \colon \mathcal{L}_u^{\#} \to \mathbb{R}$, where $\mathcal{L}_u^{\#} := \mathcal{L}_u \cup \{\#\}$. Here, $\#$ denotes a *dummy label* distinct from all labels in $\mathcal{L}$ to encode that no label is selected. Likewise, for each edge $uv \in \mathcal{E}$ let $\theta_{uv} \colon \mathcal{L}_u^{\#} \times \mathcal{L}_v^{\#} \to \mathbb{R}$ be a *pairwise cost function*.

Then the problem of finding an optimal assignment of labels to nodes, known as *graph matching* or *quadratic assignment* problem, can be stated as

$$\min_{x \in X} \Big[E(x) := \sum_{u \in \mathcal{V}} \theta_u(x_u) + \sum_{uv \in \mathcal{E}} \theta_{uv}(x_u, x_v) \Big] \qquad (1)$$
$$\text{s.t.} \quad \forall u, v \in \mathcal{V}, u \neq v : \; x_u \neq x_v \text{ or } x_u = \#,$$

where X stands for the Cartesian product $\bigtimes_{u \in \mathcal{V}} \mathcal{L}_u^{\#}$. The objective E is referred to as *energy*, and the constraints in (1) are known as *uniqueness constraints*. They allow each non-dummy label to be selected at most once. The number of selected dummy labels is not limited. Elements $x \in X$ are called *assignments*. An assignment is *feasible* if it satisfies all uniqueness constraints. So, essentially, (1) corresponds to an *MRF problem with uniqueness constraints* for the labels.

Note that this formulation generalizes the classical quadratic assignment problem, see *e.g.* [10], by allowing for *incomplete* assignments, *i.e.* not every label in $\mathcal{L}$ has to be assigned to a node, and not necessarily every node is assigned a label in $\mathcal{L}$. Instead, nodes can be assigned the dummy label. Choosing a large constant as unary cost for the dummy label in each node enforces a *complete* assignment.

Without pairwise costs θ_{uv} the quadratic assignment problem (1) reduces to the well-known *linear assignment problem* (LAP). While the quadratic assignment problem is in general NP-hard, the LAP can be solved in polynomial time by *e.g.* the Hungarian method.

Fusion moves [34] address the, compared to (1) unconstrained, MRF problem $\min_{x\in X} E(x)$. In the simplest, but most widely used scenario, on each iteration of the algorithm the currently best assignment $x' \in X$ is *fused* with another candidate assignment $x'' \in X$ by solving the *auxiliary* minimization problem

$$\min_{x\in X_{\text{aux}}} E(x)\,, \tag{2}$$

where $X_{\text{aux}} := \{x \in X \mid x_u \in \{x'_u, x''_u\}, u \in \mathcal{V}\}$. Due to the considerably smaller size of the restricted label space X_{aux} the auxiliary problem (2) can often be efficiently solved approximately, or even exactly. The solver only has to guarantee *monotone improvement* of the best assignment by assuring

$$E(x^*) \leq \min(E(x'), E(x'')) \tag{3}$$

for its output x^*, which is then further considered as the best assignment, *i.e.* in the next iteration $x' := x^*$. Note that the monotonicity condition (3) automatically holds for any x^* that is an exact solution of (2). For approximate methods the inequality (3) can be enforced by assigning x^* to the proposal with lower energy if needed. Each fusion operation is also referred to as a *fusion move*.

We adopt this method to the graph matching problem (1) by extending the auxiliary problem (2):

$$\begin{aligned} &\min_{x\in X_{\text{aux}}} E(x) \\ &\text{s.t.} \quad \forall\, u, v \in \mathcal{V}, u \neq v:\ x_u \neq x_v \text{ or } x_u = \# \,. \end{aligned} \tag{4}$$

That is, compared to (2), the uniqueness constraints are taken into account during fusion, which guarantees feasibility of the current best assignment.

There are two main questions that have to be answered to apply fusion moves: **(i)** How to generate proposals? **(ii)** How to solve the auxiliary problem (4)? Starting with the second, we address these questions below.

3. Solving the auxiliary problem

ILP formulation. The auxiliary problem (4) can be formulated as an *integer linear program* (ILP) as follows. For all $u \in \mathcal{V}$ let $\hat{\mathcal{L}}_u := \{x'_u, x''_u\}$ be the restricted set of labels.[3] We introduce binary variables $\mu_{u,s} \in \{0,1\}$ for each node $u \in \mathcal{V}$ and label $s \in \hat{\mathcal{L}}_u$, and $\mu_{uv,st} \in \{0,1\}$ for each edge $uv \in \mathcal{E}$ and each label pair $(s,t) \in \hat{\mathcal{L}}_u \times \hat{\mathcal{L}}_v$. Setting $\mu_{u,s} = \mu_{v,t} = \mu_{uv,st} = 1$ corresponds to assigning coordinates $x_u = s$ and $x_v = t$ of the solution labeling x. Together these variables form a vector $\mu \in \{0,1\}^N$, where $N = 2|\mathcal{V}| + 4|\mathcal{E}|$. Then the ILP

$$\min_{\mu\in\{0,1\}^N} \sum_{\substack{u\in\mathcal{V}\\ s\in\hat{\mathcal{L}}_u}} \mu_{u,s}\theta_u(s) + \sum_{\substack{uv\in\mathcal{E}\\ (s,t)\in\hat{\mathcal{L}}_u\times\hat{\mathcal{L}}_v}} \mu_{uv,st}\theta_{uv}(s,t) \tag{5}$$

$$\begin{aligned} \text{s.t. } &\forall\, u \in \mathcal{V}\colon \mu_{u,x'_u} + \mu_{u,x''_u} = 1 \\ &\forall\, uv \in \mathcal{E}, (s,t) \in \hat{\mathcal{L}}_u \times \hat{\mathcal{L}}_v\colon \\ &\quad \mu_{uv,st} \leq \mu_{u,s},\ \mu_{uv,st} \leq \mu_{v,t}\,, \\ &\quad \mu_{uv,st} \geq \mu_{u,s} + \mu_{v,t} - 1\,, \\ &\forall\, u, v \in \mathcal{V}, u \neq v, s \in (\hat{\mathcal{L}}_u \cap \hat{\mathcal{L}}_v)\backslash\{\#\}\colon \\ &\quad \mu_{u,s} + \mu_{v,s} \leq 1 \end{aligned} \tag{6}$$

is equivalent to (4). In particular, the inequalities in (6) enforce the uniqueness constraints. Clearly, problem (5) without the uniqueness constraints (6) constitutes an ILP representation of the MRF auxiliary problem (2).

The ILP problem (5)-(6) can be addressed by off-the-shelf ILP solvers like Gurobi [21]. However, with growing problem size, such solvers become prohibitively slow, as they have exponential worst-case complexity. Therefore, one has to resort to other exact or approximate optimization techniques, which we review now.

Elimination of uniqueness constraints. The uniqueness constraints (6) between nodes u and v can be eliminated by assigning a very large cost C_∞ to the pairwise cost function on the corresponding edge, *i.e.*

$$\theta_{uv}(s,s) := C_\infty,\ \forall s \in (\hat{\mathcal{L}}_u \cap \hat{\mathcal{L}}_v)\backslash\{\#\}\,. \tag{7}$$

If $uv \notin \mathcal{E}$, the edge uv is added to $\mathcal{E}$ together with pairwise costs $\theta_{uv}(s,t) := C_\infty \cdot [\![s = t \neq \#]\!]$, where $[\![A]\!]$ is equal to 1 if A holds, and 0 otherwise.

This way the graph matching auxiliary problem (4) is reduced to the MRF auxiliary problem (2), on a, possibly different, graph. This allows considering dedicated methods addressing the MRF auxiliary problem (2). Efficiency of these methods is very much dependent on the *submodularity* of the pairwise costs θ_{uv}. We review this property and the corresponding optimization methods below.

Submodular case. In general, two-label MRF problems like (2) are NP-hard [8]. However, they become efficiently solvable, if for all $u \in \mathcal{V}$ there exists a bijective mapping $\delta_u\colon \{0,1\} \to \hat{\mathcal{L}}_u$ called *ordering*, such that all pairwise costs θ_{uv}, $uv \in \mathcal{E}$, in problem (2) are *submodular*, *i.e.*

$$\theta_{uv}(0,0) + \theta_{uv}(1,1) \leq \theta_{uv}(0,1) + \theta_{uv}(1,0)\,, \tag{8}$$

where we abbreviate $\theta_{uv}(\delta_u(0), \delta_v(1))$ by $\theta_{uv}(0,1)$. It is known that in this case the natural linear program (LP) relaxation of (5) is tight, and, moreover, reducible to the efficiently solvable min-cut/max-flow problem [31].[4]

[3] Without loss of generality we assume the non-trivial case $x'_u \neq x''_u$ for all $u \in \mathcal{V}$.

[4] The orderings δ_u can also be found explicitly [44], allowing for a more efficient min-cut/max-flow reduction [32].

Non-submodular case. The pairwise costs not fulfilling the submodularity condition (8) for a given mapping δ_u are called *supermodular*. Inequality (8) implies that swapping the "labels" 1 and 0 turns submodular pairwise costs into supermodular ones and vice versa. However, since a swap in one node changes sub-/supermodularity of all incident pairwise costs, we cannot always turn all supermodular pairwise costs into submodular ones. This is already impossible if the graph contains a triangular subgraph with all pairwise costs being supermodular.

In these cases the mentioned LP relaxation is in general not tight. However, it has the important *persistency* property, *i.e*. all integer coordinates of a relaxed solution belong to an optimal integer solution [31]. This allows for building efficient approximate methods for (2) applicable also to the non-submodular case [41]. These methods are known in the literature as *quadratic pseudo-boolean optimization* (QPBO) or *roof duality*. As an alternative, *trust region-based* approximate optimization algorithms for (2) have been suggested by [20]. They are based on an iterative approximation of the problem by submodular problems. To this end the supermodular pairwise costs are approximated with unary costs. Similar to the QPBO techniques, performance of trust-region methods drops as the number of supermodular pairwise costs increases. Contrary to the QPBO techniques they require an explicit ordering of the label sets.

4. Feasibility of proposals

Before we address the generation of proposals, we theoretically substantiate the main property of fusion move proposals for graph matching problems: *feasibility*. In other words, proposals should satisfy the uniqueness constraints to allow the method to perform well.

Size of the search space. In a nutshell, fusion moves is a local search method, with the search space defined by proposals. Performance of such methods critically depends on the size of the search space. Assuming that a better, or even the best, solution within this space can be found efficiently, this search space should be as large as possible to allow for better approximations. The following proposition sets the bounds on the size of the search space:

Proposition 1. *Let x' be a feasible, and x'' a possibly infeasible assignment for the graph matching problem* (1). *Let m be the number of dummy, and n the number of different non-dummy labels in x''. Then the auxiliary problem* (4) *has at most $2^m\left(\frac{|\mathcal{V}|}{n}+1\right)^n$ feasible solutions.*

In other words, for a fixed number of dummy labels in x'' the size of the search space exponentially increases with the number of different labels in x''. Feasible assignments maximize this number, see §A1 for a proof of Prop. 1.

The need for feasible assignments distinguishes graph matching from the MRF problem, where the space of possible solutions always grows as 2^n, where n is the *total* number of nodes where the proposals differ. Therefore, a popular and quite efficient way to generate MRF proposals known as α-expansion [9], where $x''_u = \alpha$ for all $u \in \mathcal{V}$, is completely ineffective for graph matching: According to Proposition 1 the search space reduces to $|\mathcal{V}|+1$ solutions. Another popular method [29, 34] suggests constructing proposals from locally best labels returned by, *e.g*., loopy belief propagation. As empirically observed by [29], for the graph matching problem such proposals typically do not satisfy the uniqueness constraints and, therefore, lead to a non-competitive performance of fusion moves.

Efficiency of approximate solvers. As noted in Section 3, performance of approximate solvers for the auxiliary problem (2) drops with an increasing proportion of supermodular pairwise costs. Since the uniqueness constraints for the auxiliary problem (4) are translated into large pairwise costs, it is important to find an ordering where these large costs do not lead to a violation of the submodularity constraint (8).

Let the proposal x'' be infeasible, *i.e*. there exist $u, v \in \mathcal{V}$, $u \neq v$, with $x''_u = x''_v \neq \#$. Consider now the ordering where labels x''_u are mapped to 0 for all $u \in \mathcal{V}$, and all x'_u to 1. Then, according to (7), $\theta_{uv}(0,0) = C_\infty$, which would lead to a supermodular pairwise cost θ_{uv}. Should there be multiple nodes with equal labels, *i.e*. $x''_u = x''_v = x''_w$, this would lead to a fully connected subgraph with supermodular costs. As discussed in Section 3, these costs cannot all be turned into submodular ones by swapping the labels 0 and 1. As a consequence, this leads to a deterioration in performance of approximate methods for the graph matching auxiliary problem (4). This case can be avoided by requiring x'' to be feasible.

Conversely, consider the practically inevitable case of equal labels in *different* proposals, *i.e*. $x'_u = x''_v$ for some $u, v \in \mathcal{V}$, $u \neq v$. According to (7), with the same initial ordering as above, $\theta_{uv}(1,0) := C_\infty$. This, however, renders the corresponding pairwise cost submodular, *c.f*. (8), which simplifies optimization.

***To summarize**, the feasibility of proposals increases the search space for each fusion, while at the same time allowing for efficient approximate solvers for the auxiliary problem.*

5. Proposal generation

As mentioned in Section 1 fusion moves work best if the proposals are of *high quality* and *diverse*. Essentially, *high quality* means low corresponding energy E, and *diversity* can be quantified by counting the number of nodes where two proposals differ.

How to obtain high quality proposals? The natural idea to get high quality proposals is to employ some iterative optimization process which outputs solutions on each iteration. As discussed in Section 4, in the case of graph matching, these proposals should be feasible. Dual methods equipped

Algorithm 1: Randomized greedy heuristic.

Input: graph $\mathcal{G} = (\mathcal{V}, \mathcal{E})$, labels $\mathcal{L}$ and costs θ

initialize $\mathcal{V}' := \emptyset$ and $\mathcal{L}' := \emptyset$

while $\mathcal{V}' \neq \mathcal{V}$ **do**

randomly select $u \in \mathcal{N}(\mathcal{V}')$ or $u \in \mathcal{V} \setminus \mathcal{V}'$ if $\mathcal{N}(\mathcal{V}') = \emptyset$

set

$$x_u := \operatorname*{arg\,min}_{s \in \mathcal{L}_u \setminus \mathcal{L}' \cup \{\#\}} \left[\theta_u(s) + \sum_{v \in \mathcal{N}(u) \cap \mathcal{V}'} \theta_{uv}(s, x_v) \right]$$

update $\mathcal{V}' := \mathcal{V}' \cup \{u\}$ and $\mathcal{L}' := \mathcal{L}' \cup \{x_u\}$

Output: feasible assignment $x = (x_u)_{u \in \mathcal{V}}$

with efficiently computable primal heuristics are therefore natural candidates for proposal generators. In Section 5.2 we briefly describe two types of such methods, block-coordinate ascent- and subgradient-based ones.

How to obtain diverse proposals? Diversity of proposals based on dual optimization can either be induced by noisy dual updates, or must be an intrinsic property of the primal heuristic. We utilize both strategies.

The subgradient method is a representative of the first type. Due to non-optimal step-sizes and update directions it usually demonstrates a "zig-zag" progress of the dual value that induces similar behavior in the assignment scores obtained by a primal heuristic.

In contrast, block-coordinate ascent methods are based on optimal updates and guarantee a monotone improvement of the dual value. As a consequence, the corresponding assignments computed by deterministic primal heuristics often lack diversity.

To address this issue, we suggest to use the *randomized greedy heuristic* described in Section 5.1 as a generic method to generate diverse proposals. It combines *diversity* due to randomization of the node selection order with *high quality* due to taking locally optimal labels. Another important advantage of this method is that it can profit from the dual optimization, and provides qualitatively better proposals as the dual optimization progresses. In particular, it returns a globally optimal assignment if the latter is unique and the dual bound is tight. We describe its use in connection with a dual BCA solver in Section 5.2.

5.1. Randomized greedy heuristic

Let $\mathcal{N}(u) := \{v \in \mathcal{V} \mid uv \in \mathcal{E}\}$ be the neighborhood of u, and $\mathcal{N}(\mathcal{V}') := \left(\bigcup_{u \in \mathcal{V}'} \mathcal{N}(u)\right) \setminus \mathcal{V}'$ the neighborhood of $\mathcal{V}' \subseteq \mathcal{V}$. Note, $\mathcal{N}(\emptyset) = \emptyset$. The *randomized greedy heuristic* is defined by Algorithm 1. In each step an unassigned node is randomly selected from the neighborhood of the assigned nodes, and a label is assigned to it such that the uniqueness constraints are satisfied and the sum of its unary cost and all pairwise costs on edges connecting it with assigned nodes minimized.

5.2. Dual solvers

Dual problem. The graph matching problem (1) can be represented in an ILP form similar to that of the auxiliary problem (2). We define binary variables $\mu_{u,s}$ and $\mu_{uv,st}$ analogously. The number of such variables is $M := \sum_{u \in \mathcal{V}} |\mathcal{L}_u^\#| + \sum_{uv \in \mathcal{E}} |\mathcal{L}_u^\#||\mathcal{L}_v^\#|$. By denoting the set of nodes containing a particular non-dummy label s as $\mathcal{V}(s) := \{u \in \mathcal{V} \mid s \in \mathcal{L}_u\}$, problem (1) can be written as:

$$\min_{\mu \in \{0,1\}^M} \sum_{\substack{u \in \mathcal{V} \\ s \in \mathcal{L}_u^\#}} \mu_{u,s} \theta_u(s) + \sum_{\substack{uv \in \mathcal{E} \\ (s,t) \in \mathcal{L}_u^\# \times \mathcal{L}_v^\#}} \mu_{uv,st} \theta_{uv}(s,t) \tag{9}$$

$$\text{s.t. } \forall\, uv \in \mathcal{E},\ t \in \mathcal{L}_v^\#\colon \sum_{s \in \mathcal{L}_u^\#} \mu_{uv,st} = \mu_{v,t} \tag{10}$$

$$\forall\, u \in \mathcal{V}\colon \sum\nolimits_{s \in \mathcal{L}_u^\#} \mu_{u,s} = 1 \tag{11}$$

$$\forall\, s \in \mathcal{L}\colon \sum\nolimits_{u \in \mathcal{V}(s)} \mu_{u,s} \leq 1 \tag{12}$$

By introducing $\xi_u^\lambda(s) := \frac{\theta_u(s)}{2} + \lambda_{u,s}$ and $\hat{\xi}_u^\lambda(s) := \frac{\theta_u(s)}{2} - \lambda_{u,s}$ for $u \in \mathcal{V}$, $s \in \mathcal{L}_u^\#$, and arbitrary $\lambda_{u,s} \in \mathbb{R}$, we can equivalently rewrite the objective in (9) as a sum of objectives of MRF and LAP subproblems denoted as E^{MRF} and E^{LAP}, respectively:

$$\underbrace{\sum_{\substack{u \in \mathcal{V} \\ s \in \mathcal{L}_u^\#}} \mu_{u,s} \xi_u^\lambda(s) + \sum_{\substack{uv \in \mathcal{E} \\ (s,t) \in \mathcal{L}_u^\# \times \mathcal{L}_v^\#}} \mu_{uv,st} \theta_{uv}(s,t)}_{=: E^{\text{MRF}}(\mu,\lambda)} + \underbrace{\sum_{\substack{u \in \mathcal{V} \\ s \in \mathcal{L}_u^\#}} \mu_{u,s} \hat{\xi}_u^\lambda(s)}_{=: E^{\text{LAP}}(\mu,\lambda)}.$$

Let Λ be the set of all binary vectors $\mu \in \{0,1\}^M$ satisfying constraints (10)-(11), and B the set of those satisfying (11)-(12). Then the sum

$$\min_{\mu \in \Lambda} E^{\text{MRF}}(\mu, \lambda) + \min_{\hat{\mu} \in B} E^{\text{LAP}}(\hat{\mu}, \lambda) \tag{13}$$

of independent minimizations of the MRF and LAP subproblems constitutes a lower bound for (9)-(12).

While the second term can be minimized efficiently, *e.g.* by the Hungarian method, the first term is an NP-hard problem by itself. By dualizing the constraints (10) one obtains its Lagrange dual lower bound, *c.f.* [43, Ch.6],

$$D(\phi, \lambda) := \sum_{u \in \mathcal{V}} \min_{s \in \mathcal{L}_u^\#} \xi_u^{\phi,\lambda}(s) + \sum_{uv \in \mathcal{E}} \min_{(s,t) \in \mathcal{L}_u^\# \times \mathcal{L}_v^\#} \theta_{uv}^\phi(s,t),$$

where

$$\xi_u^{\phi,\lambda}(s) := \xi_u^\lambda(s) - \sum_{v \in \mathcal{N}(u)} \phi_{u,v}(s), \tag{14}$$

$$\theta_{uv}^\phi(s,t) := \theta_{uv}(s,t) + \phi_{u,v}(s) + \phi_{v,u}(t),$$

are commonly referred to as *reparametrized costs*.

All in all, the dual problem of (9)-(12) consists in the lower bound maximization

$$\max_{\phi,\lambda} \left[D(\phi, \lambda) + \min_{\hat{\mu} \in B} E^{\text{LAP}}(\hat{\mu}, \lambda) \right]. \tag{15}$$

Dual block-coordinate ascent, §A2. Based on the ideas of [45, 56], and the recent progress in development of dual solvers for MRFs [48, 49], we implemented a *block-coordinate ascent* (BCA) solver that also allows to output assignment proposals.

Our solver monotonically improves the dual bound (15) by interleaving maximization w.r.t. ϕ and λ. Each step on ϕ consists of maximizing the bound w.r.t. the block of variables $(\phi_{u,v}(s), \phi_{v,u}(t))$, $(s,t) \in \mathcal{L}_u^\# \times \mathcal{L}_v^\#$ associated with one edge $uv \in \mathcal{E}$. A sequence of these steps addressing all edges is equivalent to one iteration of the MPLP++ algorithm of [48], that notably outperforms the MPLP algorithm [18] used by [56]. Each step on λ consists of maximizing the dual objective w.r.t. blocks $(\lambda_{u,s})$, $u \in \mathcal{V}(s)$, for each label $s \in \mathcal{L}$ similar to how it was done by [45].

For primal estimates we either use the exact solution of the LAP term $\min_{\hat{\mu} \in B} E^{\text{LAP}}(\hat{\mu}, \lambda)$ in (15) for the current value of λ, or run our randomized greedy Algorithm 1 on the graph matching problem with unary and pairwise costs $\xi_u^{\phi,\lambda}$ and θ_{uv}^{ϕ}, for current values of ϕ and λ. For the LAP heuristic we use Gurobi [21] as a solver. While using *e.g.* the Hungarian method for solving LAPs would be faster, we found that the greedy heuristics combined with fusion moves consistently outperforms its LAP counterpart in all our experiments in terms of run time and quality.

Subgradient method. We use the code of [47] as a representative of the dual subgradient methods. In its basic version denoted as *dd-ls0*, which stands for *dual decomposition with no local subproblems*, it optimizes the same bound as (15) with the difference that instead of the dual MRF-term $D(\phi, \lambda)$ it uses an equivalent *tree-decomposition* of the problem $\min_{\mu \in \Lambda} E^{\text{MRF}}(\mu, \lambda)$, see *e.g.* [43, Ch.9] for details. As the primal bound it uses a solution of the LAP problem $\min_{\hat{\mu} \in B} E^{\text{LAP}}(\hat{\mu}, \lambda)$ for the current value of λ.

Two other versions of the solver we use in our experiments, denoted as *dd-ls3* and *dd-ls4*, additionally consider *local subproblems* on subgraphs of $\mathcal{G}$ consisting of 3 or 4 neighboring nodes of the original graph, respectively. These modifications require more time per iteration, but optimize tighter bounds than (15). Additionally, these variants estimate primal solutions based on solutions of the local subproblems. We refer to [47] for further details.

Dual BCA algorithm complexity per iteration is $O(\sum_{uv \in \mathcal{E}} |\mathcal{L}_u^\#||\mathcal{L}_v^\#|)$, *e.g.* linear in the size of the problem. For a fully connected graph with $\mathcal{L}_u^\# = \mathcal{L} \cup \{\#\}$, $\forall u \in \mathcal{V}$, this turns to $O(|\mathcal{V}|^4)$. This is one degree of power less than the iteration complexity $O(|\mathcal{V}|^5)$ of the dual ascent algorithms [2, 22, 30] known in operations research.

6. Experiments and analysis

Experimental setup. We evaluate the performance of all tested algorithms by measuring their total run time and the obtained solution quality. Our experiments were run on a compute cluster equipped with AMD EPYC 7702 2.0 GHz processors and 512 GB main memory. For a fair comparison we used efficient implementations of all discussed algorithms, and report the minimal runtime of 5 independently scheduled trials.

Datasets, §A3. Our experimental evaluation was conducted on 8 datasets with overall 316 problem instances from computer vision and bio-imaging described in detail below. To demonstrate the scalability of our approach, along with the standard small-scale datasets for computer vision `hotel`, `house`, `car`, `motor` and `opengm` with $|\mathcal{V}| \leq 52$, we consider the middle-sized ones `flow`, $|\mathcal{V}| \leq 126$, and the large-scaled `worms` and `pairs` datasets with $|\mathcal{V}| \leq 565$. The latter are, to our knowledge, the *largest graph matching problem instances ever considered in computer vision*.

Wide baseline matching (`hotel`, `house`) is based on a series of images of the same object from different view angles. We use the same image pairs, landmarks, and cost structure as in [47] based on the work by [11].

Keypoint matching (`car`, `motor`) contains *car* and *motor*bike instances from the PASCAL VOC 2007 Challenge [16] with the features and costs from [37]. We preprocessed the models by removing edges with zero cost, thereby reducing graph density substantially.

Large displacement flow (`flow`) was introduced by [5] for key point matching on scenes with large displacement flow. We use the keypoints and costs from [46].

OpenGM matching (`opengm`) is a set of non-rigid point matching problems by [33], now part of the *OpenGM* Benchmark [28].

Worm atlas matching (`worms`) has the goal to annotate nuclei of *C. elegans*, a famous model organism used in developmental biology, by assigning nuclei names from a precomputed atlas of the organism. We use the models from [26, 27].

Worm-to-worm matching (`pairs`), see Fig. 1 for illustration, in contrast to the `worms` dataset, directly matches the cell nuclei of individual *C. elegans* worms to each other. This alleviates the need to precompute an atlas based on manual annotations. Unary and pairwise costs of the respective graph matching problems are derived by averaging the nucleus-(pair-)specific covariance matrices captured by the atlas over all nuclei. This coarsens the model to a level achievable without manual annotations. For our experiments we randomly chose 16 instances out of the $30 \cdot 29 = 870$ non-trivial pairs of worms based on the same data as `worms`.

Algorithms. As proposal generators we evaluate the three dual subgradient-based algorithms `dd-ls0`, `dd-ls3`, `dd-ls4` and our BCA solver `bca` described in Section 5.2. The latter is used with either the primal heuristics based on the LAP solution or on the greedy Algorithm 1, denoted as `bca-lap` and `bca-greedy`, respectively. We also use the `greedy` Algorithm 1 as a standalone baseline.

As proposal fusing methods we evaluate *Gurobi* [21] as

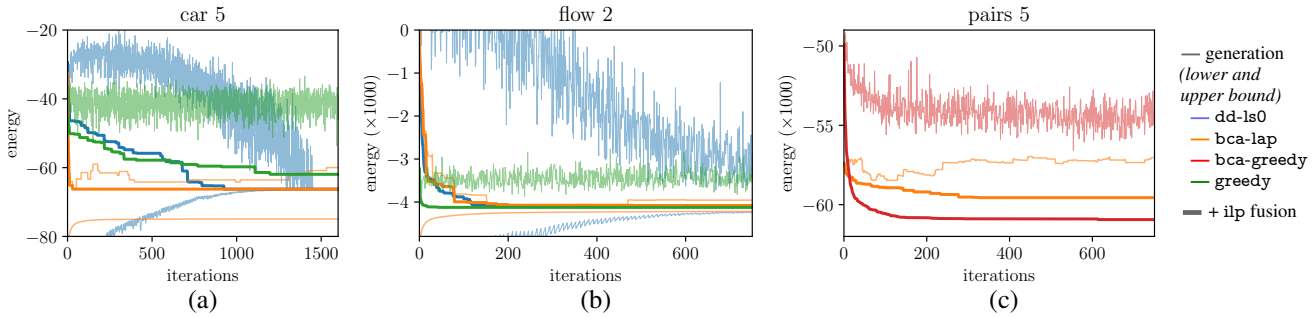

Figure 2. **(a-b) Influence of fusion.** The plots show the energy of assignments generated by `dd-ls0` (blue), `bca-lap` (orange) and `greedy` (green) algorithms together with the dual bound where applicable. The thick line in matching color shows for each algorithm the achieved energy when using an `ilp` solver for fusion on top. Notably, fusion achieves very good quality with much less iterations. For some datasets, even greedily generated proposals suffice to obtain (almost) optimal solutions when fused. **(c) LAP vs. greedy heuristic.** The plot shows the quality of proposals generated by `bca-lap` (orange) and `bca-greedy` (red) for an exemplary instance of `pairs`. The fused solutions on top of these generators are shown in the same color as a thick line. Fusion moves applied to `bca-greedy` yield significantly better results than when applied to `bca-lap`, even though the `bca-greedy` proposals are visibly worse than those of `bca-lap`.

an exact ILP solver for the auxiliary problem (5) denoted as `ilp`, the *trust region*-based method of [20] denoted as `lsatr`, as well as different *QPBO* variants denoted as `qpbo-XX`. For the description of these variants see [41], and the corresponding source code.

Additionally, in Section 6.2 we compare our method to a number of state-of-the-art algorithms.

6.1. Influence of different components

Influence of fusion on solution quality, Fig. 2 (a-b), §A4,A6. For our first experiment we ran three methods to generate proposals: `bca-lap`, `dd-ls0` and `greedy`. The algorithms `bca-lap` and `dd-ls0` represent standard dual techniques with a LAP-based primal heuristic, and `greedy` constitutes a baseline. We fuse the generated proposals with the `ilp` method.

Fig. 2 (a-b) shows the results for these three proposal generators before and after fusion for two exemplary instances from the considered datasets. Although the energy of `dd-ls0` proposals is far from optimal, their fusion immediately leads to much better results.

Although the energy of `bca-lap` proposals is often much lower than that of `dd-ls0`, the energy of the fused solutions is not necessarily lower. We explain this by lacking diversity in the `bca-lap` proposals. This explanation is confirmed by the performance of the fused `greedy` proposals. Even though the proposal quality for `greedy` is very dataset dependent, in combination with fusion it often leads to good results. While they are still worse than those obtained by dual methods in Fig. 2 (a), they can be very competitive as seen in Fig. 2 (b).

This experiment clearly shows that the overall solution quality can be substantially improved by fusing generated proposals. Since fusion provides already very good results with relatively few proposals, it promises a significant speed-up compared to fusion-free methods as this can significantly reduce the number of necessary iterations to achieve a certain solution quality.

Exact vs. approximate fusion, §A4,A6. To estimate the speed-up in runtime obtained by fusion we compared the exact `ilp` solver with the approximate `qpbo-i`, `qpbo-p`, `qpbo-pi` and `lsatr` solvers. Among them we found `qpbo-i` to be best performing in terms of consistent quality and speed. Despite a worst-case computational complexity of $O(|\mathcal{V}||\mathcal{E}|)$, `qpbo-i` was 10–50 times faster than the dual updates.

LAP vs. greedy heuristic for BCA, Fig. 2 (c). As noted above, fusion moves only marginally improve performance of `bca-lap` because of the low diversity of proposals generated by this method. This is easy to see if we compare it to `bca-greedy`, where the LAP heuristic is replaced by the greedy Algorithm 1. Indeed, for all datasets we observed that fusion of `bca-greedy` proposals produced results at least as good as fusion of `bca-lap` proposals, even when the `bca-greedy` proposals themselves had higher energies than those of `bca-lap`.

Effect of relaxation tightening, §A4,A6. In general, tighter relaxations provide better bounds in the long run. However, one pays with a higher runtime per iteration for this. Interestingly, due to fusion all three subgradient methods, `dd-ls0`, `dd-ls3` and `dd-ls4`, get close or even attain the global optimum in most of the datasets. Therefore, due to lower iteration time the method `dd-ls0` corresponding to the weakest relaxation converges first, and, hence, is preferable. Since fusion notably improves the energy of the found solutions, we claim that without fusion one would have to use tighter relaxations to attain the same result quality.

Summary. Table 1 summarizes our performance study. We include `dd-ls0` and `bca-greedy` as the best representatives of their algorithm classes. We observed `qpbo-i`-based fusion to achieve solutions with the same or lower energy as the underlying proposal generator, while also on average converging faster than the proposal generator without fusion. In other words, *it is always sensible to use fusion moves*.

Table 1. **Summary of fusion moves performance.** Averaged energy of the best proposals for each dataset (*best gen.*), and time needed on average to generate it (t_{gen}) are shown. Furthermore, it shows for the `qpbo-i` fusion algorithm how long it took on average to beat the `dd-ls0` or `bca-greedy` proposals when fusing (t_{beat}), the average energy of the best proposal generated by fusion (*best fused*), and the average time after which this was obtained (t_{fuse}). All times are in seconds. The small numbers in front of the energies represent the number of instances solved to optimality by the respective method. Methods with fusion attain better energy values and are faster on average.

dataset (number of instances)	`dd-ls0`			+ `qpbo-i`				`bca-greedy`			+ `qpbo-i`			
		best gen.	$t_{\text{gen.}}$	t_{beat}		*best fused*	t_{fuse}		*best gen.*	$t_{\text{gen.}}$	t_{beat}		*best fused*	t_{fuse}
`hotel` (105)	105	**-4293.00**	0.07	0.04	105	**-4293.00**	0.04	103	-4291.21	0.81	0.03	105	**-4293.00**	**0.03**
`house` (105)	105	**-3778.13**	**0.02**	0.02	105	**-3778.13**	**0.02**	105	**-3778.13**	0.94	0.09	105	**-3778.13**	0.09
`car` (30)	29	-69.34	**0.17**	0.17	29	**-69.37**	**0.17**	27	-69.19	1.28	0.12	29	**-69.37**	**0.17**
`motor` (20)	20	**-62.95**	0.06	0.03	20	**-62.95**	0.03	19	-62.93	0.80	0.02	20	**-62.95**	**0.02**
`flow` (6)	3	-2818.83	2.79	1.12	5	-2835.84	1.91	4	-2837.82	9.65	0.65	5	**-2840.00**	**0.66**
`opengm` (4)	3	31.42	0.94	0.77	3	26.18	0.87	4	**21.22**	1.29	0.04	4	**21.22**	**0.04**
`worms` (30)	0	-43824.08	492.00	41.57	1	-48347.09	428.79	9	-48454.89	54.53	15.72	27	**-48465.28**	**17.77**
`pairs` (16)	0	-63453.77	348.33	7.87	0	-65936.89	**343.49**	0	-62696.28	783.83	1.96	0	**-66005.55**	953.09

Table 2. **Comparison table.** *our* denotes the proposed `bca-greedy+qpbo-i` method. For each method we state *opt*/*t* denoting the number of optimally solved instances together with the average time in seconds to attain the optimal solutions ("–" if no instance was solved to optimality), the average solution energy E (lower is better), and the average solution accuracy *acc* in percent. The sign "–" in the E or *acc* column means that at least for one problem instance the respective method yielded no assignment. For datasets indicated by † no ground truth is known and, therefore, no accuracy reported. The best accuracy is not highlighted in bold, since algorithms do not have access to the ground truth and hence do not maximize accuracy explicitly. The relatively low accuracy of 86% attained for `worms` is explained by model misspecification. The original work [27] reports 83% accuracy achieved by `dd-ls4` without time restrictions. Since *our* method is randomized, we report ranges where appropriate.

dataset (number of instances)	time budget	`dd-ls0` [47]			`dd-ls3` [47]			HBP [56]			AMP [46]			AMP-tight [46]			*our*		
		opt/*t*	E	acc	opt/*t*	E	acc	opt/*t*	E	acc	opt/*t*	E	acc	opt/*t*	E	acc	opt/*t*	E	acc
`hotel` (105)	1 s	**105/0.01**	**-4293**	100	**105**/0.04	**-4293**	100	102/0.11	—	—	98/0.11	-4280	99	104/0.13	-4292	100	100–**105/0.01**	**-4291**±2	100
`house` (105)	1 s	**105**/0.03	**-3778**	100	**105**/0.13	**-3778**	100	104/0.20	—	—	102/0.30	-3773	100	**105**/0.19	**-3778**	100	**105/0.01**	**-3778**	100
`car` (30)	1 s	**28**/0.13	**-69**	92	14/0.55	-57	74	23/0.12	—	—	24/0.11	**-69**	92	26/0.12	**-69**	91	27–**28/0.01**	**-69**	91±1
`motor` (20)	1 s	**20**/0.07	**-63**	97	13/0.25	-57	87	19/0.14	—	—	18/0.04	**-63**	96	17/0.08	**-63**	97	19–**20/0.01**	**-63**	98±1
`opengm`† (4)	1 s	1/0.81	-151		0/—	-118		0/—	—		0/—	-57		0/—	-150		**4/0.004**	**-171**	
	10 s	3/1.08	-161		**4**/2.61	**-171**		2/2.71	-164		0/—	-57		0/—	-150		**4/0.004**	**-171**	
`flow`† (6)	1 s	2/0.79	-2089		1/0.90	-1962		0/—	—		1/0.13	-2628		3/0.16	—		4–**5/0.06**	**-2837**±1	
	10 s	3/1.66	-2819		**5**/2.81	-2821		0/—	—		1/0.13	-2674		3/0.16	-2838		**5/0.06**	**-2838**	
`worms` (30)	1 s	0/—	60597	26	0/—	64158	23	0/—	—	—	0/—	—	—	0/—	—	—	10–**22/0.23**	**-48461**±3	86
	10 s	0/—	50578	24	0/—	49610	24	0/—	—	—	1/6.45	-48389	86	0/—	—	—	16–**25/0.39**	**-48464**±1	86
`pairs`† (16)	10 s	0/—	-61482		0/—	-61638		0/—	—		0/—	-64130		0/—	—		0/—	**-65259**±133	
	30 s	0/—	-61482		0/—	-61638		0/—	—		0/—	-64319		0/—	—		0/—	**-65594**±120	

Although `bca-greedy+qpbo-i` outperforms `dd-ls0+qpbo-i`, the latter one is very competitive and notably outperforms its basic variant `dd-ls0`.

6.2. Comparisons and conclusions

Table 2 compares our `bca-greedy+qpbo-i` method to several state-of-the-art techniques, see also §A5. We omitted a detailed comparison to [11, 13, 19, 35, 36, 58], since the accuracy they attain is notably lower than that of the dual methods [47, 56] as is shown in the latter papers. This conclusion is also supported by our own experiments. The more recent works [25, 54] unfortunately compare only to the weak baselines above, and do not make their code publicly available. Therefore, we restrict our comparison to the duality-based techniques, as they have been shown to perform best on the computer vision datasets. Note that the `AMP` method [46] recently pushed up the state-of-the-art within a deep graph matching approach [40].

We distinguish between *easy* problem instances (`hotel`, `house`, `motor`, `car`), *mid-difficult* problems (`opengm`, `flow`, `worms`) and *difficult* ones (`pairs`). For the easy datasets we provide results in 1 second, for mid-difficult in 1 and 10 and for difficult in 10 and 30 seconds respectively, see also §A5 for other run-time settings and a comparison of memory consumption.

Conclusions. As Table 2 shows our method notably outperforms its competitors in terms of speed and accuracy. Since it practically solves all easy and mid-difficult problem instances in significantly less than a second, it can be efficiently used in deep graph matching pipelines. The easy datasets `hotel`, `house`, `motor`, `car` are largely solved by all state-of-the-art methods and cannot be used to show progress of the solvers anymore.

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(For reproducibilty and easier comparision of work in the future, this supplement contains a record of all experimental results, totaling over 100 pages.)

Fusion Moves for Graph Matching – Supplementary Material

A1. Proof of Proposition 1

Proposition 1 (as stated in the main paper)**.** *Let x' be a feasible, and x'' a possibly infeasible assignment for the graph matching problem (1). Let m be the number of dummy, and n the number of different non-dummy labels in x''. Then the auxiliary problem (4) has at most $2^m \left(\frac{|\mathcal{V}|}{n} + 1\right)^n$ feasible solutions.*

Proof. Let $s_1, \dots, s_n \in \mathcal{L}$ be the n distinct non-dummy labels occurring in x'', and let $m_1, \dots, m_n \in \mathbb{N}$ be the corresponding number of occurences. Obviously,

$$m_i \geq 1 \qquad \text{for all } i \in \{1, \dots, n\}, \tag{A1}$$

$$\sum_{i=1}^{n} m_i \leq |\mathcal{V}|. \tag{A2}$$

The number of feasible solutions of the auxiliary problem (4) is bounded by the maximum number of choices possible between x' and x'', since any solution $\hat{x}$ of (4) satisfies $\hat{x}_u = x'_u$ or $\hat{x}_u = x''_u$ for all $u \in \mathcal{V}$ by definition.

We can now observe the following:

- For each node $u \in \mathcal{V}$ where x'' is assigned the dummy label, *i.e.* $x''_u = \#$, we have at most 2 possible choices. We can either choose x'_u, or $\#$.
- Consider fixed $i \in \{1, \dots, n\}$. For the set of all nodes that share label s_i in x'', we have at most $m_i + 1$ choices. We can either choose s_i for exactly one of these m_i nodes or for none, and stay with the label from x' for the remaining of these nodes. s_i cannot be chosen for more than one of these m_i nodes, as this would guarantee the resulting assignment to be infeasible.

Hence, by basic combinatorics the number of feasible solutions of the auxiliary problem is at most

$$2^m \cdot \prod_{i=1}^{n} (m_i + 1). \tag{A3}$$

By the inequality of arithmetic and geometric means, applicable due to (A1), together with (A2), we obtain

$$2^m \cdot \prod_{i=1}^{n} (m_i + 1) \leq 2^m \cdot \left(\frac{1}{n} \sum_{i=1}^{n} (m_i + 1) \right)^n = 2^m \cdot \left(\frac{1}{n} \sum_{i=1}^{n} m_i + 1 \right)^n \tag{A4}$$

$$\leq 2^m \cdot \left(\frac{|\mathcal{V}|}{n} + 1 \right)^n, \tag{A5}$$

which proves Proposition 1. □

A2. Dual algorithm description

Consider the dual problem (15):

$$\max_{\phi,\lambda} \left[D(\phi,\lambda) + \min_{\hat{\mu}\in B} E^{\text{LAP}}(\hat{\mu},\lambda) \right] . \tag{A6}$$

To avoid the necessity to minimize E^{LAP} on each iteration we consider an equivalent dual

$$\max_{\phi,\lambda} \left[D(\phi,\lambda) + \min_{\substack{\hat{\mu}\in\{0,1\}^I \\ \forall s\in\mathcal{L}:\ \sum_{u\in\mathcal{V}(s)} \hat{\mu}_{u,s}\le 1}} \sum_{\substack{u\in\mathcal{V} \\ s\in\mathcal{L}_u^{\#}}} \hat{\mu}_{u,s}\hat{\xi}_u^{\lambda}(s) \right] , \tag{A7}$$

where $I = \sum_{s\in\mathcal{L}} |\mathcal{V}(s)|$, and the second term contains only the *node uniqueness* constraints (12) and does not contain the *label uniqueness* constraints (11), as the latter are already included in the first term $D(\phi,\lambda)$. We also fix the values $\lambda_{u,\#}$ to $\theta_u(\#)/2$ implying that $\hat{\xi}_u^{\lambda}(\#) = 0$, as the corresponding variable $\hat{\mu}_{u,\#}$ is not included in the uniqueness constraints in the second term of (A7).

Note that the inequalities in the second term of (A7) are independent for different values of $s \in \mathcal{L}$, and, therefore, the corresponding minimization can be solved in closed form. (A7) turns into

$$\max_{\phi,\lambda} \left[D(\phi,\lambda) + \sum_{s\in\mathcal{L}_u} \min_{u\in\mathcal{V}(s)} \{\hat{\xi}_u^{\lambda}(s), 0\} \right] . \tag{A8}$$

For the sake of notation, similarly to the dummy label, we introduce a *dummy node* $\#$ and introduce the respective notations $\mathcal{V}^{\#}(s) := \mathcal{V}(s) \cup \{\#\}$ and $\hat{\xi}_{\#}^{\lambda}(s) := 0, \forall s \in \mathcal{L}$. This turns the problem (A8) into

$$\max_{\phi,\lambda} \left[D(\phi,\lambda) + \sum_{s\in\mathcal{L}_u} \min_{u\in\mathcal{V}^{\#}(s)} \hat{\xi}_u^{\lambda}(s) \right] . \tag{A9}$$

We maximize the objective of (A9) by interleaving ϕ- and λ-steps, defined below. First we perform ϕ-steps for all edges $uv \in \mathcal{E}$ and then λ-steps for all $u \in \mathcal{V}$ and all $s \in \mathcal{L}$.

1. A ϕ-**step** maximizes $D(\phi,\lambda)$ w.r.t. $(\phi_{u,v}(s), \phi_{v,u}(l) \colon s \in \mathcal{L}_u^{\#}, l \in \mathcal{L}_v^{\#})$ for each $uv \in \mathcal{E}$. We denote the vector ϕ prior to the maximization as ϕ^t . The vector λ is fixed. Each maximization consists of two blocks of operations:

   - *Accumulation*. The unary costs from the nodes u, v are pushed to the pairwise costs of the edge uv:

   $$\begin{aligned} &\forall s \in \mathcal{L}_u^{\#}\,, \quad \phi_{u,v}^{t+1}(s) := \phi_{u,v}^{t}(s) + \xi_u^{\phi^t,\lambda}(s)\,, \\ &\forall l \in \mathcal{L}_v^{\#}\,, \quad \phi_{v,u}^{t+1}(l) := \phi_{v,u}^{t}(l) + \xi_v^{\phi^t,\lambda}(l)\,. \end{aligned} \tag{A10}$$

   - *Redistribution*. The pairwise costs from the edge uv are redistributed to the unary costs of the incident nodes u and v:

   $$\begin{aligned} &\forall uv \in \mathcal{E}\colon \\ &\qquad \forall s \in \mathcal{L}_u^{\#}\,, \quad \phi_{u,v}^{t+2}(s) := \phi_{u,v}^{t+1}(s) - \frac{1}{2}\min_{l\in\mathcal{L}_v^{\#}} \theta_{uv}^{\phi^{t+1}}(s,l)\,, \\ &\qquad \forall l \in \mathcal{L}_v^{\#}\,, \quad \phi_{v,u}^{t+2}(l) := -\min_{s\in\mathcal{L}_u^{\#}} \left(\theta_{uv}(s,l) + \phi_{u,v}^{t+2}(s)\right)\,, \\ &\qquad \forall s \in \mathcal{L}_u^{\#}\,, \quad \phi_{u,v}^{t+3}(s) := \phi_{u,v}^{t+2}(s) - \min_{l\in\mathcal{L}_v^{\#}} \theta_{uv}^{\phi^{t+2}}(s,l)\,. \end{aligned} \tag{A11}$$

Operations (A10)-(A11) are the updates of the MPLP++ algorithm for maximization of the MRF dual D, see [48] for a theoretical substantiation, empirical evaluation, proof of convergence and the BCA property.

2. A λ**-step** aims to increase the value of the dual objective by updating first the block of variables $(\lambda_{u,s} \colon s \in \mathcal{L}_u^{\#})$ for each $u \in \mathcal{V}$, and then the block $(\lambda_{u,s} \colon u \in \mathcal{V}(s))$ for each $s \in \mathcal{L}$. The vector ϕ is fixed. We denote the vector λ prior to the operations as λ^t .

   - Consider the minimal label s^* and the second minimal label s' in a node u:

$$s^* \in \operatorname*{arg\,min}_{s \in \mathcal{L}_u^{\#}} \xi_u^{\phi,\lambda^t}(s)\,; \quad s' \in \operatorname*{arg\,min}_{s \in \mathcal{L}_u^{\#} \setminus \{s^*\}} \xi_u^{\phi,\lambda^t}(s)\,. \tag{A12}$$

   The first update step consists in setting the values of $\xi_u^{\phi,\lambda^{t+1}}(s)$ for all $s \in \mathcal{L}_u$ to $\Delta_u := \frac{\xi_u^{\phi,\lambda^t}(s') - \xi_u^{\phi,\lambda^t}(s^*)}{2}$:

$$\forall s \in \mathcal{L}_u \colon \quad \lambda_{u,s}^{t+1} = \lambda_{u,s}^t - \xi_u^{\phi,\lambda^t}(s) + \Delta_u\,. \tag{A13}$$

   - Symmetrically for each $s \in \mathcal{L}$ let

$$u^* \in \operatorname*{arg\,min}_{u \in \mathcal{V}^{\#}(s)} \hat{\xi}_u^{\lambda^{t+1}}(s)\,; \quad u' \in \operatorname*{arg\,min}_{u \in \mathcal{V}^{\#}(s) \setminus \{u^*\}} \hat{\xi}_u^{\lambda^{t+1}}(s)\,. \tag{A14}$$

   The second update step sets the values of $\hat{\xi}_u^{\lambda^{t+2}}(s)$ for all $u \in \mathcal{V}(s)$ to $\hat{\Delta}_s := \frac{\hat{\xi}_{u'}^{\lambda^{t+1}}(s) - \hat{\xi}_{u^*}^{\lambda^{t+1}}(s)}{2}$:

$$\forall u \in \mathcal{V}(s) \colon \quad \lambda_{u,s}^{t+2} = \lambda_{u,s}^{t+1} + \hat{\xi}_u^{\lambda^{t+1}}(s) - \hat{\Delta}_s\,. \tag{A15}$$

   Each λ-step constitutes an *admissible message* [45], and, therefore, guarantees a monotonic (non-decreasing) improvement of the dual objective, see [45, 46] for details.

We execute the greedy Algorithm 1 between the ϕ- and λ-steps.

A3. Details of used datasets

Our experimental evaluation was conducted on 8 datasets from computer vision and bio-imaging, whose characteristics are listed in Table A1, and which are described again in detail below, see also Section 6. To demonstrate the scalability of our approach, along with the standard small-scale datasets for computer vision `hotel`, `house`, `car`, `motor` and `opengm` with $|\mathcal{V}| \leq 52$, we consider the middle-sized ones `flow`, $|\mathcal{V}| \leq 126$, and the large-scaled `worms` and `pairs` datasets with $|\mathcal{V}| \leq 565$. The latter are, to our knowledge, the largest graph matching problem instances ever investigated in the literature.

We provide all dataset instances used in the paper on our project website: https://vislearn.github.io/libmpopt/iccv2021/

Wide baseline matching (`hotel`, `house`) is based on a series of images of the same object from different view angles. We use the same image pairs, landmarks, and cost structure as in [47] based on the work by [11].

Keypoint matching (`car`, `motor`) contains *car* and *motor*bike instances from the PASCAL VOC 2007 Challenge [16] with the features and costs from [37]. We preprocessed the models by removing edges with zero cost, thereby reducing graph density substantially.

Large displacement flow (`flow`) was introduced by [5] for key point matching on scenes with large displacement flow. We use the keypoints and costs from [46].

OpenGM matching (`opengm`) is a set of non-rigid point matching problems by [33], now part of the *OpenGM* Benchmark [28].

Worm atlas matching (`worms`) has the goal to annotate nuclei of *C. elegans*, a famous model organism used in developmental biology, by assigning nuclei names from a precomputed atlas of the organism. We use the models from [26, 27].

Worm-to-worm matching (`pairs`), in contrast to the `worms` dataset, directly matches the cell nuclei of individual *C. elegans* worms to each other. This alleviates the need to precompute an atlas based on manual annotations. Unary and pairwise costs of the respective graph matching problems are derived by averaging the nucleus-(pair-)specific covariance matrices captured by the atlas over all nuclei. This coarsens the model to a level achievable without manual annotations. For our experiments we randomly chose 16 instances out of the $30 \cdot 29 = 870$ non-trivial pairs of worms based on the same data as `worms`.

The `pairs` dataset was constructed by ourselves on the basis of the `worms` data [26, 27]. The files are available for download on our project website: https://vislearn.github.io/libmpopt/iccv2021/

Table A1. **Characteristics of datasets.** For all datasets used for evaluation we state number of instances (*inst.*), number of nodes (n), number of labels ($|\mathcal{L}|$), and graph density in percent (*dens.*).

	inst.	n	$\lvert\mathcal{L}\rvert$	*dens. (%)*
hotel	105	30	$= n$	100
house	105	30	$= n$	100
car[†]	30	19–49	$= n$	11–27
motor[†]	20	15–52	$= n$	10–32
flow	6	48–126	$\approx n$	45–98
opengm	4	19 / 20	$= n$	66 / 100
worms	30	558	$\approx 2.4\,n$	≈ 1.5
pairs	16	511–565	$\approx n$	≈ 20

[†] Zero edges were removed. Prior to this, graph density was 100 %.

Table A2. **Exact vs. approximate fusion.** The table shows the averaged energy of the best proposals generated by dd-ls0 for each dataset (*best gen.*), and time in seconds needed on average to generate it (t_{gen}). Furthermore, it states for ilp and qpbo-i fusion algorithms how long it took on average to beat the dd-ls0 proposal when fusing (t_{beat}), and the average energy of the best proposal generated by the respective fusion method (*best fused*). Notably, the best fused proposals obtained with qpbo-i do not differ significantly from those obtained with ilp, while the time it takes qpbo-i to surpass the dd-ls0 proposal quality is significantly lower than for ilp fusion. For each dataset, the best primal and best time are highlighted in bold.

	dd-ls0		+ ilp		+ qpbo-i	
	best gen.	t_{gen}	t_{beat}	*best fused*	t_{beat}	*best fused*
hotel	**-4293.00**	0.07	0.09	**-4293.00**	**0.04**	**-4293.00**
house	**-3778.13**	**0.02**	0.09	**-3778.13**	**0.02**	**-3778.13**
car	-69.34	**0.17**	0.81	-69.35	**0.17**	**-69.37**
motor	**-62.95**	0.06	0.23	**-62.95**	**0.03**	**-62.95**
flow	-2818.83	2.79	4.83	**-2835.84**	**1.12**	**-2835.84**
opengm	31.42	0.94	28.02	**24.61**	**0.77**	26.18
worms	-43824.08	492.00	177.65	**-48349.36**	**41.57**	-48347.09
pairs	-63453.77	348.33	20.37	**-65975.40**	**7.87**	-65936.89

Table A3. **Maximum peak memory consumption per dataset.** The numbers indicate the maximum resident set size of the process. The values in the *our* column are cleaned to only count the problem instance data once (otherwise it would be counted twice – once for the Python interpreter memory and once in the native C++ library).

dataset	dd-ls0	dd-ls3	HBP	AMP	AMP-tight	*our*
hotel	9 MB	16 MB	777 MB	10 MB	259 MB	40 MB
house	9 MB	16 MB	714 MB	10 MB	309 MB	40 MB
car	11 MB	21 MB	1262 MB	9 MB	183 MB	40 MB
motor	12 MB	24 MB	670 MB	10 MB	155 MB	40 MB
opengm	13 MB	15 MB	851 MB	9 MB	15 MB	38 MB
flow	28 MB	40 MB	—	26 MB	161 MB	60 MB
worms	270 MB	372 MB	—	78 MB	509 MB	58 MB
pairs	257 MB	351 MB	—	217 MB	1494 MB	270 MB

A4. Additional material for performance study

Exact vs. approximate fusion, Table A2. Among all evaluated approximate fusion methods we found qpbo-i to be best performing in terms of consistent quality and speed. Table A2 shows the averaged results for each dataset for exact fusion with the ilp method vs. approximate fusion with the qpbo-i method when applied on top of the dd-ls0 proposal generation method. More detailed results for all other fusion methods can be found in §A6. Conclusively, Table A2 shows that qpbo-i produces results significantly faster than ilp, while the achieved quality is on par.

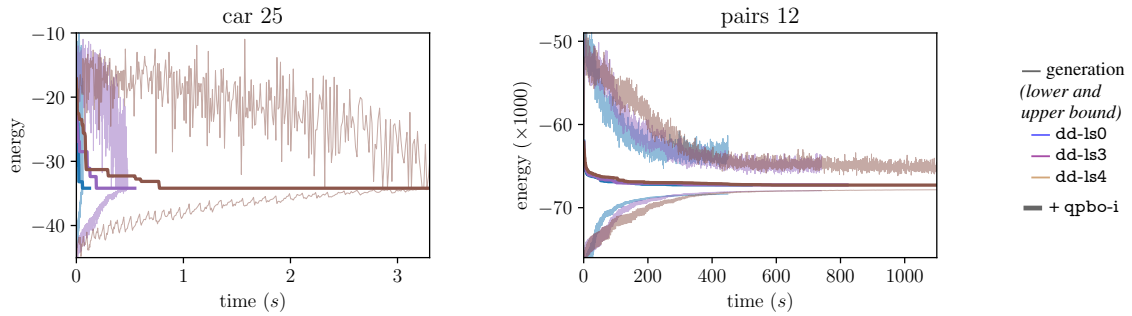


Figure A1. **Effect of relaxation tightening.** The plots show the obtained dual and primal bound together with the `qpbo-i` fused solutions for `dd-ls0` (blue), `dd-ls3` (violet), and `dd-ls4` (brown) over time for two instances from `car` and `pairs`. Unsurprisingly, the tighter relaxations take longer, but converge to better bounds for more difficult instances. For the `car` instance on the left even the basic relaxation is tight, while for the `pairs` instance on the right better bounds can be observed for the tighter relaxations. For all three generation variants, fusion added on top gives the same, or, if at all possible, even better bounds much faster.

Effect of relaxation tightening, Figure A1. In general, tighter relaxations provide better bounds in the long run. However, for that one pays with a higher runtime per iteration. This can be clearly seen in Figure A1, where the performance of `dd-ls0`, `dd-ls3` and `dd-ls4` solvers is compared. Interestingly, due to fusion all three methods attain the global optimum for most datasets. Therefore, due to lower iteration time the method `dd-ls0` corresponding to the weakest relaxation converges first, and, hence, is preferable. Only in rare cases, mainly in the `pairs` dataset, the optimum is not reached and methods `dd-ls3` and `dd-ls4` opting for tighter relaxations overtake `dd-ls0`. However, these better results come at the price of significantly higher runtimes. Since fusion notably improves the energy of the found solutions, we claim that without it one would have to use tighter relaxations to attain the same result quality.

A5. Details of the comparison study

Comparision of peak memory consumption, Table A3. The memory usages of the methods used in our comparison study are comparable, see Table A3. Our implementation uses Python bindings to conveniently construct a C++ solver instance, hence our memory consumption is larger by a constant. Note that we delete the problem instance data from the Python interpreter and run the garbage collector before counting memory consumption for *our* – otherwise model data would be accounted twice, once in the Python interpreter and once in the C++ native library (only the C++ solver is necessary for optimizing the problem). Other methods were benchmarked without modifications as to the best of our knowledge they directly construct the model only once in the solver's memory. The auxiliary fusion problems are tiny when compared to the initial graph matching problems, and their memory consumption is essentially negligible. Overall, the fusion method can be implemented without sacrifices in memory consumption.

Extended comparison study, Table A4. It can be seen that our method remains competitive also in longer runs of 300 seconds. This is the case even when compared to `dd-ls3` and `AMP-tight` which are optimizing tighter relaxations than ours.

Computation of `worms` accuracies. To make results comparable, we computed accuracies for `worms` in the same way as done in [27, 39]. Out of 558 nuclei only 357 were faithfully segmented and annotated in most instances. In some instances ground truth is not available in the dataset for all of them. To measure accuracy we count the fraction of correctly matched nuclei out of the total 357 that are part of the annotated atlas. Due to incomplete annotations, 100% accuracy is for most instances impossible to obtain.

Run-time settings for the comparison study. Below we provide a description of the run-time settings of all algorithms that have been used in the comparison study. We also specifiy the source where we obtained the algorithms if applicable.

- `bca-greedy+qpbo-i`: See https://vislearn.github.io/libmpopt/iccv2021/.

  The command used for the benchmark was:

  ```
  qap_dd --max-batches 50000 --batch-size 1 --greedy-generations 1 input.dd
  ```

  Note that the command line tool allows to switch to use Gurobi for solving the fusion move problems. The suffix `_dd` selects the `*.dd` file format parser. The format was established in [47].

Table A4. **Comparison study for extended run-time settings.** The notation is the same as in Table 2. Our method remains competitive also in long-term 300 second runs, even when compared to dd-ls3 and AMP-tight which are optimizing tighter relaxations than ours.

dataset	t_{budget}	dd-ls0 [47]			dd-ls3 [47]			HBP [56]			AMP [46]			AMP-tight [46]			*our*		
		opt / t	E	acc	opt / t	E	acc	opt / t	E	acc	opt / t	E	acc	opt / t	E	acc	opt / t	E	acc
hotel (105)	1 s	**105/0.01**	**-4293**	100	**105**/0.04	**-4293**	100	102/0.11	—	—	98/0.11	-4280	99	104/0.13	-4292	100	100–**105/0.01**	**-4291**±2	100
	10 s	**105/0.01**	**-4293**	100	**105**/0.04	**-4293**	100	104/0.14	**-4293**	100	99/0.13	-4281	99	**105**/0.14	**-4293**	100	**105/0.01**	**-4293**	100
	30 s	**105/0.01**	**-4293**	100	**105**/0.04	**-4293**	100	104/0.14	**-4293**	100	99/0.13	-4281	99	**105**/0.14	**-4293**	100	**105/0.01**	**-4293**	100
	180 s	**105/0.01**	**-4293**	100	**105**/0.04	**-4293**	100	104/0.14	**-4293**	100	99/0.13	-4281	99	**105**/0.14	**-4293**	100	**105/0.01**	**-4293**	100
	300 s	**105/0.01**	**-4293**	100	**105**/0.04	**-4293**	100	104/0.14	**-4293**	100	99/0.13	-4281	99	**105**/0.14	**-4293**	100	**105/0.01**	**-4293**	100
house (105)	1 s	**105**/0.03	**-3778**	100	**105**/0.13	**-3778**	100	104/0.20	—	—	102/0.30	-3773	100	**105**/0.19	**-3778**	100	**105/0.01**	**-3778**	100
	10 s	**105**/0.03	**-3778**	100	**105**/0.13	**-3778**	100	**105**/0.22	**-3778**	100	104/0.31	-3777	100	**105**/0.19	**-3778**	100	**105/0.01**	**-3778**	100
	30 s	**105**/0.03	**-3778**	100	**105**/0.13	**-3778**	100	**105**/0.22	**-3778**	100	104/0.31	-3777	100	**105**/0.19	**-3778**	100	**105/0.01**	**-3778**	100
	180 s	**105**/0.03	**-3778**	100	**105**/0.13	**-3778**	100	**105**/0.22	**-3778**	100	104/0.31	-3777	100	**105**/0.19	**-3778**	100	**105/0.01**	**-3778**	100
	300 s	**105**/0.03	**-3778**	100	**105**/0.13	**-3778**	100	**105**/0.22	**-3778**	100	104/0.31	-3777	100	**105**/0.19	**-3778**	100	**105/0.01**	**-3778**	100
car (30)	1 s	**28**/0.13	**-69**	92	14/0.55	-57	74	23/0.12	—	—	24/0.11	-69	92	26/0.12	-69	91	27–**28/0.01**	**-69**	91±1
	10 s	**29**/0.18	**-69**	91	26/1.83	-68	89	26/0.33	—	—	24/0.11	-69	91	**29**/0.51	**-69**	92	27–**29/0.06**	**-69**	91±1
	30 s	29/0.18	**-69**	91	29/3.31	**-69**	91	26/0.33	-69	91	24/**0.11**	-69	91	**30**/1.16	**-69**	91	27–**30**/0.71	**-69**	91±1
	180 s	29/0.18	**-69**	91	29/3.31	**-69**	91	26/0.33	-69	91	24/**0.11**	-69	91	**30**/1.16	**-69**	91	27–**30**/0.71	**-69**	91±1
	300 s	29/0.18	**-69**	91	29/3.31	**-69**	91	26/0.33	-69	91	24/**0.11**	-69	91	**30**/1.16	**-69**	91	27–**30**/0.71	**-69**	91±1
motor (20)	1 s	**20**/0.07	**-63**	97	13/0.25	-57	87	19/0.14	—	—	18/0.04	-63	96	17/0.08	-63	97	19–**20/0.01**	**-63**	98±1
	10 s	**20**/0.07	**-63**	97	**20**/1.27	**-63**	97	**20**/0.30	**-63**	97	18/0.04	-63	96	19/0.24	**-63**	99	**20/0.01**	**-63**	97
	30 s	**20**/0.07	**-63**	97	**20**/1.27	**-63**	97	**20**/0.30	**-63**	97	18/0.04	-63	96	19/0.24	**-63**	99	**20/0.01**	**-63**	97
	180 s	**20**/0.07	**-63**	97	**20**/1.27	**-63**	97	**20**/0.30	**-63**	97	18/0.04	-63	96	19/0.24	**-63**	99	**20/0.01**	**-63**	97
	300 s	**20**/0.07	**-63**	97	**20**/1.27	**-63**	97	**20**/0.30	**-63**	97	18/0.04	-63	96	19/0.24	**-63**	99	**20/0.01**	**-63**	97
opengm† (4)	1 s	1/0.81	-151		0/—	-118		0/—	—		0/—	-57		0/—	-150		**4/0.004**	**-171**	
	10 s	3/1.08	-161		**4**/2.61	**-171**		2/2.71	-164		0/—	-57		0/—	-150		**4/0.004**	**-171**	
	30 s	3/1.08	-161		**4**/2.61	**-171**		2/2.71	-164		0/—	-57		0/—	-150		**4/0.004**	**-171**	
	180 s	3/1.08	-161		**4**/2.61	**-171**		2/2.71	-164		0/—	-57		0/—	-150		**4/0.004**	**-171**	
	300 s	3/1.08	-161		**4**/2.61	**-171**		2/2.71	-164		0/—	-57		0/—	-150		**4/0.004**	**-171**	
flow† (6)	1 s	2/0.79	-2089		1/0.90	-1962		0/—	—		1/0.13	-2628		3/0.16	—		**4–5/0.06**	**-2837**±1	
	10 s	3/1.66	-2819		**5**/2.81	-2821		0/—	—		1/0.13	-2674		3/0.16	-2838		**5/0.06**	**-2838**	
	30 s	3/1.66	-2819		**5**/2.81	-2834		0/—	—		1/0.13	-2674		4/5.27	-2838		**5/0.06**	**-2838**	
	180 s	3/1.66	-2819		5/2.81	-2834		0/—	—		1/**0.13**	-2674		4/5.27	-2838		**6**/14.61	**-2840**	
	300 s	3/1.66	-2819		5/2.81	-2834		0/—	—		1/**0.13**	-2674		4/5.27	-2838		**6**/14.61	**-2840**	
worms (30)	1 s	0/—	60597	26	0/—	64158	23	0/—	—	—	0/—	—	—	0/—	—	—	**10–22/0.23**	**-48461**±3	86
	10 s	0/—	50578	24	0/—	49610	24	0/—	—	—	1/6.45	-48389	86	0/—	—	—	**16–25/0.39**	**-48464**±1	86
	30 s	0/—	35020	32	0/—	33948	32	0/—	—	—	1/6.45	-48392	86	0/—	-48429	85	**18–27/2.36**	**-48464**±1	86
	180 s	0/—	-36697	79	0/—	-17316	63	0/—	—	—	1/6.45	-48392	86	0/—	-48440	85	**18–27/2.36**	**-48465**±1	86
	300 s	0/—	-43805	84	0/—	-39283	81	0/—	—	—	1/6.45	-48392	86	0/—	-48441	85	**18–27/2.36**	**-48465**±1	86
pairs† (16)	1 s	0/—	-61482		0/—	**-61638**		0/—	—		0/—	—		0/—	—		0/—	-61162±1059	
	10 s	0/—	-61482		0/—	-61638		0/—	—		0/—	-64130		0/—	—		0/—	**-65259**±133	
	30 s	0/—	-61482		0/—	-61638		0/—	—		0/—	-64319		0/—	—		0/—	**-65594**±120	
	180 s	0/—	-63436		0/—	-63800		0/—	—		0/—	-64380		0/—	-65786		0/—	**-65798**±86	
	300 s	0/—	-63454		0/—	-64503		0/—	—		0/—	-64380		0/—	-65827		0/—	**-65821**±84	

- dd-ls0, dd-ls3 and dd-ls4: We used the source code that the authors provide for [47]. The original source code can be obtained at https://pub.ist.ac.at/~vnk/software.html. We modified the code to output more detailed timing, bound and assignment information, see https://github.com/vislearn/tkr-graphmatching.

  The commands used for the benchmark were:

  dd-ls0: `dd --linear --tree input.dd`

  dd-ls3: `dd --linear --local 3 --tree input.dd`

  dd-ls4: `dd --linear --local 4 --tree input.dd`

  Note: The `--local` parameter determines the number of nodes in each local subproblem. In the original implementation by [47] a setting of `1` results in two nodes per subproblem (so one more node than the setting suggests). We found the original interpretation of the parameter confusing and hence adjusted the behaviour in our command line wrapper. As one node per subproblem does not make sense, setting `--local 1` is invalid in our version.

- AMP and AMP-tight: The source code for [46] was obtained from https://github.com/LPMP/LPMP. Parameters have been selected after correspondence with the authors of [46]. AMP optimizes the same relaxation as bca and dd-ls0,

and uses a LAP solver as primal heuristic. AMP-tight optimizes the relaxation equivalent to that of dd-ls3, and uses a Frank-Wolfe algorithm as a primal heuristic.

The commands used for the benchmark were:

AMP: `graph_matching_mp -i input.dd --roundingReparametrization uniform`

AMP-tight:
```
graph_matching_mp_tightening -i input.dd --tighten \
    --tightenInterval 50 \
    --tightenIteration 200 \
    --tightenConstraintsPercentage 0.01 \
    --tightenReparametrization uniform:0.5 \
    --graphMatchingRounding fw
```

- HBP: The Matlab source code for [56] was taken from https://github.com/zzhang1987/HungarianBP. Note that the initialization scripts where unable to download the fgm dependency and we replaced it by https://github.com/zhfe99/fgm. A working source copy can be obtained by running:

  ```
  git clone --recurse-submodules https://github.com/zzhang1987/HungarianBP
  cd HungarianBP
  git clone https://github.com/zhfe99/fgm
  matlab -nodisplay -nojvm -r compiling
  ```

  We modified the code slightly in order to be able to load the datasets and make the output more suitable. We converted the datasets into matrix form and saved them in Matlab format. The graph matching problem for computer vision is formulated as a minimization problem, but HBP expects a maximization problem. Therefore we flipped the sign for all costs before passing them to HBP.

A6. Detailed experimental results for the performance study

To minimize computational time for the performance study we implemented a tool that takes a list of assignments and fuses them one after another. This makes the fusion move operation independent of the dual algorithms and, thereby, avoids having to run the comparably slow dual algorithms for each fusion algorithm anew. We used this tool to report results for all algorithms in the performance study including our winning method bca-greedy+qpbo-i. This is in contrast to the comparison study, see Sections 6.2, §A5, where an optimized version of the latter method was used.

The command for this tool is: `qap_dd_fuse input.dd proposals.txt fusion_results.txt`

Below we list our complete experimental results on which the tables in the main paper are based. For each dataset we repeat how many instances there are in the dataset (*c.f.* Table A1), and state for how many iterations the respective generating algorithms ran for each instance.

Then, for each instance in the dataset we first specify the simplified name we used, and, if applicable, the name used in previous publications in brackets. If the energy of the optimal solution is known, we indicate it. Optima were taken from [46] for hotel, house, car, motor, flow, from [28] for opengm, and obtained with CombiLP [23] for worms. A few previously missing optima for car and motor are due to tight lower bounds in our own experiments.

In the table below the instance name, we state in the second column for all evaluated proposal generating methods, *i.e.* for dd-ls0, dd-ls3, dd-ls4, bca-lap, bca-greedy, and greedy,

- the best energy the respective method obtained within the given maximum number of iterations (*best generated*), and
- how long the generation ran in seconds until reaching this energy (t_{gen}).

We then state for all evaluated fusion methods, namely for ilp, qpbo, qpbo-i, qpbo-p, qpbo-pi, and lsatr, in columns four to nine,

- how long it took in seconds, when adding the fusion method on top of the respective generation method, to obtain an energy at least as good as the best energy obtained purely by the underlying generation method (t_{beat}),

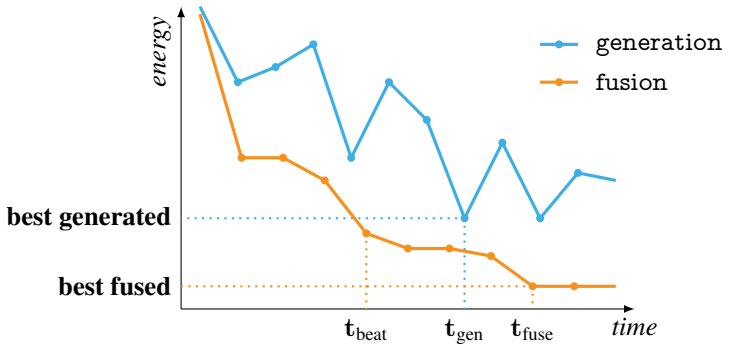


Figure A2. **Fictional generation and fusion data** to illustrate the meaning of *best generated*, *best fused*, t_{gen}, t_{beat}, and t_{fuse} as provided in the tables in Section A6 for each combination of a `generation` and `fusion` method.

- the overall best energy the respective method obtained when fusing the given generated proposals (*best fused*), and
- how long fusion ran in seconds on top of generation until reaching this energy (t_{fuse}).

If the optimal solution is known, it is highlighted in bold if obtained by the respective generation or fusion method.

The meaning of table entries is illustrated in Figure A2. As explained above, for each generation method each individual table contains four lines. The entries to the left of "*best generated*" and "t_{gen}" correspond to the generation method itself, the entries to the right of "t_{beat}", "*best fused*" and "t_{fuse}" correspond columnwise to the respective fusion method applied on top of the generation method.

A6.1. hotel

number of instances: 105

maximum number of iterations during generation: 500

hotel1 (*energy_hotel_frame1frame8*), known optimum: -4570.58

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4570.58**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.040	0.010	0.010	0.010	0.010	0.010
		best fused	**−4570.58**	**−4570.58**	**−4570.58**	**−4570.58**	**−4570.58**	**−4570.58**
		$t_{\text{fuse}}(s)$	0.040	0.010	0.010	0.010	0.010	0.010
dd-ls3	**−4570.58**	*best generated*						
	0.002	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.081	0.054	0.055	0.055	0.055	0.055
		best fused	**−4570.58**	**−4570.58**	**−4570.58**	**−4570.58**	**−4570.58**	**−4570.58**
		$t_{\text{fuse}}(s)$	0.081	0.054	0.055	0.055	0.055	0.055
dd-ls4	**−4570.58**	*best generated*						
	0.003	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.111	0.086	0.086	0.086	0.086	0.086
		best fused	**−4570.58**	**−4570.58**	**−4570.58**	**−4570.58**	**−4570.58**	**−4570.58**
		$t_{\text{fuse}}(s)$	0.111	0.086	0.086	0.086	0.086	0.086
bca-lap	**−4570.58**	*best generated*						
	0.041	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.080	0.055	0.055	0.055	0.055	0.055
		best fused	**−4570.58**	**−4570.58**	**−4570.58**	**−4570.58**	**−4570.58**	**−4570.58**
		$t_{\text{fuse}}(s)$	0.080	0.055	0.055	0.055	0.055	0.055
bca-greedy	**−4570.58**	*best generated*						
	0.993	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
		best fused	**−4570.58**	**−4570.58**	**−4570.58**	**−4570.58**	**−4570.58**	**−4570.58**
		$t_{\text{fuse}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
greedy	**−4570.58**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001
		best fused	**−4570.58**	**−4570.58**	**−4570.58**	**−4570.58**	**−4570.58**	**−4570.58**
		$t_{\text{fuse}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001

hotel2 (*energy_hotel_frame1frame15*), known optimum: -4498.03

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4498.03**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.040	0.010	0.010	0.010	0.010	0.010
		best fused	**−4498.03**	**−4498.03**	**−4498.03**	**−4498.03**	**−4498.03**	**−4498.03**
		$t_{\text{fuse}}(s)$	0.040	0.010	0.010	0.010	0.010	0.010
dd-ls3	**−4498.03**	*best generated*						
	0.002	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.244	0.055	0.055	0.055	0.055	0.056
		best fused	**−4498.03**	**−4498.03**	**−4498.03**	**−4498.03**	**−4498.03**	**−4498.03**
		$t_{\text{fuse}}(s)$	0.244	0.055	0.055	0.055	0.055	0.056
dd-ls4	**−4498.03**	*best generated*						
	0.003	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.109	0.082	0.082	0.082	0.082	0.082
		best fused	**−4498.03**	**−4498.03**	**−4498.03**	**−4498.03**	**−4498.03**	**−4498.03**
		$t_{\text{fuse}}(s)$	0.109	0.082	0.082	0.082	0.082	0.082
bca-lap	**−4498.03**	*best generated*						
	1.313	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.078	0.052	0.052	0.052	0.052	0.052
		best fused	**−4498.03**	**−4498.03**	**−4498.03**	**−4498.03**	**−4498.03**	**−4498.03**
		$t_{\text{fuse}}(s)$	0.078	0.052	0.052	0.052	0.052	0.052
bca-greedy	**−4498.03**	*best generated*						
	0.390	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.033	0.005	0.005	0.005	0.005	0.006
		best fused	**−4498.03**	**−4498.03**	**−4498.03**	**−4498.03**	**−4498.03**	**−4498.03**
		$t_{\text{fuse}}(s)$	0.033	0.005	0.005	0.005	0.005	0.006
greedy	**−4498.03**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.026	0.001	0.001	0.001	0.001	0.001
		best fused	**−4498.03**	**−4498.03**	**−4498.03**	**−4498.03**	**−4498.03**	**−4498.03**
		$t_{\text{fuse}}(s)$	0.026	0.001	0.001	0.001	0.001	0.001

hotel3 (*energy_hotel_frame1frame22*), known optimum: -4438.33

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4438.33**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.040	0.010	0.010	0.010	0.010	0.010
		best fused	**−4438.33**	**−4438.33**	**−4438.33**	**−4438.33**	**−4438.33**	**−4438.33**
		$t_{\text{fuse}}(s)$	0.040	0.010	0.010	0.010	0.010	0.010
dd-ls3	**−4438.33**	*best generated*						
	0.233	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.339	0.294	0.294	0.294	0.293	0.295
		best fused	**−4438.33**	**−4438.33**	**−4438.33**	**−4438.33**	**−4438.33**	**−4438.33**
		$t_{\text{fuse}}(s)$	0.339	0.294	0.294	0.294	0.293	0.295
dd-ls4	**−4438.33**	*best generated*						
	0.191	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.317	0.288	0.288	0.288	0.288	0.289
		best fused	**−4438.33**	**−4438.33**	**−4438.33**	**−4438.33**	**−4438.33**	**−4438.33**
		$t_{\text{fuse}}(s)$	0.317	0.288	0.288	0.288	0.288	0.289
bca-lap	**−4438.33**	*best generated*						
	0.042	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.083	0.054	0.054	0.054	0.054	0.054
		best fused	**−4438.33**	**−4438.33**	**−4438.33**	**−4438.33**	**−4438.33**	**−4438.33**
		$t_{\text{fuse}}(s)$	0.083	0.054	0.054	0.054	0.054	0.054
bca-greedy	**−4438.33**	*best generated*						
	0.007	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.042	0.016	0.016	0.016	0.016	0.016
		best fused	**−4438.33**	**−4438.33**	**−4438.33**	**−4438.33**	**−4438.33**	**−4438.33**
		$t_{\text{fuse}}(s)$	0.042	0.016	0.016	0.016	0.016	0.016
greedy	**−4438.33**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.035	0.003	0.003	0.003	0.003	0.003
		best fused	**−4438.33**	**−4438.33**	**−4438.33**	**−4438.33**	**−4438.33**	**−4438.33**
		$t_{\text{fuse}}(s)$	0.035	0.003	0.003	0.003	0.003	0.003

hotel4 (*energy_hotel_frame1frame29*), known optimum: -4368.55

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4368.55**	*best generated*						
	0.018	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.062	0.028	0.028	0.028	0.028	0.029
		best fused	**−4368.55**	**−4368.55**	**−4368.55**	**−4368.55**	**−4368.55**	**−4368.55**
		$t_{\text{fuse}}(s)$	0.062	0.028	0.028	0.028	0.028	0.029
dd-ls3	**−4368.55**	*best generated*						
	0.203	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.303	0.274	0.274	0.274	0.274	0.275
		best fused	**−4368.55**	**−4368.55**	**−4368.55**	**−4368.55**	**−4368.55**	**−4368.55**
		$t_{\text{fuse}}(s)$	0.303	0.274	0.274	0.274	0.274	0.275
dd-ls4	**−4368.55**	*best generated*						
	0.477	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.629	0.600	0.600	0.600	0.601	0.601
		best fused	**−4368.55**	**−4368.55**	**−4368.55**	**−4368.55**	**−4368.55**	**−4368.55**
		$t_{\text{fuse}}(s)$	0.629	0.600	0.600	0.600	0.601	0.601
bca-lap	**−4368.55**	*best generated*						
	3.848	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.090	0.063	0.064	0.064	0.064	0.064
		best fused	**−4368.55**	**−4368.55**	**−4368.55**	**−4368.55**	**−4368.55**	**−4368.55**
		$t_{\text{fuse}}(s)$	0.090	0.063	0.064	0.064	0.064	0.064
bca-greedy	**−4368.55**	*best generated*						
	1.125	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.039	0.010	0.011	0.010	0.010	0.011
		best fused	**−4368.55**	**−4368.55**	**−4368.55**	**−4368.55**	**−4368.55**	**−4368.55**
		$t_{\text{fuse}}(s)$	0.039	0.010	0.011	0.010	0.010	0.011
greedy	**−4368.55**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.077	0.003	0.003	0.003	0.003	0.004
		best fused	**−4368.55**	**−4368.55**	**−4368.55**	**−4368.55**	**−4368.55**	**−4368.55**
		$t_{\text{fuse}}(s)$	0.077	0.003	0.003	0.003	0.003	0.004

hotel5 (*energy_hotel_frame1frame36*), known optimum: -4306.23

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4306.23**	*best generated*						
	0.043	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.090	0.054	0.054	0.054	0.054	0.056
		best fused	**−4306.23**	**−4306.23**	**−4306.23**	**−4306.23**	**−4306.23**	**−4306.23**
		$t_{\text{fuse}}(s)$	0.090	0.054	0.054	0.054	0.054	0.056
dd-ls3	**−4306.23**	*best generated*						
	0.138	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.239	0.210	0.210	0.210	0.210	0.211
		best fused	**−4306.23**	**−4306.23**	**−4306.23**	**−4306.23**	**−4306.23**	**−4306.23**
		$t_{\text{fuse}}(s)$	0.239	0.210	0.210	0.210	0.210	0.211
dd-ls4	**−4306.23**	*best generated*						
	0.003	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.183	0.158	0.158	0.158	0.158	0.158
		best fused	**−4306.23**	**−4306.23**	**−4306.23**	**−4306.23**	**−4306.23**	**−4306.23**
		$t_{\text{fuse}}(s)$	0.183	0.158	0.158	0.158	0.158	0.158
bca-lap	**−4306.23**	*best generated*						
	0.314	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.072	0.047	0.047	0.047	0.047	0.047
		best fused	**−4306.23**	**−4306.23**	**−4306.23**	**−4306.23**	**−4306.23**	**−4306.23**
		$t_{\text{fuse}}(s)$	0.072	0.047	0.047	0.047	0.047	0.047
bca-greedy	**−4306.23**	*best generated*						
	0.081	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.058	0.013	0.013	0.014	0.013	0.014
		best fused	**−4306.23**	**−4306.23**	**−4306.23**	**−4306.23**	**−4306.23**	**−4306.23**
		$t_{\text{fuse}}(s)$	0.058	0.013	0.013	0.014	0.013	0.014
greedy	**−4306.23**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.054	0.005	0.005	0.006	0.005	0.015
		best fused	**−4306.23**	**−4306.23**	**−4306.23**	**−4306.23**	**−4306.23**	**−4306.23**
		$t_{\text{fuse}}(s)$	0.054	0.005	0.005	0.006	0.005	0.015

hotel6 (*energy_hotel_frame1frame43*), known optimum: -4194.42

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4194.42**	*best generated*						
	0.110	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.100	0.064	0.064	0.123	0.123	0.065
		best fused	**−4194.42**	**−4194.42**	**−4194.42**	**−4194.42**	**−4194.42**	**−4194.42**
		$t_{\text{fuse}}(s)$	0.100	0.064	0.064	0.123	0.123	0.065
dd-ls3	**−4194.42**	*best generated*						
	0.327	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.447	0.413	0.413	0.413	0.413	0.414
		best fused	**−4194.42**	**−4194.42**	**−4194.42**	**−4194.42**	**−4194.42**	**−4194.42**
		$t_{\text{fuse}}(s)$	0.447	0.413	0.413	0.413	0.413	0.414
dd-ls4	**−4194.42**	*best generated*						
	0.842	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.258	1.062	1.062	1.063	1.063	1.063
		best fused	**−4194.42**	**−4194.42**	**−4194.42**	**−4194.42**	**−4194.42**	**−4194.42**
		$t_{\text{fuse}}(s)$	1.258	1.062	1.062	1.063	1.063	1.063
bca-lap	**−4194.42**	*best generated*						
	5.969	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.127	0.099	0.099	0.099	0.099	0.100
		best fused	**−4194.42**	**−4194.42**	**−4194.42**	**−4194.42**	**−4194.42**	**−4194.42**
		$t_{\text{fuse}}(s)$	0.127	0.099	0.099	0.099	0.099	0.100
bca-greedy	**−4194.42**	*best generated*						
	1.721	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.074	0.031	0.032	0.031	0.031	0.033
		best fused	**−4194.42**	**−4194.42**	**−4194.42**	**−4194.42**	**−4194.42**	**−4194.42**
		$t_{\text{fuse}}(s)$	0.074	0.031	0.032	0.031	0.031	0.033
greedy	**−4194.42**	*best generated*						
	0.012	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.053	0.004	0.004	0.041	0.041	0.077
		best fused	**−4194.42**	**−4194.42**	**−4194.42**	**−4194.42**	**−4194.42**	**−4194.42**
		$t_{\text{fuse}}(s)$	0.053	0.004	0.004	0.041	0.041	0.077

hotel7 (*energy_hotel_frame1frame50*), known optimum: -4125.68

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4125.68**	*best generated*						
	0.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.082	0.046	0.046	0.046	0.046	0.047
		best fused	**−4125.68**	**−4125.68**	**−4125.68**	**−4125.68**	**−4125.68**	**−4125.68**
		$t_{\text{fuse}}(s)$	0.082	0.046	0.046	0.046	0.046	0.047
dd-ls3	**−4125.68**	*best generated*						
	0.182	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.312	0.275	0.275	0.275	0.275	0.275
		best fused	**−4125.68**	**−4125.68**	**−4125.68**	**−4125.68**	**−4125.68**	**−4125.68**
		$t_{\text{fuse}}(s)$	0.312	0.275	0.275	0.275	0.275	0.275
dd-ls4	**−4125.68**	*best generated*						
	1.219	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.787	1.469	1.469	1.469	1.469	1.470
		best fused	**−4125.68**	**−4125.68**	**−4125.68**	**−4125.68**	**−4125.68**	**−4125.68**
		$t_{\text{fuse}}(s)$	1.787	1.469	1.469	1.469	1.469	1.470
bca-lap	**−4125.68**	*best generated*						
	3.339	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.107	0.080	0.080	0.080	0.080	0.081
		best fused	**−4125.68**	**−4125.68**	**−4125.68**	**−4125.68**	**−4125.68**	**−4125.68**
		$t_{\text{fuse}}(s)$	0.107	0.080	0.080	0.080	0.080	0.081
bca-greedy	**−4125.68**	*best generated*						
	0.956	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.054	0.014	0.014	0.014	0.014	0.018
		best fused	**−4125.68**	**−4125.68**	**−4125.68**	**−4125.68**	**−4125.68**	**−4125.68**
		$t_{\text{fuse}}(s)$	0.054	0.014	0.014	0.014	0.014	0.018
greedy	**−4125.68**	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.142	0.013	0.014	0.043	0.044	0.071
		best fused	**−4125.68**	**−4125.68**	**−4125.68**	**−4125.68**	**−4125.68**	**−4125.68**
		$t_{\text{fuse}}(s)$	0.142	0.013	0.014	0.043	0.044	0.071

hotel8 (*energy_hotel_frame1frame57*), known optimum: -4064.73

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4064.73**	*best generated*						
	0.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.092	0.046	0.046	0.046	0.046	0.048
		best fused	**−4064.73**	**−4064.73**	**−4064.73**	**−4064.73**	**−4064.73**	**−4064.73**
		$t_{\text{fuse}}(s)$	0.092	0.046	0.046	0.046	0.046	0.048
dd-ls3	**−4064.73**	*best generated*						
	0.380	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.511	0.479	0.479	0.479	0.479	0.480
		best fused	**−4064.73**	**−4064.73**	**−4064.73**	**−4064.73**	**−4064.73**	**−4064.73**
		$t_{\text{fuse}}(s)$	0.511	0.479	0.479	0.479	0.479	0.480
dd-ls4	**−4064.73**	*best generated*						
	1.072	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.407	1.358	1.358	1.358	1.359	1.359
		best fused	**−4064.73**	**−4064.73**	**−4064.73**	**−4064.73**	**−4064.73**	**−4064.73**
		$t_{\text{fuse}}(s)$	1.407	1.358	1.358	1.358	1.359	1.359
bca-lap	**−4064.73**	*best generated*						
	4.381	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.174	0.143	0.144	0.144	0.143	0.145
		best fused	**−4064.73**	**−4064.73**	**−4064.73**	**−4064.73**	**−4064.73**	**−4064.73**
		$t_{\text{fuse}}(s)$	0.174	0.143	0.144	0.144	0.143	0.145
bca-greedy	**−4064.73**	*best generated*						
	1.140	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.076	0.024	0.024	0.053	0.054	0.060
		best fused	**−4064.73**	**−4064.73**	**−4064.73**	**−4064.73**	**−4064.73**	**−4064.73**
		$t_{\text{fuse}}(s)$	0.076	0.024	0.024	0.053	0.054	0.060
greedy	**−4064.73**	*best generated*						
	0.046	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.090	0.008	0.009	0.159	0.158	0.237
		best fused	**−4064.73**	**−4064.73**	**−4064.73**	**−4064.73**	**−4064.73**	**−4064.73**
		$t_{\text{fuse}}(s)$	0.090	0.008	0.009	0.159	0.158	0.237

hotel9 (*energy_hotel_frame1frame64*), known optimum: -4021.19

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4021.19**	*best generated*						
	0.052	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.097	0.046	0.047	0.064	0.064	0.047
		best fused	**−4021.19**	**−4021.19**	**−4021.19**	**−4021.19**	**−4021.19**	**−4021.19**
		$t_{\text{fuse}}(s)$	0.097	0.046	0.047	0.064	0.064	0.047
dd-ls3	**−4021.19**	*best generated*						
	0.826	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.669	0.617	0.617	0.936	0.937	0.618
		best fused	**−4021.19**	**−4021.19**	**−4021.19**	**−4021.19**	**−4021.19**	**−4021.19**
		$t_{\text{fuse}}(s)$	0.669	0.617	0.617	0.936	0.937	0.618
dd-ls4	**−4021.19**	*best generated*						
	2.026	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.809	1.759	1.760	2.291	2.292	1.761
		best fused	**−4021.19**	**−4021.19**	**−4021.19**	**−4021.19**	**−4021.19**	**−4021.19**
		$t_{\text{fuse}}(s)$	1.809	1.759	1.760	2.291	2.292	1.761
bca-lap	**−4021.19**	*best generated*						
	4.698	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.275	0.242	0.243	0.242	0.242	0.245
		best fused	**−4021.19**	**−4021.19**	**−4021.19**	**−4021.19**	**−4021.19**	**−4021.19**
		$t_{\text{fuse}}(s)$	0.275	0.242	0.243	0.242	0.242	0.245
bca-greedy	**−4021.19**	*best generated*						
	1.178	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.059	0.017	0.017	0.041	0.041	0.047
		best fused	**−4021.19**	**−4021.19**	**−4021.19**	**−4021.19**	**−4021.19**	**−4021.19**
		$t_{\text{fuse}}(s)$	0.059	0.017	0.017	0.041	0.041	0.047
greedy	**−4021.19**	*best generated*						
	0.047	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.069	0.006	0.005	0.158	0.157	0.207
		best fused	**−4021.19**	**−4021.19**	**−4021.19**	**−4021.19**	**−4021.19**	**−4021.19**
		$t_{\text{fuse}}(s)$	0.069	0.006	0.005	0.158	0.157	0.207

hotel10 (*energy_hotel_frame1frame71*), known optimum: -3969.29

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3969.29**	*best generated*						
	0.162	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.063	0.029	0.029	0.177	0.177	0.030
		best fused	**−3969.29**	**−3969.29**	**−3969.29**	**−3969.29**	**−3969.29**	**−3969.29**
		$t_{\text{fuse}}(s)$	0.063	0.029	0.029	0.177	0.177	0.030
dd-ls3	**−3969.29**	*best generated*						
	0.201	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.670	0.306	0.306	0.306	0.306	0.307
		best fused	**−3969.29**	**−3969.29**	**−3969.29**	**−3969.29**	**−3969.29**	**−3969.29**
		$t_{\text{fuse}}(s)$	0.670	0.306	0.306	0.306	0.306	0.307
dd-ls4	**−3969.29**	*best generated*						
	3.180	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.166	1.133	1.133	3.483	3.483	1.134
		best fused	**−3969.29**	**−3969.29**	**−3969.29**	**−3969.29**	**−3969.29**	**−3969.29**
		$t_{\text{fuse}}(s)$	1.166	1.133	1.133	3.483	3.483	1.134
bca-lap	**−3969.29**	*best generated*						
	0.184	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.221	0.188	0.188	0.189	0.189	0.191
		best fused	**−3969.29**	**−3969.29**	**−3969.29**	**−3969.29**	**−3969.29**	**−3969.29**
		$t_{\text{fuse}}(s)$	0.221	0.188	0.188	0.189	0.189	0.191
bca-greedy	**−3969.29**	*best generated*						
	1.141	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.075	0.031	0.031	0.048	0.049	0.063
		best fused	**−3969.29**	**−3969.29**	**−3969.29**	**−3969.29**	**−3969.29**	**−3969.29**
		$t_{\text{fuse}}(s)$	0.075	0.031	0.031	0.048	0.049	0.063
greedy	−3721.76	*best generated*						
	0.030	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.173	0.016	0.016	0.100	0.104	0.273
		best fused	**−3969.29**	**−3969.29**	**−3969.29**	−3721.76	−3721.76	**−3969.29**
		$t_{\text{fuse}}(s)$	0.318	0.028	0.030	0.100	0.104	0.371

hotel11 (*energy_hotel_frame1frame78*), known optimum: -3874.87

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3874.87**	*best generated*						
	0.317	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.214	0.141	0.142	0.337	0.337	0.145
		best fused	**−3874.87**	**−3874.87**	**−3874.87**	**−3874.87**	**−3874.87**	**−3874.87**
		$t_{\text{fuse}}(s)$	0.214	0.141	0.142	0.337	0.337	0.145
dd-ls3	**−3874.87**	*best generated*						
	1.046	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.243	1.176	1.176	1.177	1.177	1.179
		best fused	**−3874.87**	**−3874.87**	**−3874.87**	**−3874.87**	**−3874.87**	**−3874.87**
		$t_{\text{fuse}}(s)$	1.243	1.176	1.176	1.177	1.177	1.179
dd-ls4	**−3874.87**	*best generated*						
	5.418	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.045	5.066	5.067	5.803	5.803	3.988
		best fused	**−3874.87**	**−3874.87**	**−3874.87**	**−3874.87**	**−3874.87**	**−3874.87**
		$t_{\text{fuse}}(s)$	4.045	5.066	5.067	5.803	5.803	3.988
bca-lap	**−3874.87**	*best generated*						
	2.077	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.045	1.963	1.967	1.965	1.966	1.986
		best fused	**−3874.87**	**−3874.87**	**−3874.87**	**−3874.87**	**−3874.87**	**−3874.87**
		$t_{\text{fuse}}(s)$	2.045	1.963	1.967	1.965	1.966	1.986
bca-greedy	**−3874.87**	*best generated*						
	0.424	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.110	0.048	0.049	0.171	0.172	0.201
		best fused	**−3874.87**	**−3874.87**	**−3874.87**	**−3874.87**	**−3874.87**	**−3874.87**
		$t_{\text{fuse}}(s)$	0.110	0.048	0.049	0.171	0.172	0.201
greedy	−3583.80	*best generated*						
	0.017	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.064	0.004	0.004	0.059	0.059	0.178
		best fused	**−3874.87**	**−3874.87**	**−3874.87**	−3583.80	−3583.80	**−3874.87**
		$t_{\text{fuse}}(s)$	0.346	0.027	0.030	0.059	0.059	0.342

hotel12 (*energy_hotel_frame1frame85*), known optimum: -3817.96

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3817.96**	*best generated*						
	0.563	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.341	0.213	0.213	0.590	0.590	0.219
		best fused	**−3817.96**	**−3817.96**	**−3817.96**	**−3817.96**	**−3817.96**	**−3817.96**
		$t_{\text{fuse}}(s)$	0.341	0.213	0.213	0.590	0.590	0.219
dd-ls3	**−3817.96**	*best generated*						
	8.805	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.256	1.671	2.697	8.987	8.987	1.674
		best fused	**−3817.96**	**−3817.96**	**−3817.96**	**−3817.96**	**−3817.96**	**−3817.96**
		$t_{\text{fuse}}(s)$	2.256	1.671	2.697	8.987	8.987	1.674
dd-ls4	**−3817.96**	*best generated*						
	27.374	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	10.346	5.441	10.262	27.826	27.826	10.268
		best fused	**−3817.96**	**−3817.96**	**−3817.96**	**−3817.96**	**−3817.96**	**−3817.96**
		$t_{\text{fuse}}(s)$	10.346	5.441	10.262	27.826	27.826	10.268
bca-lap	−3700.34	*best generated*						
	0.553	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.549	0.503	0.504	0.504	0.504	0.509
		best fused	−3700.34	−3700.34	−3700.34	−3700.34	−3700.34	−3700.34
		$t_{\text{fuse}}(s)$	0.549	0.503	0.504	0.504	0.504	0.509
bca-greedy	**−3817.96**	*best generated*						
	0.056	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.109	0.032	0.032	0.065	0.065	0.085
		best fused	**−3817.96**	**−3817.96**	**−3817.96**	**−3817.96**	**−3817.96**	**−3817.96**
		$t_{\text{fuse}}(s)$	0.109	0.032	0.032	0.065	0.065	0.085
greedy	−3634.58	*best generated*						
	0.016	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.145	0.007	0.008	0.058	0.057	0.247
		best fused	**−3817.96**	**−3817.96**	**−3817.96**	−3634.58	−3634.58	−3713.27
		$t_{\text{fuse}}(s)$	0.154	0.008	0.009	0.058	0.057	0.247

hotel13 (*energy_hotel_frame1frame92*), known optimum: -3728.34

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3728.34**	*best generated*						
	0.591	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.492	0.341	0.342	0.619	0.621	0.354
		best fused	**−3728.34**	**−3728.34**	**−3728.34**	**−3728.34**	**−3728.34**	**−3728.34**
		$t_{\text{fuse}}(s)$	0.492	0.341	0.342	0.619	0.621	0.354
dd-ls3	**−3728.34**	*best generated*						
	14.738	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	8.091	7.871	7.873	14.933	14.934	5.457
		best fused	**−3728.34**	**−3728.34**	**−3728.34**	**−3728.34**	**−3728.34**	**−3728.34**
		$t_{\text{fuse}}(s)$	8.091	7.871	7.873	14.933	14.934	5.457
dd-ls4	**−3728.34**	*best generated*						
	35.275	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	6.834	6.752	6.753	35.781	35.782	6.757
		best fused	**−3728.34**	**−3728.34**	**−3728.34**	**−3728.34**	**−3728.34**	**−3728.34**
		$t_{\text{fuse}}(s)$	6.834	6.752	6.753	35.781	35.782	6.757
bca-lap	−3611.47	*best generated*						
	2.739	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.310	2.214	2.217	2.216	2.217	2.237
		best fused	−3611.47	−3611.47	−3611.47	−3611.47	−3611.47	−3611.47
		$t_{\text{fuse}}(s)$	2.310	2.214	2.217	2.216	2.217	2.237
bca-greedy	**−3728.34**	*best generated*						
	0.074	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.168	0.066	0.067	0.085	0.085	0.169
		best fused	**−3728.34**	**−3728.34**	**−3728.34**	**−3728.34**	**−3728.34**	**−3728.34**
		$t_{\text{fuse}}(s)$	0.168	0.066	0.067	0.085	0.085	0.169
greedy	−3478.49	*best generated*						
	0.011	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.071	0.006	0.005	0.039	0.039	0.074
		best fused	**−3728.34**	**−3728.34**	**−3728.34**	−3478.49	−3478.49	−3513.13
		$t_{\text{fuse}}(s)$	0.264	0.009	0.020	0.039	0.039	0.870

hotel14 (*energy_hotel_frame1frame99*), known optimum: -3691.38

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3691.38**	*best generated*						
	1.344	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.076	0.580	0.767	1.397	1.399	0.786
		best fused	**−3691.38**	**−3691.38**	**−3691.38**	**−3691.38**	**−3691.38**	**−3691.38**
		$t_{\text{fuse}}(s)$	1.076	0.580	0.767	1.397	1.399	0.786
dd-ls3	**−3691.38**	*best generated*						
	24.825	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	13.425	9.488	13.155	25.050	25.051	10.492
		best fused	**−3691.38**	**−3691.38**	**−3691.38**	**−3691.38**	**−3691.38**	**−3691.38**
		$t_{\text{fuse}}(s)$	13.425	9.488	13.155	25.050	25.051	10.492
dd-ls4	**−3691.38**	*best generated*						
	44.683	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	7.755	7.670	7.671	45.224	45.224	7.675
		best fused	**−3691.38**	**−3691.38**	**−3691.38**	**−3691.38**	**−3691.38**	**−3691.38**
		$t_{\text{fuse}}(s)$	7.755	7.670	7.671	45.224	45.224	7.675
bca-lap	−3486.96	*best generated*						
	6.365	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.172	2.038	2.042	2.040	2.040	2.061
		best fused	−3486.96	−3486.96	−3486.96	−3486.96	−3486.96	−3486.96
		$t_{\text{fuse}}(s)$	2.172	2.038	2.042	2.040	2.040	2.061
bca-greedy	−3591.07	*best generated*						
	0.877	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.157	0.070	0.071	0.946	0.948	0.152
		best fused	**−3691.38**	**−3691.38**	**−3691.38**	−3591.07	−3591.07	**−3691.38**
		$t_{\text{fuse}}(s)$	0.157	0.070	0.071	0.946	0.948	0.710
greedy	−3442.31	*best generated*						
	0.016	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.278	0.008	0.014	0.054	0.055	0.092
		best fused	**−3691.38**	**−3691.38**	**−3691.38**	−3442.31	−3442.31	−3559.39
		$t_{\text{fuse}}(s)$	0.816	0.089	0.054	0.054	0.055	1.011

hotel15 (*energy_hotel_frame8frame15*), known optimum: -4572.64

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4572.64**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.041	0.010	0.010	0.010	0.010	0.010
		best fused	**−4572.64**	**−4572.64**	**−4572.64**	**−4572.64**	**−4572.64**	**−4572.64**
		$t_{\text{fuse}}(s)$	0.041	0.010	0.010	0.010	0.010	0.010
dd-ls3	**−4572.64**	*best generated*						
	0.003	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.080	0.048	0.048	0.048	0.048	0.048
		best fused	**−4572.64**	**−4572.64**	**−4572.64**	**−4572.64**	**−4572.64**	**−4572.64**
		$t_{\text{fuse}}(s)$	0.080	0.048	0.048	0.048	0.048	0.048
dd-ls4	**−4572.64**	*best generated*						
	0.003	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.082	0.057	0.057	0.057	0.057	0.057
		best fused	**−4572.64**	**−4572.64**	**−4572.64**	**−4572.64**	**−4572.64**	**−4572.64**
		$t_{\text{fuse}}(s)$	0.082	0.057	0.057	0.057	0.057	0.057
bca-lap	**−4572.64**	*best generated*						
	0.036	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.073	0.048	0.048	0.048	0.048	0.048
		best fused	**−4572.64**	**−4572.64**	**−4572.64**	**−4572.64**	**−4572.64**	**−4572.64**
		$t_{\text{fuse}}(s)$	0.073	0.048	0.048	0.048	0.048	0.048
bca-greedy	**−4572.64**	*best generated*						
	1.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
		best fused	**−4572.64**	**−4572.64**	**−4572.64**	**−4572.64**	**−4572.64**	**−4572.64**
		$t_{\text{fuse}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
greedy	**−4572.64**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.026	0.001	0.001	0.001	0.001	0.001
		best fused	**−4572.64**	**−4572.64**	**−4572.64**	**−4572.64**	**−4572.64**	**−4572.64**
		$t_{\text{fuse}}(s)$	0.026	0.001	0.001	0.001	0.001	0.001

hotel16 (*energy_hotel_frame8frame22*), known optimum: -4491.45

	generation		+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4491.45**	*best generated*						
	0.042	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.082	0.053	0.053	0.053	0.053	0.055
		best fused	**−4491.45**	**−4491.45**	**−4491.45**	**−4491.45**	**−4491.45**	**−4491.45**
		$t_{\text{fuse}}(s)$	0.082	0.053	0.053	0.053	0.053	0.055
dd-ls3	**−4491.45**	*best generated*						
	0.156	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.267	0.210	0.209	0.210	0.210	0.210
		best fused	**−4491.45**	**−4491.45**	**−4491.45**	**−4491.45**	**−4491.45**	**−4491.45**
		$t_{\text{fuse}}(s)$	0.267	0.210	0.209	0.210	0.210	0.210
dd-ls4	**−4491.45**	*best generated*						
	0.003	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.088	0.062	0.062	0.062	0.062	0.063
		best fused	**−4491.45**	**−4491.45**	**−4491.45**	**−4491.45**	**−4491.45**	**−4491.45**
		$t_{\text{fuse}}(s)$	0.088	0.062	0.062	0.062	0.062	0.063
bca-lap	**−4491.45**	*best generated*						
	0.041	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.079	0.053	0.054	0.053	0.054	0.054
		best fused	**−4491.45**	**−4491.45**	**−4491.45**	**−4491.45**	**−4491.45**	**−4491.45**
		$t_{\text{fuse}}(s)$	0.079	0.053	0.054	0.053	0.054	0.054
bca-greedy	**−4491.45**	*best generated*						
	1.189	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.048	0.005	0.005	0.005	0.005	0.006
		best fused	**−4491.45**	**−4491.45**	**−4491.45**	**−4491.45**	**−4491.45**	**−4491.45**
		$t_{\text{fuse}}(s)$	0.048	0.005	0.005	0.005	0.005	0.006
greedy	**−4491.45**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.001	0.001	0.001	0.001	0.001
		best fused	**−4491.45**	**−4491.45**	**−4491.45**	**−4491.45**	**−4491.45**	**−4491.45**
		$t_{\text{fuse}}(s)$	0.028	0.001	0.001	0.001	0.001	0.001

hotel17 (*energy_hotel_frame8frame29*), known optimum: -4424.96

	generation		+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4424.96**	*best generated*						
	0.042	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.085	0.053	0.053	0.053	0.053	0.055
		best fused	**−4424.96**	**−4424.96**	**−4424.96**	**−4424.96**	**−4424.96**	**−4424.96**
		$t_{\text{fuse}}(s)$	0.085	0.053	0.053	0.053	0.053	0.055
dd-ls3	**−4424.96**	*best generated*						
	0.179	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.299	0.240	0.240	0.240	0.240	0.241
		best fused	**−4424.96**	**−4424.96**	**−4424.96**	**−4424.96**	**−4424.96**	**−4424.96**
		$t_{\text{fuse}}(s)$	0.299	0.240	0.240	0.240	0.240	0.241
dd-ls4	**−4424.96**	*best generated*						
	0.188	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.312	0.282	0.283	0.282	0.283	0.283
		best fused	**−4424.96**	**−4424.96**	**−4424.96**	**−4424.96**	**−4424.96**	**−4424.96**
		$t_{\text{fuse}}(s)$	0.312	0.282	0.283	0.282	0.283	0.283
bca-lap	**−4424.96**	*best generated*						
	0.110	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.079	0.053	0.053	0.053	0.053	0.053
		best fused	**−4424.96**	**−4424.96**	**−4424.96**	**−4424.96**	**−4424.96**	**−4424.96**
		$t_{\text{fuse}}(s)$	0.079	0.053	0.053	0.053	0.053	0.053
bca-greedy	**−4424.96**	*best generated*						
	0.022	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.053	0.011	0.010	0.010	0.010	0.010
		best fused	**−4424.96**	**−4424.96**	**−4424.96**	**−4424.96**	**−4424.96**	**−4424.96**
		$t_{\text{fuse}}(s)$	0.053	0.011	0.010	0.010	0.010	0.010
greedy	**−4424.96**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.040	0.003	0.004	0.005	0.005	0.007
		best fused	**−4424.96**	**−4424.96**	**−4424.96**	**−4424.96**	**−4424.96**	**−4424.96**
		$t_{\text{fuse}}(s)$	0.040	0.003	0.004	0.005	0.005	0.007

hotel18 (*energy_hotel_frame8frame36*), known optimum: -4379.36

	generation		+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4379.36**	*best generated*						
	0.051	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.092	0.062	0.062	0.062	0.062	0.064
		best fused	**−4379.36**	**−4379.36**	**−4379.36**	**−4379.36**	**−4379.36**	**−4379.36**
		$t_{\text{fuse}}(s)$	0.092	0.062	0.062	0.062	0.062	0.064
dd-ls3	**−4379.36**	*best generated*						
	0.002	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.089	0.060	0.060	0.060	0.060	0.060
		best fused	**−4379.36**	**−4379.36**	**−4379.36**	**−4379.36**	**−4379.36**	**−4379.36**
		$t_{\text{fuse}}(s)$	0.089	0.060	0.060	0.060	0.060	0.060
dd-ls4	**−4379.36**	*best generated*						
	0.003	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.138	0.108	0.108	0.108	0.108	0.108
		best fused	**−4379.36**	**−4379.36**	**−4379.36**	**−4379.36**	**−4379.36**	**−4379.36**
		$t_{\text{fuse}}(s)$	0.138	0.108	0.108	0.108	0.108	0.108
bca-lap	**−4379.36**	*best generated*						
	0.964	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.074	0.048	0.048	0.048	0.048	0.049
		best fused	**−4379.36**	**−4379.36**	**−4379.36**	**−4379.36**	**−4379.36**	**−4379.36**
		$t_{\text{fuse}}(s)$	0.074	0.048	0.048	0.048	0.048	0.049
bca-greedy	**−4379.36**	*best generated*						
	0.270	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.037	0.010	0.010	0.010	0.010	0.011
		best fused	**−4379.36**	**−4379.36**	**−4379.36**	**−4379.36**	**−4379.36**	**−4379.36**
		$t_{\text{fuse}}(s)$	0.037	0.010	0.010	0.010	0.010	0.011
greedy	**−4379.36**	*best generated*						
	0.003	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.034	0.003	0.003	0.011	0.012	0.007
		best fused	**−4379.36**	**−4379.36**	**−4379.36**	**−4379.36**	**−4379.36**	**−4379.36**
		$t_{\text{fuse}}(s)$	0.034	0.003	0.003	0.011	0.012	0.007

hotel19 (*energy_hotel_frame8frame43*), known optimum: -4262.09

	generation		+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4262.09**	*best generated*						
	0.060	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.105	0.071	0.071	0.072	0.071	0.073
		best fused	**−4262.09**	**−4262.09**	**−4262.09**	**−4262.09**	**−4262.09**	**−4262.09**
		$t_{\text{fuse}}(s)$	0.105	0.071	0.071	0.072	0.071	0.073
dd-ls3	**−4262.09**	*best generated*						
	0.486	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.374	0.346	0.345	0.559	0.559	0.346
		best fused	**−4262.09**	**−4262.09**	**−4262.09**	**−4262.09**	**−4262.09**	**−4262.09**
		$t_{\text{fuse}}(s)$	0.374	0.346	0.345	0.559	0.559	0.346
dd-ls4	**−4262.09**	*best generated*						
	0.422	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.653	0.568	0.569	0.569	0.569	0.570
		best fused	**−4262.09**	**−4262.09**	**−4262.09**	**−4262.09**	**−4262.09**	**−4262.09**
		$t_{\text{fuse}}(s)$	0.653	0.568	0.569	0.569	0.569	0.570
bca-lap	**−4262.09**	*best generated*						
	0.061	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.102	0.076	0.076	0.076	0.075	0.076
		best fused	**−4262.09**	**−4262.09**	**−4262.09**	**−4262.09**	**−4262.09**	**−4262.09**
		$t_{\text{fuse}}(s)$	0.102	0.076	0.076	0.076	0.075	0.076
bca-greedy	**−4262.09**	*best generated*						
	0.016	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.067	0.022	0.022	0.022	0.022	0.027
		best fused	**−4262.09**	**−4262.09**	**−4262.09**	**−4262.09**	**−4262.09**	**−4262.09**
		$t_{\text{fuse}}(s)$	0.067	0.022	0.022	0.022	0.022	0.027
greedy	**−4262.09**	*best generated*						
	0.034	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.045	0.003	0.004	0.110	0.111	0.024
		best fused	**−4262.09**	**−4262.09**	**−4262.09**	**−4262.09**	**−4262.09**	**−4262.09**
		$t_{\text{fuse}}(s)$	0.045	0.003	0.004	0.110	0.111	0.024

hotel20 (*energy_hotel_frame8frame50*), known optimum: -4179.32

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4179.32**	*best generated*						
	0.093	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.101	0.071	0.072	0.105	0.105	0.073
		best fused	**−4179.32**	**−4179.32**	**−4179.32**	**−4179.32**	**−4179.32**	**−4179.32**
		$t_{\text{fuse}}(s)$	0.101	0.071	0.072	0.105	0.105	0.073
dd-ls3	**−4179.32**	*best generated*						
	0.499	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.534	0.502	0.502	0.589	0.589	0.503
		best fused	**−4179.32**	**−4179.32**	**−4179.32**	**−4179.32**	**−4179.32**	**−4179.32**
		$t_{\text{fuse}}(s)$	0.534	0.502	0.502	0.589	0.589	0.503
dd-ls4	**−4179.32**	*best generated*						
	0.874	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.920	0.877	0.877	1.050	1.050	0.878
		best fused	**−4179.32**	**−4179.32**	**−4179.32**	**−4179.32**	**−4179.32**	**−4179.32**
		$t_{\text{fuse}}(s)$	0.920	0.877	0.877	1.050	1.050	0.878
bca-lap	**−4179.32**	*best generated*						
	2.686	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.108	0.081	0.081	0.081	0.081	0.081
		best fused	**−4179.32**	**−4179.32**	**−4179.32**	**−4179.32**	**−4179.32**	**−4179.32**
		$t_{\text{fuse}}(s)$	0.108	0.081	0.081	0.081	0.081	0.081
bca-greedy	**−4179.32**	*best generated*						
	0.752	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.060	0.026	0.026	0.026	0.026	0.027
		best fused	**−4179.32**	**−4179.32**	**−4179.32**	**−4179.32**	**−4179.32**	**−4179.32**
		$t_{\text{fuse}}(s)$	0.060	0.026	0.026	0.026	0.026	0.027
greedy	**−4179.32**	*best generated*						
	0.018	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.049	0.004	0.005	0.061	0.061	0.054
		best fused	**−4179.32**	**−4179.32**	**−4179.32**	**−4179.32**	**−4179.32**	**−4179.32**
		$t_{\text{fuse}}(s)$	0.049	0.004	0.005	0.061	0.061	0.054

hotel21 (*energy_hotel_frame8frame57*), known optimum: -4131.18

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4131.18**	*best generated*						
	0.069	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.113	0.080	0.081	0.081	0.081	0.083
		best fused	**−4131.18**	**−4131.18**	**−4131.18**	**−4131.18**	**−4131.18**	**−4131.18**
		$t_{\text{fuse}}(s)$	0.113	0.080	0.081	0.081	0.081	0.083
dd-ls3	**−4131.18**	*best generated*						
	0.492	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.685	0.583	0.583	0.583	0.583	0.584
		best fused	**−4131.18**	**−4131.18**	**−4131.18**	**−4131.18**	**−4131.18**	**−4131.18**
		$t_{\text{fuse}}(s)$	0.685	0.583	0.583	0.583	0.583	0.584
dd-ls4	**−4131.18**	*best generated*						
	1.269	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.520	1.490	1.489	1.489	1.490	1.491
		best fused	**−4131.18**	**−4131.18**	**−4131.18**	**−4131.18**	**−4131.18**	**−4131.18**
		$t_{\text{fuse}}(s)$	1.520	1.490	1.489	1.489	1.490	1.491
bca-lap	**−4131.18**	*best generated*						
	5.652	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.144	0.116	0.117	0.117	0.117	0.117
		best fused	**−4131.18**	**−4131.18**	**−4131.18**	**−4131.18**	**−4131.18**	**−4131.18**
		$t_{\text{fuse}}(s)$	0.144	0.116	0.117	0.117	0.117	0.117
bca-greedy	**−4131.18**	*best generated*						
	1.608	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.056	0.018	0.018	0.032	0.032	0.034
		best fused	**−4131.18**	**−4131.18**	**−4131.18**	**−4131.18**	**−4131.18**	**−4131.18**
		$t_{\text{fuse}}(s)$	0.056	0.018	0.018	0.032	0.032	0.034
greedy	**−4131.18**	*best generated*						
	0.017	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.056	0.005	0.006	0.055	0.054	0.013
		best fused	**−4131.18**	**−4131.18**	**−4131.18**	**−4131.18**	**−4131.18**	**−4131.18**
		$t_{\text{fuse}}(s)$	0.056	0.005	0.006	0.055	0.054	0.013

hotel22 (*energy_hotel_frame8frame64*), known optimum: -4060.05

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4060.05**	*best generated*						
	0.095	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.110	0.073	0.073	0.108	0.107	0.075
		best fused	**−4060.05**	**−4060.05**	**−4060.05**	**−4060.05**	**−4060.05**	**−4060.05**
		$t_{\text{fuse}}(s)$	0.110	0.073	0.073	0.108	0.107	0.075
dd-ls3	**−4060.05**	*best generated*						
	0.459	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.593	0.560	0.560	0.560	0.560	0.561
		best fused	**−4060.05**	**−4060.05**	**−4060.05**	**−4060.05**	**−4060.05**	**−4060.05**
		$t_{\text{fuse}}(s)$	0.593	0.560	0.560	0.560	0.560	0.561
dd-ls4	**−4060.05**	*best generated*						
	0.133	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.121	0.089	0.088	0.146	0.146	0.090
		best fused	**−4060.05**	**−4060.05**	**−4060.05**	**−4060.05**	**−4060.05**	**−4060.05**
		$t_{\text{fuse}}(s)$	0.121	0.089	0.088	0.146	0.146	0.090
bca-lap	**−4060.05**	*best generated*						
	5.613	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.129	0.098	0.099	0.099	0.098	0.099
		best fused	**−4060.05**	**−4060.05**	**−4060.05**	**−4060.05**	**−4060.05**	**−4060.05**
		$t_{\text{fuse}}(s)$	0.129	0.098	0.099	0.099	0.098	0.099
bca-greedy	**−4060.05**	*best generated*						
	1.571	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.066	0.022	0.022	0.040	0.041	0.049
		best fused	**−4060.05**	**−4060.05**	**−4060.05**	**−4060.05**	**−4060.05**	**−4060.05**
		$t_{\text{fuse}}(s)$	0.066	0.022	0.022	0.040	0.041	0.049
greedy	−3742.32	*best generated*						
	0.038	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.075	0.005	0.006	0.130	0.130	0.188
		best fused	**−4060.05**	**−4060.05**	**−4060.05**	−3742.32	−3742.32	**−4060.05**
		$t_{\text{fuse}}(s)$	0.611	0.055	0.061	0.130	0.130	0.489

hotel23 (*energy_hotel_frame8frame71*), known optimum: -4021.39

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4021.39**	*best generated*						
	0.136	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.089	0.055	0.055	0.150	0.150	0.056
		best fused	**−4021.39**	**−4021.39**	**−4021.39**	**−4021.39**	**−4021.39**	**−4021.39**
		$t_{\text{fuse}}(s)$	0.089	0.055	0.055	0.150	0.150	0.056
dd-ls3	**−4021.39**	*best generated*						
	0.280	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.466	0.380	0.380	0.380	0.380	0.381
		best fused	**−4021.39**	**−4021.39**	**−4021.39**	**−4021.39**	**−4021.39**	**−4021.39**
		$t_{\text{fuse}}(s)$	0.466	0.380	0.380	0.380	0.380	0.381
dd-ls4	**−4021.39**	*best generated*						
	0.029	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.077	0.041	0.041	0.041	0.041	0.042
		best fused	**−4021.39**	**−4021.39**	**−4021.39**	**−4021.39**	**−4021.39**	**−4021.39**
		$t_{\text{fuse}}(s)$	0.077	0.041	0.041	0.041	0.041	0.042
bca-lap	**−4021.39**	*best generated*						
	7.701	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.125	0.095	0.095	0.095	0.095	0.096
		best fused	**−4021.39**	**−4021.39**	**−4021.39**	**−4021.39**	**−4021.39**	**−4021.39**
		$t_{\text{fuse}}(s)$	0.125	0.095	0.095	0.095	0.095	0.096
bca-greedy	**−4021.39**	*best generated*						
	1.678	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.062	0.025	0.025	0.025	0.025	0.032
		best fused	**−4021.39**	**−4021.39**	**−4021.39**	**−4021.39**	**−4021.39**	**−4021.39**
		$t_{\text{fuse}}(s)$	0.062	0.025	0.025	0.025	0.025	0.032
greedy	−3887.25	*best generated*						
	0.032	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.125	0.012	0.013	0.109	0.109	0.355
		best fused	**−4021.39**	**−4021.39**	**−4021.39**	−3887.25	−3887.25	−3925.26
		$t_{\text{fuse}}(s)$	0.144	0.014	0.016	0.109	0.109	0.355

hotel24 (*energy_hotel_frame8frame78*), known optimum: -3931.28

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3931.28**	*best generated*						
	0.511	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.114	0.072	0.072	0.536	0.536	0.074
		best fused	**−3931.28**	**−3931.28**	**−3931.28**	**−3931.28**	**−3931.28**	**−3931.28**
		$t_{\text{fuse}}(s)$	0.114	0.072	0.072	0.536	0.536	0.074
dd-ls3	**−3931.28**	*best generated*						
	4.099	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.676	1.616	1.617	4.229	4.229	1.619
		best fused	**−3931.28**	**−3931.28**	**−3931.28**	**−3931.28**	**−3931.28**	**−3931.28**
		$t_{\text{fuse}}(s)$	1.676	1.616	1.617	4.229	4.229	1.619
dd-ls4	**−3931.28**	*best generated*						
	0.271	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.293	0.195	0.196	0.291	0.291	0.199
		best fused	**−3931.28**	**−3931.28**	**−3931.28**	**−3931.28**	**−3931.28**	**−3931.28**
		$t_{\text{fuse}}(s)$	0.293	0.195	0.196	0.291	0.291	0.199
bca-lap	**−3931.28**	*best generated*						
	1.508	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.806	0.758	0.760	0.759	0.760	0.767
		best fused	**−3931.28**	**−3931.28**	**−3931.28**	**−3931.28**	**−3931.28**	**−3931.28**
		$t_{\text{fuse}}(s)$	0.806	0.758	0.760	0.759	0.760	0.767
bca-greedy	**−3931.28**	*best generated*						
	0.293	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.197	0.113	0.115	0.183	0.183	0.211
		best fused	**−3931.28**	**−3931.28**	**−3931.28**	**−3931.28**	**−3931.28**	**−3931.28**
		$t_{\text{fuse}}(s)$	0.197	0.113	0.115	0.183	0.183	0.211
greedy	−3717.36	*best generated*						
	0.010	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.071	0.006	0.005	0.036	0.036	0.201
		best fused	**−3931.28**	**−3931.28**	**−3931.28**	−3717.36	−3717.36	−3814.49
		$t_{\text{fuse}}(s)$	0.330	0.027	0.030	0.036	0.036	0.683

hotel25 (*energy_hotel_frame8frame85*), known optimum: -3877.57

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3877.57**	*best generated*						
	0.661	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.269	0.195	0.196	0.691	0.692	0.236
		best fused	**−3877.57**	**−3877.57**	**−3877.57**	**−3877.57**	**−3877.57**	**−3877.57**
		$t_{\text{fuse}}(s)$	0.269	0.195	0.196	0.691	0.692	0.236
dd-ls3	**−3877.57**	*best generated*						
	2.040	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.335	2.171	1.800	2.171	2.172	2.174
		best fused	**−3877.57**	**−3877.57**	**−3877.57**	**−3877.57**	**−3877.57**	**−3877.57**
		$t_{\text{fuse}}(s)$	2.335	2.171	1.800	2.171	2.172	2.174
dd-ls4	**−3877.57**	*best generated*						
	0.526	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.293	0.234	0.234	0.553	0.553	0.239
		best fused	**−3877.57**	**−3877.57**	**−3877.57**	**−3877.57**	**−3877.57**	**−3877.57**
		$t_{\text{fuse}}(s)$	0.293	0.234	0.234	0.553	0.553	0.239
bca-lap	−3767.08	*best generated*						
	5.379	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.275	0.242	0.242	0.242	0.242	0.244
		best fused	−3767.08	−3767.08	−3767.08	−3767.08	−3767.08	−3767.08
		$t_{\text{fuse}}(s)$	0.275	0.242	0.242	0.242	0.242	0.244
bca-greedy	**−3877.57**	*best generated*						
	0.055	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.131	0.060	0.061	0.064	0.065	0.078
		best fused	**−3877.57**	**−3877.57**	**−3877.57**	**−3877.57**	**−3877.57**	**−3877.57**
		$t_{\text{fuse}}(s)$	0.131	0.060	0.061	0.064	0.065	0.078
greedy	−3675.86	*best generated*						
	0.057	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.101	0.006	0.006	0.186	0.185	0.434
		best fused	**−3877.57**	**−3877.57**	**−3877.57**	−3675.86	−3675.86	−3789.73
		$t_{\text{fuse}}(s)$	0.159	0.011	0.012	0.186	0.185	0.543

hotel26 (*energy_hotel_frame8frame92*), known optimum: -3802.05

	generation		+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3802.05**	*best generated*						
	0.825	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.776	0.578	0.581	0.861	0.861	0.595
		best fused	**−3802.05**	**−3802.05**	**−3802.05**	**−3802.05**	**−3802.05**	**−3802.05**
		$t_{\text{fuse}}(s)$	0.776	0.578	0.581	0.861	0.861	0.595
dd-ls3	**−3802.05**	*best generated*						
	2.341	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.550	2.482	2.481	2.481	2.482	2.485
		best fused	**−3802.05**	**−3802.05**	**−3802.05**	**−3802.05**	**−3802.05**	**−3802.05**
		$t_{\text{fuse}}(s)$	2.550	2.482	2.481	2.481	2.482	2.485
dd-ls4	**−3802.05**	*best generated*						
	0.367	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.237	0.172	0.173	0.395	0.396	0.159
		best fused	**−3802.05**	**−3802.05**	**−3802.05**	**−3802.05**	**−3802.05**	**−3802.05**
		$t_{\text{fuse}}(s)$	0.237	0.172	0.173	0.395	0.396	0.159
bca-lap	−3688.83	*best generated*						
	1.106	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.774	0.703	0.704	0.703	0.704	0.709
		best fused	−3688.83	−3688.83	−3688.83	−3688.83	−3688.83	−3688.83
		$t_{\text{fuse}}(s)$	0.774	0.703	0.704	0.703	0.704	0.709
bca-greedy	**−3802.05**	*best generated*						
	0.031	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.279	1.592	1.609	0.039	0.038	0.098
		best fused	**−3802.05**	**−3802.05**	**−3802.05**	**−3802.05**	**−3802.05**	**−3802.05**
		$t_{\text{fuse}}(s)$	2.279	1.592	1.609	0.039	0.038	0.098
greedy	−3612.23	*best generated*						
	0.014	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.120	0.013	0.007	0.052	0.051	0.247
		best fused	**−3802.05**	**−3802.05**	**−3802.05**	−3612.23	−3612.23	−3739.03
		$t_{\text{fuse}}(s)$	0.236	0.048	0.054	0.052	0.051	0.636

hotel27 (*energy_hotel_frame8frame99*), known optimum: -3762.66

	generation		+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3762.66**	*best generated*						
	1.480	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.921	1.069	1.074	1.534	1.534	1.099
		best fused	**−3762.66**	**−3762.66**	**−3762.66**	**−3762.66**	**−3762.66**	**−3762.66**
		$t_{\text{fuse}}(s)$	0.921	1.069	1.074	1.534	1.534	1.099
dd-ls3	**−3762.66**	*best generated*						
	6.042	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.391	4.292	4.293	6.199	6.199	4.299
		best fused	**−3762.66**	**−3762.66**	**−3762.66**	**−3762.66**	**−3762.66**	**−3762.66**
		$t_{\text{fuse}}(s)$	4.391	4.292	4.293	6.199	6.199	4.299
dd-ls4	**−3762.66**	*best generated*						
	1.019	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.485	0.383	0.384	1.056	1.055	0.406
		best fused	**−3762.66**	**−3762.66**	**−3762.66**	**−3762.66**	**−3762.66**	**−3762.66**
		$t_{\text{fuse}}(s)$	0.485	0.383	0.384	1.056	1.055	0.406
bca-lap	−3559.45	*best generated*						
	5.596	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.978	0.915	0.917	0.916	0.916	0.926
		best fused	−3559.45	−3559.45	−3559.45	−3559.45	−3559.45	−3559.45
		$t_{\text{fuse}}(s)$	0.978	0.915	0.917	0.916	0.916	0.926
bca-greedy	−3674.62	*best generated*						
	0.792	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.134	0.063	0.064	0.136	0.136	0.153
		best fused	**−3762.66**	**−3762.66**	**−3762.66**	−3674.62	−3674.62	−3674.62
		$t_{\text{fuse}}(s)$	0.134	0.063	0.064	0.136	0.136	0.153
greedy	−3639.77	*best generated*						
	0.034	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.147	0.012	0.013	0.118	0.118	0.568
		best fused	**−3762.66**	**−3762.66**	**−3762.66**	−3639.77	−3639.77	−3639.77
		$t_{\text{fuse}}(s)$	0.161	0.013	0.015	0.118	0.118	0.568

hotel28 (*energy_hotel_frame15frame22*), known optimum: -4598.04

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4598.04**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.042	0.010	0.010	0.010	0.010	0.010
		best fused	**−4598.04**	**−4598.04**	**−4598.04**	**−4598.04**	**−4598.04**	**−4598.04**
		$t_{\text{fuse}}(s)$	0.042	0.010	0.010	0.010	0.010	0.010
dd-ls3	**−4598.04**	*best generated*						
	0.002	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.073	0.047	0.047	0.047	0.047	0.047
		best fused	**−4598.04**	**−4598.04**	**−4598.04**	**−4598.04**	**−4598.04**	**−4598.04**
		$t_{\text{fuse}}(s)$	0.073	0.047	0.047	0.047	0.047	0.047
dd-ls4	**−4598.04**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.100	0.003	0.003	0.003	0.003	0.003
		best fused	**−4598.04**	**−4598.04**	**−4598.04**	**−4598.04**	**−4598.04**	**−4598.04**
		$t_{\text{fuse}}(s)$	0.100	0.003	0.003	0.003	0.003	0.003
bca-lap	**−4598.04**	*best generated*						
	2.280	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.076	0.051	0.051	0.051	0.051	0.051
		best fused	**−4598.04**	**−4598.04**	**−4598.04**	**−4598.04**	**−4598.04**	**−4598.04**
		$t_{\text{fuse}}(s)$	0.076	0.051	0.051	0.051	0.051	0.051
bca-greedy	**−4598.04**	*best generated*						
	0.652	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.032	0.005	0.005	0.005	0.005	0.005
		best fused	**−4598.04**	**−4598.04**	**−4598.04**	**−4598.04**	**−4598.04**	**−4598.04**
		$t_{\text{fuse}}(s)$	0.032	0.005	0.005	0.005	0.005	0.005
greedy	**−4598.04**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.026	0.001	0.001	0.001	0.001	0.001
		best fused	**−4598.04**	**−4598.04**	**−4598.04**	**−4598.04**	**−4598.04**	**−4598.04**
		$t_{\text{fuse}}(s)$	0.026	0.001	0.001	0.001	0.001	0.001

hotel29 (*energy_hotel_frame15frame29*), known optimum: -4540.81

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4540.81**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.037	0.010	0.010	0.010	0.010	0.010
		best fused	**−4540.81**	**−4540.81**	**−4540.81**	**−4540.81**	**−4540.81**	**−4540.81**
		$t_{\text{fuse}}(s)$	0.037	0.010	0.010	0.010	0.010	0.010
dd-ls3	**−4540.81**	*best generated*						
	0.002	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.076	0.047	0.047	0.047	0.047	0.048
		best fused	**−4540.81**	**−4540.81**	**−4540.81**	**−4540.81**	**−4540.81**	**−4540.81**
		$t_{\text{fuse}}(s)$	0.076	0.047	0.047	0.047	0.047	0.048
dd-ls4	**−4540.81**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.032	0.003	0.003	0.003	0.003	0.004
		best fused	**−4540.81**	**−4540.81**	**−4540.81**	**−4540.81**	**−4540.81**	**−4540.81**
		$t_{\text{fuse}}(s)$	0.032	0.003	0.003	0.003	0.003	0.004
bca-lap	**−4540.81**	*best generated*						
	0.036	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.074	0.048	0.048	0.048	0.048	0.048
		best fused	**−4540.81**	**−4540.81**	**−4540.81**	**−4540.81**	**−4540.81**	**−4540.81**
		$t_{\text{fuse}}(s)$	0.074	0.048	0.048	0.048	0.048	0.048
bca-greedy	**−4540.81**	*best generated*						
	0.631	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
		best fused	**−4540.81**	**−4540.81**	**−4540.81**	**−4540.81**	**−4540.81**	**−4540.81**
		$t_{\text{fuse}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
greedy	**−4540.81**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.001	0.001	0.001	0.001	0.001
		best fused	**−4540.81**	**−4540.81**	**−4540.81**	**−4540.81**	**−4540.81**	**−4540.81**
		$t_{\text{fuse}}(s)$	0.028	0.001	0.001	0.001	0.001	0.001

hotel30 (*energy_hotel_frame15frame36*), known optimum: -4481.33

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4481.33**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.036	0.010	0.010	0.010	0.010	0.010
		best fused	**−4481.33**	**−4481.33**	**−4481.33**	**−4481.33**	**−4481.33**	**−4481.33**
		$t_{\text{fuse}}(s)$	0.036	0.010	0.010	0.010	0.010	0.010
dd-ls3	**−4481.33**	*best generated*						
	0.002	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.250	0.049	0.049	0.049	0.049	0.050
		best fused	**−4481.33**	**−4481.33**	**−4481.33**	**−4481.33**	**−4481.33**	**−4481.33**
		$t_{\text{fuse}}(s)$	0.250	0.049	0.049	0.049	0.049	0.050
dd-ls4	**−4481.33**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.073	0.004	0.004	0.004	0.004	0.004
		best fused	**−4481.33**	**−4481.33**	**−4481.33**	**−4481.33**	**−4481.33**	**−4481.33**
		$t_{\text{fuse}}(s)$	0.073	0.004	0.004	0.004	0.004	0.004
bca-lap	**−4481.33**	*best generated*						
	0.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.073	0.047	0.048	0.047	0.047	0.048
		best fused	**−4481.33**	**−4481.33**	**−4481.33**	**−4481.33**	**−4481.33**	**−4481.33**
		$t_{\text{fuse}}(s)$	0.073	0.047	0.048	0.047	0.047	0.048
bca-greedy	**−4481.33**	*best generated*						
	1.206	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.032	0.005	0.005	0.005	0.005	0.005
		best fused	**−4481.33**	**−4481.33**	**−4481.33**	**−4481.33**	**−4481.33**	**−4481.33**
		$t_{\text{fuse}}(s)$	0.032	0.005	0.005	0.005	0.005	0.005
greedy	**−4481.33**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001
		best fused	**−4481.33**	**−4481.33**	**−4481.33**	**−4481.33**	**−4481.33**	**−4481.33**
		$t_{\text{fuse}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001

hotel31 (*energy_hotel_frame15frame43*), known optimum: -4377.31

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4377.31**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.036	0.010	0.010	0.010	0.010	0.010
		best fused	**−4377.31**	**−4377.31**	**−4377.31**	**−4377.31**	**−4377.31**	**−4377.31**
		$t_{\text{fuse}}(s)$	0.036	0.010	0.010	0.010	0.010	0.010
dd-ls3	**−4377.31**	*best generated*						
	0.110	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.197	0.166	0.166	0.166	0.166	0.166
		best fused	**−4377.31**	**−4377.31**	**−4377.31**	**−4377.31**	**−4377.31**	**−4377.31**
		$t_{\text{fuse}}(s)$	0.197	0.166	0.166	0.166	0.166	0.166
dd-ls4	**−4377.31**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.040	0.006	0.006	0.006	0.006	0.006
		best fused	**−4377.31**	**−4377.31**	**−4377.31**	**−4377.31**	**−4377.31**	**−4377.31**
		$t_{\text{fuse}}(s)$	0.040	0.006	0.006	0.006	0.006	0.006
bca-lap	**−4377.31**	*best generated*						
	0.854	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.088	0.062	0.062	0.063	0.063	0.063
		best fused	**−4377.31**	**−4377.31**	**−4377.31**	**−4377.31**	**−4377.31**	**−4377.31**
		$t_{\text{fuse}}(s)$	0.088	0.062	0.062	0.063	0.063	0.063
bca-greedy	**−4377.31**	*best generated*						
	0.238	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.041	0.014	0.014	0.013	0.014	0.015
		best fused	**−4377.31**	**−4377.31**	**−4377.31**	**−4377.31**	**−4377.31**	**−4377.31**
		$t_{\text{fuse}}(s)$	0.041	0.014	0.014	0.013	0.014	0.015
greedy	**−4377.31**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.002	0.003	0.005	0.005	0.007
		best fused	**−4377.31**	**−4377.31**	**−4377.31**	**−4377.31**	**−4377.31**	**−4377.31**
		$t_{\text{fuse}}(s)$	0.030	0.002	0.003	0.005	0.005	0.007

hotel32 (*energy_hotel_frame15frame50*), known optimum: -4294.04

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4294.04**	*best generated*						
	0.051	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.082	0.053	0.053	0.062	0.062	0.055
		best fused	**−4294.04**	**−4294.04**	**−4294.04**	**−4294.04**	**−4294.04**	**−4294.04**
		$t_{\text{fuse}}(s)$	0.082	0.053	0.053	0.062	0.062	0.055
dd-ls3	**−4294.04**	*best generated*						
	0.227	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.313	0.286	0.285	0.286	0.286	0.286
		best fused	**−4294.04**	**−4294.04**	**−4294.04**	**−4294.04**	**−4294.04**	**−4294.04**
		$t_{\text{fuse}}(s)$	0.313	0.286	0.285	0.286	0.286	0.286
dd-ls4	**−4294.04**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.036	0.005	0.005	0.005	0.005	0.005
		best fused	**−4294.04**	**−4294.04**	**−4294.04**	**−4294.04**	**−4294.04**	**−4294.04**
		$t_{\text{fuse}}(s)$	0.036	0.005	0.005	0.005	0.005	0.005
bca-lap	**−4294.04**	*best generated*						
	0.671	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.104	0.075	0.075	0.075	0.075	0.075
		best fused	**−4294.04**	**−4294.04**	**−4294.04**	**−4294.04**	**−4294.04**	**−4294.04**
		$t_{\text{fuse}}(s)$	0.104	0.075	0.075	0.075	0.075	0.075
bca-greedy	**−4294.04**	*best generated*						
	0.182	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.037	0.010	0.010	0.010	0.010	0.010
		best fused	**−4294.04**	**−4294.04**	**−4294.04**	**−4294.04**	**−4294.04**	**−4294.04**
		$t_{\text{fuse}}(s)$	0.037	0.010	0.010	0.010	0.010	0.010
greedy	**−4294.04**	*best generated*						
	0.004	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.033	0.002	0.002	0.013	0.013	0.008
		best fused	**−4294.04**	**−4294.04**	**−4294.04**	**−4294.04**	**−4294.04**	**−4294.04**
		$t_{\text{fuse}}(s)$	0.033	0.002	0.002	0.013	0.013	0.008

hotel33 (*energy_hotel_frame15frame57*), known optimum: -4244.75

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4244.75**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.036	0.010	0.010	0.010	0.010	0.010
		best fused	**−4244.75**	**−4244.75**	**−4244.75**	**−4244.75**	**−4244.75**	**−4244.75**
		$t_{\text{fuse}}(s)$	0.036	0.010	0.010	0.010	0.010	0.010
dd-ls3	**−4244.75**	*best generated*						
	0.002	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.093	0.067	0.067	0.067	0.067	0.068
		best fused	**−4244.75**	**−4244.75**	**−4244.75**	**−4244.75**	**−4244.75**	**−4244.75**
		$t_{\text{fuse}}(s)$	0.093	0.067	0.067	0.067	0.067	0.068
dd-ls4	**−4244.75**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.006	0.006	0.005	0.005	0.006
		best fused	**−4244.75**	**−4244.75**	**−4244.75**	**−4244.75**	**−4244.75**	**−4244.75**
		$t_{\text{fuse}}(s)$	0.031	0.006	0.006	0.005	0.005	0.006
bca-lap	**−4244.75**	*best generated*						
	0.067	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.093	0.067	0.067	0.067	0.067	0.067
		best fused	**−4244.75**	**−4244.75**	**−4244.75**	**−4244.75**	**−4244.75**	**−4244.75**
		$t_{\text{fuse}}(s)$	0.093	0.067	0.067	0.067	0.067	0.067
bca-greedy	**−4244.75**	*best generated*						
	0.005	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.093	0.010	0.010	0.013	0.013	0.014
		best fused	**−4244.75**	**−4244.75**	**−4244.75**	**−4244.75**	**−4244.75**	**−4244.75**
		$t_{\text{fuse}}(s)$	0.093	0.010	0.010	0.013	0.013	0.014
greedy	**−4244.75**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.074	0.003	0.004	0.005	0.005	0.008
		best fused	**−4244.75**	**−4244.75**	**−4244.75**	**−4244.75**	**−4244.75**	**−4244.75**
		$t_{\text{fuse}}(s)$	0.074	0.003	0.004	0.005	0.005	0.008

hotel34 (*energy_hotel_frame15frame64*), known optimum: -4172.32

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4172.32**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.036	0.010	0.010	0.010	0.010	0.010
		best fused	**−4172.32**	**−4172.32**	**−4172.32**	**−4172.32**	**−4172.32**	**−4172.32**
		$t_{\text{fuse}}(s)$	0.036	0.010	0.010	0.010	0.010	0.010
dd-ls3	**−4172.32**	*best generated*						
	0.309	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.273	0.234	0.234	0.390	0.390	0.234
		best fused	**−4172.32**	**−4172.32**	**−4172.32**	**−4172.32**	**−4172.32**	**−4172.32**
		$t_{\text{fuse}}(s)$	0.273	0.234	0.234	0.390	0.390	0.234
dd-ls4	**−4172.32**	*best generated*						
	0.012	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.067	0.019	0.020	0.019	0.020	0.020
		best fused	**−4172.32**	**−4172.32**	**−4172.32**	**−4172.32**	**−4172.32**	**−4172.32**
		$t_{\text{fuse}}(s)$	0.067	0.019	0.020	0.019	0.020	0.020
bca-lap	**−4172.32**	*best generated*						
	1.091	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.089	0.062	0.062	0.061	0.061	0.062
		best fused	**−4172.32**	**−4172.32**	**−4172.32**	**−4172.32**	**−4172.32**	**−4172.32**
		$t_{\text{fuse}}(s)$	0.089	0.062	0.062	0.061	0.061	0.062
bca-greedy	**−4172.32**	*best generated*						
	0.301	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.050	0.010	0.010	0.009	0.010	0.010
		best fused	**−4172.32**	**−4172.32**	**−4172.32**	**−4172.32**	**−4172.32**	**−4172.32**
		$t_{\text{fuse}}(s)$	0.050	0.010	0.010	0.009	0.010	0.010
greedy	**−4172.32**	*best generated*						
	0.002	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.084	0.003	0.004	0.011	0.010	0.012
		best fused	**−4172.32**	**−4172.32**	**−4172.32**	**−4172.32**	**−4172.32**	**−4172.32**
		$t_{\text{fuse}}(s)$	0.084	0.003	0.004	0.011	0.010	0.012

hotel35 (*energy_hotel_frame15frame71*), known optimum: -4135.78

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4135.78**	*best generated*						
	0.052	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.097	0.063	0.063	0.063	0.063	0.065
		best fused	**−4135.78**	**−4135.78**	**−4135.78**	**−4135.78**	**−4135.78**	**−4135.78**
		$t_{\text{fuse}}(s)$	0.097	0.063	0.063	0.063	0.063	0.065
dd-ls3	**−4135.78**	*best generated*						
	0.386	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.432	0.388	0.388	0.469	0.469	0.389
		best fused	**−4135.78**	**−4135.78**	**−4135.78**	**−4135.78**	**−4135.78**	**−4135.78**
		$t_{\text{fuse}}(s)$	0.432	0.388	0.388	0.469	0.469	0.389
dd-ls4	**−4135.78**	*best generated*						
	0.037	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.090	0.047	0.048	0.047	0.048	0.048
		best fused	**−4135.78**	**−4135.78**	**−4135.78**	**−4135.78**	**−4135.78**	**−4135.78**
		$t_{\text{fuse}}(s)$	0.090	0.047	0.048	0.047	0.048	0.048
bca-lap	**−4135.78**	*best generated*						
	4.572	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.107	0.080	0.080	0.092	0.092	0.081
		best fused	**−4135.78**	**−4135.78**	**−4135.78**	**−4135.78**	**−4135.78**	**−4135.78**
		$t_{\text{fuse}}(s)$	0.107	0.080	0.080	0.092	0.092	0.081
bca-greedy	**−4135.78**	*best generated*						
	1.331	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.055	0.022	0.022	0.033	0.033	0.034
		best fused	**−4135.78**	**−4135.78**	**−4135.78**	**−4135.78**	**−4135.78**	**−4135.78**
		$t_{\text{fuse}}(s)$	0.055	0.022	0.022	0.033	0.033	0.034
greedy	**−4135.78**	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.038	0.003	0.003	0.043	0.043	0.009
		best fused	**−4135.78**	**−4135.78**	**−4135.78**	**−4135.78**	**−4135.78**	**−4135.78**
		$t_{\text{fuse}}(s)$	0.038	0.003	0.003	0.043	0.043	0.009

hotel36 (*energy_hotel_frame15frame78*), known optimum: -4036.15

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4036.15**	*best generated*						
	0.011	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.070	0.006	0.006	0.020	0.020	0.007
		best fused	**−4036.15**	**−4036.15**	**−4036.15**	**−4036.15**	**−4036.15**	**−4036.15**
		$t_{\text{fuse}}(s)$	0.070	0.006	0.006	0.020	0.020	0.007
dd-ls3	**−4036.15**	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.057	0.019	0.019	0.019	0.019	0.021
		best fused	**−4036.15**	**−4036.15**	**−4036.15**	**−4036.15**	**−4036.15**	**−4036.15**
		$t_{\text{fuse}}(s)$	0.057	0.019	0.019	0.019	0.019	0.021
dd-ls4	**−4036.15**	*best generated*						
	0.023	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.066	0.033	0.033	0.033	0.034	0.035
		best fused	**−4036.15**	**−4036.15**	**−4036.15**	**−4036.15**	**−4036.15**	**−4036.15**
		$t_{\text{fuse}}(s)$	0.066	0.033	0.033	0.033	0.034	0.035
bca-lap	**−4036.15**	*best generated*						
	2.245	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.456	0.419	0.419	0.418	0.419	0.423
		best fused	**−4036.15**	**−4036.15**	**−4036.15**	**−4036.15**	**−4036.15**	**−4036.15**
		$t_{\text{fuse}}(s)$	0.456	0.419	0.419	0.418	0.419	0.423
bca-greedy	**−4036.15**	*best generated*						
	0.488	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.049	0.014	0.013	0.093	0.093	0.099
		best fused	**−4036.15**	**−4036.15**	**−4036.15**	**−4036.15**	**−4036.15**	**−4036.15**
		$t_{\text{fuse}}(s)$	0.049	0.014	0.013	0.093	0.093	0.099
greedy	−4017.85	*best generated*						
	0.011	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.091	0.006	0.007	0.040	0.040	0.090
		best fused	**−4036.15**	**−4036.15**	**−4036.15**	−4017.85	−4017.85	**−4036.15**
		$t_{\text{fuse}}(s)$	0.091	0.006	0.007	0.040	0.040	0.090

hotel37 (*energy_hotel_frame15frame85*), known optimum: -3985.99

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3985.99**	*best generated*						
	0.018	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.079	0.009	0.009	0.033	0.033	0.012
		best fused	**−3985.99**	**−3985.99**	**−3985.99**	**−3985.99**	**−3985.99**	**−3985.99**
		$t_{\text{fuse}}(s)$	0.079	0.009	0.009	0.033	0.033	0.012
dd-ls3	**−3985.99**	*best generated*						
	0.044	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.048	0.015	0.015	0.053	0.053	0.016
		best fused	**−3985.99**	**−3985.99**	**−3985.99**	**−3985.99**	**−3985.99**	**−3985.99**
		$t_{\text{fuse}}(s)$	0.048	0.015	0.015	0.053	0.053	0.016
dd-ls4	**−3985.99**	*best generated*						
	0.123	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.114	0.077	0.077	0.138	0.139	0.079
		best fused	**−3985.99**	**−3985.99**	**−3985.99**	**−3985.99**	**−3985.99**	**−3985.99**
		$t_{\text{fuse}}(s)$	0.114	0.077	0.077	0.138	0.139	0.079
bca-lap	**−3985.99**	*best generated*						
	7.481	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.371	0.336	0.336	0.336	0.336	0.340
		best fused	**−3985.99**	**−3985.99**	**−3985.99**	**−3985.99**	**−3985.99**	**−3985.99**
		$t_{\text{fuse}}(s)$	0.371	0.336	0.336	0.336	0.336	0.340
bca-greedy	**−3985.99**	*best generated*						
	1.617	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.107	0.043	0.044	0.072	0.071	0.074
		best fused	**−3985.99**	**−3985.99**	**−3985.99**	**−3985.99**	**−3985.99**	**−3985.99**
		$t_{\text{fuse}}(s)$	0.107	0.043	0.044	0.072	0.071	0.074
greedy	−3757.60	*best generated*						
	0.027	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.187	0.004	0.004	0.092	0.092	0.520
		best fused	−3972.04	−3972.04	−3972.04	−3757.60	−3757.60	−3972.04
		$t_{\text{fuse}}(s)$	0.223	0.007	0.008	0.092	0.092	0.758

hotel38 (*energy_hotel_frame15frame92*), known optimum: -3898.11

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3898.11**	*best generated*						
	0.022	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.082	0.009	0.009	0.039	0.039	0.018
		best fused	**−3898.11**	**−3898.11**	**−3898.11**	**−3898.11**	**−3898.11**	**−3898.11**
		$t_{\text{fuse}}(s)$	0.082	0.009	0.009	0.039	0.039	0.018
dd-ls3	**−3898.11**	*best generated*						
	0.015	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.061	0.021	0.022	0.021	0.022	0.022
		best fused	**−3898.11**	**−3898.11**	**−3898.11**	**−3898.11**	**−3898.11**	**−3898.11**
		$t_{\text{fuse}}(s)$	0.061	0.021	0.022	0.021	0.022	0.022
dd-ls4	**−3898.11**	*best generated*						
	0.555	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.164	0.103	0.103	0.580	0.580	0.105
		best fused	**−3898.11**	**−3898.11**	**−3898.11**	**−3898.11**	**−3898.11**	**−3898.11**
		$t_{\text{fuse}}(s)$	0.164	0.103	0.103	0.580	0.580	0.105
bca-lap	**−3898.11**	*best generated*						
	6.004	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.324	1.238	1.240	1.239	1.240	1.254
		best fused	**−3898.11**	**−3898.11**	**−3898.11**	**−3898.11**	**−3898.11**	**−3898.11**
		$t_{\text{fuse}}(s)$	1.324	1.238	1.240	1.239	1.240	1.254
bca-greedy	**−3898.11**	*best generated*						
	0.917	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.095	0.038	0.039	0.039	0.039	0.046
		best fused	**−3898.11**	**−3898.11**	**−3898.11**	**−3898.11**	**−3898.11**	**−3898.11**
		$t_{\text{fuse}}(s)$	0.095	0.038	0.039	0.039	0.039	0.046
greedy	−3894.17	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.199	0.012	0.013	0.043	0.044	0.243
		best fused	**−3898.11**	**−3898.11**	**−3898.11**	−3894.17	−3894.17	−3894.17
		$t_{\text{fuse}}(s)$	1.560	0.144	0.158	0.043	0.044	0.243

hotel39 (*energy_hotel_frame15frame99*), known optimum: -3860.42

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3860.42**	*best generated*						
	0.015	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.175	0.026	0.027	0.028	0.028	0.036
		best fused	**−3860.42**	**−3860.42**	**−3860.42**	**−3860.42**	**−3860.42**	**−3860.42**
		$t_{\text{fuse}}(s)$	0.175	0.026	0.027	0.028	0.028	0.036
dd-ls3	**−3860.42**	*best generated*						
	0.264	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.114	0.054	0.055	0.285	0.289	0.058
		best fused	**−3860.42**	**−3860.42**	**−3860.42**	**−3860.42**	**−3860.42**	**−3860.42**
		$t_{\text{fuse}}(s)$	0.114	0.054	0.055	0.285	0.289	0.058
dd-ls4	**−3860.42**	*best generated*						
	0.637	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.285	0.221	0.221	0.665	0.665	0.225
		best fused	**−3860.42**	**−3860.42**	**−3860.42**	**−3860.42**	**−3860.42**	**−3860.42**
		$t_{\text{fuse}}(s)$	0.285	0.221	0.221	0.665	0.665	0.225
bca-lap	−3749.80	*best generated*						
	2.129	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.355	1.285	1.287	1.286	1.287	1.301
		best fused	−3749.80	−3749.80	−3749.80	−3749.80	−3749.80	−3749.80
		$t_{\text{fuse}}(s)$	1.355	1.285	1.287	1.286	1.287	1.301
bca-greedy	**−3860.42**	*best generated*						
	0.338	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.114	0.063	0.057	0.367	0.367	0.290
		best fused	**−3860.42**	**−3860.42**	**−3860.42**	**−3860.42**	**−3860.42**	**−3860.42**
		$t_{\text{fuse}}(s)$	0.114	0.063	0.057	0.367	0.367	0.290
greedy	−3784.99	*best generated*						
	0.008	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.084	0.006	0.007	0.028	0.030	0.729
		best fused	**−3860.42**	**−3860.42**	**−3860.42**	−3784.99	−3784.99	**−3860.42**
		$t_{\text{fuse}}(s)$	0.084	0.006	0.007	0.028	0.030	0.729

hotel40 (*energy_hotel_frame22frame29*), known optimum: -4615.38

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4615.38**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.026	0.001	0.001	0.001	0.001	0.001
		best fused	**−4615.38**	**−4615.38**	**−4615.38**	**−4615.38**	**−4615.38**	**−4615.38**
		$t_{\text{fuse}}(s)$	0.026	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4615.38**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.003	0.003	0.003	0.003	0.003
		best fused	**−4615.38**	**−4615.38**	**−4615.38**	**−4615.38**	**−4615.38**	**−4615.38**
		$t_{\text{fuse}}(s)$	0.031	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4615.38**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.034	0.003	0.003	0.003	0.003	0.003
		best fused	**−4615.38**	**−4615.38**	**−4615.38**	**−4615.38**	**−4615.38**	**−4615.38**
		$t_{\text{fuse}}(s)$	0.034	0.003	0.003	0.003	0.003	0.003
bca-lap	**−4615.38**	*best generated*						
	0.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.074	0.046	0.047	0.047	0.046	0.047
		best fused	**−4615.38**	**−4615.38**	**−4615.38**	**−4615.38**	**−4615.38**	**−4615.38**
		$t_{\text{fuse}}(s)$	0.074	0.046	0.047	0.047	0.046	0.047
bca-greedy	**−4615.38**	*best generated*						
	0.718	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
		best fused	**−4615.38**	**−4615.38**	**−4615.38**	**−4615.38**	**−4615.38**	**−4615.38**
		$t_{\text{fuse}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
greedy	**−4615.38**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.035	0.001	0.001	0.001	0.001	0.001
		best fused	**−4615.38**	**−4615.38**	**−4615.38**	**−4615.38**	**−4615.38**	**−4615.38**
		$t_{\text{fuse}}(s)$	0.035	0.001	0.001	0.001	0.001	0.001

hotel41 (*energy_hotel_frame22frame36*), known optimum: -4527.37

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4527.37**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.026	0.001	0.001	0.001	0.001	0.001
		best fused	**−4527.37**	**−4527.37**	**−4527.37**	**−4527.37**	**−4527.37**	**−4527.37**
		$t_{\text{fuse}}(s)$	0.026	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4527.37**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.002	0.003	0.002	0.003	0.003
		best fused	**−4527.37**	**−4527.37**	**−4527.37**	**−4527.37**	**−4527.37**	**−4527.37**
		$t_{\text{fuse}}(s)$	0.028	0.002	0.003	0.002	0.003	0.003
dd-ls4	**−4527.37**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.040	0.003	0.003	0.003	0.003	0.003
		best fused	**−4527.37**	**−4527.37**	**−4527.37**	**−4527.37**	**−4527.37**	**−4527.37**
		$t_{\text{fuse}}(s)$	0.040	0.003	0.003	0.003	0.003	0.003
bca-lap	**−4527.37**	*best generated*						
	0.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.073	0.047	0.047	0.047	0.047	0.047
		best fused	**−4527.37**	**−4527.37**	**−4527.37**	**−4527.37**	**−4527.37**	**−4527.37**
		$t_{\text{fuse}}(s)$	0.073	0.047	0.047	0.047	0.047	0.047
bca-greedy	**−4527.37**	*best generated*						
	1.707	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.039	0.005	0.005	0.005	0.005	0.005
		best fused	**−4527.37**	**−4527.37**	**−4527.37**	**−4527.37**	**−4527.37**	**−4527.37**
		$t_{\text{fuse}}(s)$	0.039	0.005	0.005	0.005	0.005	0.005
greedy	**−4527.37**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001
		best fused	**−4527.37**	**−4527.37**	**−4527.37**	**−4527.37**	**−4527.37**	**−4527.37**
		$t_{\text{fuse}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001

hotel42 (*energy_hotel_frame22frame43*), known optimum: -4428.42

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4428.42**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.043	0.001	0.001	0.001	0.001	0.001
		best fused	**−4428.42**	**−4428.42**	**−4428.42**	**−4428.42**	**−4428.42**	**−4428.42**
		$t_{\text{fuse}}(s)$	0.043	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4428.42**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.003	0.003	0.003	0.003	0.003
		best fused	**−4428.42**	**−4428.42**	**−4428.42**	**−4428.42**	**−4428.42**	**−4428.42**
		$t_{\text{fuse}}(s)$	0.028	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4428.42**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.004	0.004	0.004	0.004	0.004
		best fused	**−4428.42**	**−4428.42**	**−4428.42**	**−4428.42**	**−4428.42**	**−4428.42**
		$t_{\text{fuse}}(s)$	0.029	0.004	0.004	0.004	0.004	0.004
bca-lap	**−4428.42**	*best generated*						
	0.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.075	0.047	0.047	0.047	0.047	0.047
		best fused	**−4428.42**	**−4428.42**	**−4428.42**	**−4428.42**	**−4428.42**	**−4428.42**
		$t_{\text{fuse}}(s)$	0.075	0.047	0.047	0.047	0.047	0.047
bca-greedy	**−4428.42**	*best generated*						
	0.641	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.033	0.005	0.005	0.005	0.005	0.005
		best fused	**−4428.42**	**−4428.42**	**−4428.42**	**−4428.42**	**−4428.42**	**−4428.42**
		$t_{\text{fuse}}(s)$	0.033	0.005	0.005	0.005	0.005	0.005
greedy	**−4428.42**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.039	0.002	0.002	0.002	0.002	0.004
		best fused	**−4428.42**	**−4428.42**	**−4428.42**	**−4428.42**	**−4428.42**	**−4428.42**
		$t_{\text{fuse}}(s)$	0.039	0.002	0.002	0.002	0.002	0.004

hotel43 (*energy_hotel_frame22frame50*), known optimum: -4343.82

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4343.82**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.042	0.001	0.001	0.001	0.001	0.001
		best fused	**−4343.82**	**−4343.82**	**−4343.82**	**−4343.82**	**−4343.82**	**−4343.82**
		$t_{\text{fuse}}(s)$	0.042	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4343.82**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.003	0.003	0.003	0.003	0.003
		best fused	**−4343.82**	**−4343.82**	**−4343.82**	**−4343.82**	**−4343.82**	**−4343.82**
		$t_{\text{fuse}}(s)$	0.031	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4343.82**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.004	0.004	0.004	0.004	0.005
		best fused	**−4343.82**	**−4343.82**	**−4343.82**	**−4343.82**	**−4343.82**	**−4343.82**
		$t_{\text{fuse}}(s)$	0.030	0.004	0.004	0.004	0.004	0.005
bca-lap	**−4343.82**	*best generated*						
	5.423	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.075	0.048	0.048	0.048	0.048	0.049
		best fused	**−4343.82**	**−4343.82**	**−4343.82**	**−4343.82**	**−4343.82**	**−4343.82**
		$t_{\text{fuse}}(s)$	0.075	0.048	0.048	0.048	0.048	0.049
bca-greedy	**−4343.82**	*best generated*						
	1.561	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.066	0.010	0.010	0.010	0.010	0.010
		best fused	**−4343.82**	**−4343.82**	**−4343.82**	**−4343.82**	**−4343.82**	**−4343.82**
		$t_{\text{fuse}}(s)$	0.066	0.010	0.010	0.010	0.010	0.010
greedy	**−4343.82**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.002	0.002	0.003	0.003	0.003
		best fused	**−4343.82**	**−4343.82**	**−4343.82**	**−4343.82**	**−4343.82**	**−4343.82**
		$t_{\text{fuse}}(s)$	0.030	0.002	0.002	0.003	0.003	0.003

hotel44 (*energy_hotel_frame22frame57*), known optimum: -4302.35

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4302.35**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.036	0.001	0.001	0.001	0.001	0.001
		best fused	**−4302.35**	**−4302.35**	**−4302.35**	**−4302.35**	**−4302.35**	**−4302.35**
		$t_{\text{fuse}}(s)$	0.036	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4302.35**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.003	0.003	0.003	0.003	0.003
		best fused	**−4302.35**	**−4302.35**	**−4302.35**	**−4302.35**	**−4302.35**	**−4302.35**
		$t_{\text{fuse}}(s)$	0.031	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4302.35**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.048	0.005	0.005	0.005	0.005	0.005
		best fused	**−4302.35**	**−4302.35**	**−4302.35**	**−4302.35**	**−4302.35**	**−4302.35**
		$t_{\text{fuse}}(s)$	0.048	0.005	0.005	0.005	0.005	0.005
bca-lap	**−4302.35**	*best generated*						
	5.629	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.073	0.047	0.047	0.047	0.047	0.047
		best fused	**−4302.35**	**−4302.35**	**−4302.35**	**−4302.35**	**−4302.35**	**−4302.35**
		$t_{\text{fuse}}(s)$	0.073	0.047	0.047	0.047	0.047	0.047
bca-greedy	**−4302.35**	*best generated*						
	1.637	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.041	0.014	0.014	0.014	0.014	0.015
		best fused	**−4302.35**	**−4302.35**	**−4302.35**	**−4302.35**	**−4302.35**	**−4302.35**
		$t_{\text{fuse}}(s)$	0.041	0.014	0.014	0.014	0.014	0.015
greedy	**−4302.35**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.052	0.003	0.002	0.005	0.005	0.006
		best fused	**−4302.35**	**−4302.35**	**−4302.35**	**−4302.35**	**−4302.35**	**−4302.35**
		$t_{\text{fuse}}(s)$	0.052	0.003	0.002	0.005	0.005	0.006

hotel45 (*energy_hotel_frame22frame64*), known optimum: -4219.53

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4219.53**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.221	0.001	0.001	0.001	0.001	0.001
		best fused	**−4219.53**	**−4219.53**	**−4219.53**	**−4219.53**	**−4219.53**	**−4219.53**
		$t_{\text{fuse}}(s)$	0.221	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4219.53**	*best generated*						
	0.005	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.039	0.010	0.010	0.010	0.010	0.011
		best fused	**−4219.53**	**−4219.53**	**−4219.53**	**−4219.53**	**−4219.53**	**−4219.53**
		$t_{\text{fuse}}(s)$	0.039	0.010	0.010	0.010	0.010	0.011
dd-ls4	**−4219.53**	*best generated*						
	0.018	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.054	0.026	0.026	0.027	0.026	0.027
		best fused	**−4219.53**	**−4219.53**	**−4219.53**	**−4219.53**	**−4219.53**	**−4219.53**
		$t_{\text{fuse}}(s)$	0.054	0.026	0.026	0.027	0.026	0.027
bca-lap	**−4219.53**	*best generated*						
	5.059	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.085	0.060	0.059	0.059	0.059	0.059
		best fused	**−4219.53**	**−4219.53**	**−4219.53**	**−4219.53**	**−4219.53**	**−4219.53**
		$t_{\text{fuse}}(s)$	0.085	0.060	0.059	0.059	0.059	0.059
bca-greedy	**−4219.53**	*best generated*						
	1.500	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.041	0.013	0.013	0.013	0.013	0.013
		best fused	**−4219.53**	**−4219.53**	**−4219.53**	**−4219.53**	**−4219.53**	**−4219.53**
		$t_{\text{fuse}}(s)$	0.041	0.013	0.013	0.013	0.013	0.013
greedy	**−4219.53**	*best generated*						
	0.002	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.047	0.003	0.004	0.008	0.007	0.015
		best fused	**−4219.53**	**−4219.53**	**−4219.53**	**−4219.53**	**−4219.53**	**−4219.53**
		$t_{\text{fuse}}(s)$	0.047	0.003	0.004	0.008	0.007	0.015

hotel46 (*energy_hotel_frame22frame71*), known optimum: -4188.30

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4188.30**	*best generated*						
	0.003	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.037	0.005	0.006	0.006	0.006	0.007
		best fused	**−4188.30**	**−4188.30**	**−4188.30**	**−4188.30**	**−4188.30**	**−4188.30**
		$t_{\text{fuse}}(s)$	0.037	0.005	0.006	0.006	0.006	0.007
dd-ls3	**−4188.30**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.003	0.003	0.003	0.003	0.003
		best fused	**−4188.30**	**−4188.30**	**−4188.30**	**−4188.30**	**−4188.30**	**−4188.30**
		$t_{\text{fuse}}(s)$	0.031	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4188.30**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.042	0.007	0.008	0.008	0.008	0.008
		best fused	**−4188.30**	**−4188.30**	**−4188.30**	**−4188.30**	**−4188.30**	**−4188.30**
		$t_{\text{fuse}}(s)$	0.042	0.007	0.008	0.008	0.008	0.008
bca-lap	**−4188.30**	*best generated*						
	1.194	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.092	0.065	0.065	0.065	0.065	0.065
		best fused	**−4188.30**	**−4188.30**	**−4188.30**	**−4188.30**	**−4188.30**	**−4188.30**
		$t_{\text{fuse}}(s)$	0.092	0.065	0.065	0.065	0.065	0.065
bca-greedy	**−4188.30**	*best generated*						
	0.333	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.039	0.010	0.010	0.010	0.010	0.010
		best fused	**−4188.30**	**−4188.30**	**−4188.30**	**−4188.30**	**−4188.30**	**−4188.30**
		$t_{\text{fuse}}(s)$	0.039	0.010	0.010	0.010	0.010	0.010
greedy	**−4188.30**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.171	0.001	0.001	0.001	0.001	0.001
		best fused	**−4188.30**	**−4188.30**	**−4188.30**	**−4188.30**	**−4188.30**	**−4188.30**
		$t_{\text{fuse}}(s)$	0.171	0.001	0.001	0.001	0.001	0.001

hotel47 (*energy_hotel_frame22frame78*), known optimum: -4109.42

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4109.42**	*best generated*						
	0.004	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.037	0.005	0.006	0.009	0.010	0.007
		best fused	**−4109.42**	**−4109.42**	**−4109.42**	**−4109.42**	**−4109.42**	**−4109.42**
		$t_{\text{fuse}}(s)$	0.037	0.005	0.006	0.009	0.010	0.007
dd-ls3	**−4109.42**	*best generated*						
	0.012	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.046	0.014	0.015	0.017	0.018	0.015
		best fused	**−4109.42**	**−4109.42**	**−4109.42**	**−4109.42**	**−4109.42**	**−4109.42**
		$t_{\text{fuse}}(s)$	0.046	0.014	0.015	0.017	0.018	0.015
dd-ls4	**−4109.42**	*best generated*						
	0.036	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.059	0.031	0.031	0.046	0.046	0.032
		best fused	**−4109.42**	**−4109.42**	**−4109.42**	**−4109.42**	**−4109.42**	**−4109.42**
		$t_{\text{fuse}}(s)$	0.059	0.031	0.031	0.046	0.046	0.032
bca-lap	**−4109.42**	*best generated*						
	3.130	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.387	0.348	0.349	0.348	0.348	0.353
		best fused	**−4109.42**	**−4109.42**	**−4109.42**	**−4109.42**	**−4109.42**	**−4109.42**
		$t_{\text{fuse}}(s)$	0.387	0.348	0.349	0.348	0.348	0.353
bca-greedy	**−4109.42**	*best generated*						
	0.911	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.090	0.044	0.045	0.045	0.045	0.050
		best fused	**−4109.42**	**−4109.42**	**−4109.42**	**−4109.42**	**−4109.42**	**−4109.42**
		$t_{\text{fuse}}(s)$	0.090	0.044	0.045	0.045	0.045	0.050
greedy	**−4109.42**	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.062	0.005	0.005	0.045	0.046	0.164
		best fused	**−4109.42**	**−4109.42**	**−4109.42**	**−4109.42**	**−4109.42**	**−4109.42**
		$t_{\text{fuse}}(s)$	0.062	0.005	0.005	0.045	0.046	0.164

hotel48 (*energy_hotel_frame22frame85*), known optimum: -4063.39

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4063.39**	*best generated*						
	0.011	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.056	0.008	0.008	0.021	0.021	0.010
		best fused	**−4063.39**	**−4063.39**	**−4063.39**	**−4063.39**	**−4063.39**	**−4063.39**
		$t_{\text{fuse}}(s)$	0.056	0.008	0.008	0.021	0.021	0.010
dd-ls3	**−4063.39**	*best generated*						
	0.012	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.049	0.017	0.017	0.017	0.017	0.019
		best fused	**−4063.39**	**−4063.39**	**−4063.39**	**−4063.39**	**−4063.39**	**−4063.39**
		$t_{\text{fuse}}(s)$	0.049	0.017	0.017	0.017	0.017	0.019
dd-ls4	**−4063.39**	*best generated*						
	0.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.076	0.045	0.046	0.046	0.045	0.047
		best fused	**−4063.39**	**−4063.39**	**−4063.39**	**−4063.39**	**−4063.39**	**−4063.39**
		$t_{\text{fuse}}(s)$	0.076	0.045	0.046	0.046	0.045	0.047
bca-lap	**−4063.39**	*best generated*						
	2.005	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.164	0.126	0.126	0.307	0.307	0.127
		best fused	**−4063.39**	**−4063.39**	**−4063.39**	**−4063.39**	**−4063.39**	**−4063.39**
		$t_{\text{fuse}}(s)$	0.164	0.126	0.126	0.307	0.307	0.127
bca-greedy	**−4063.39**	*best generated*						
	0.538	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.066	0.022	0.022	0.022	0.022	0.023
		best fused	**−4063.39**	**−4063.39**	**−4063.39**	**−4063.39**	**−4063.39**	**−4063.39**
		$t_{\text{fuse}}(s)$	0.066	0.022	0.022	0.022	0.022	0.023
greedy	**−4063.39**	*best generated*						
	0.020	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.064	0.006	0.006	0.069	0.071	0.191
		best fused	**−4063.39**	**−4063.39**	**−4063.39**	**−4063.39**	**−4063.39**	**−4063.39**
		$t_{\text{fuse}}(s)$	0.064	0.006	0.006	0.069	0.071	0.191

hotel49 (*energy_hotel_frame22frame92*), known optimum: -3979.05

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3979.05**	*best generated*						
	0.007	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.064	0.009	0.009	0.014	0.014	0.012
		best fused	**−3979.05**	**−3979.05**	**−3979.05**	**−3979.05**	**−3979.05**	**−3979.05**
		$t_{\text{fuse}}(s)$	0.064	0.009	0.009	0.014	0.014	0.012
dd-ls3	**−3979.05**	*best generated*						
	0.010	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.048	0.015	0.015	0.016	0.016	0.017
		best fused	**−3979.05**	**−3979.05**	**−3979.05**	**−3979.05**	**−3979.05**	**−3979.05**
		$t_{\text{fuse}}(s)$	0.048	0.015	0.015	0.016	0.016	0.017
dd-ls4	**−3979.05**	*best generated*						
	0.007	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.045	0.018	0.018	0.018	0.018	0.019
		best fused	**−3979.05**	**−3979.05**	**−3979.05**	**−3979.05**	**−3979.05**	**−3979.05**
		$t_{\text{fuse}}(s)$	0.045	0.018	0.018	0.018	0.018	0.019
bca-lap	**−3979.05**	*best generated*						
	4.006	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.120	0.062	0.063	0.481	0.481	0.063
		best fused	**−3979.05**	**−3979.05**	**−3979.05**	**−3979.05**	**−3979.05**	**−3979.05**
		$t_{\text{fuse}}(s)$	0.120	0.062	0.063	0.481	0.481	0.063
bca-greedy	**−3979.05**	*best generated*						
	0.848	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.096	0.051	0.051	0.055	0.054	0.057
		best fused	**−3979.05**	**−3979.05**	**−3979.05**	**−3979.05**	**−3979.05**	**−3979.05**
		$t_{\text{fuse}}(s)$	0.096	0.051	0.051	0.055	0.054	0.057
greedy	**−3979.05**	*best generated*						
	0.020	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.099	0.009	0.010	0.067	0.068	0.082
		best fused	**−3979.05**	**−3979.05**	**−3979.05**	**−3979.05**	**−3979.05**	**−3979.05**
		$t_{\text{fuse}}(s)$	0.099	0.009	0.010	0.067	0.068	0.082

hotel50 (*energy_hotel_frame22frame99*), known optimum: -3956.74

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3956.74**	*best generated*						
	0.012	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.070	0.009	0.009	0.022	0.023	0.012
		best fused	**−3956.74**	**−3956.74**	**−3956.74**	**−3956.74**	**−3956.74**	**−3956.74**
		$t_{\text{fuse}}(s)$	0.070	0.009	0.009	0.022	0.023	0.012
dd-ls3	**−3956.74**	*best generated*						
	0.017	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.058	0.024	0.024	0.024	0.024	0.025
		best fused	**−3956.74**	**−3956.74**	**−3956.74**	**−3956.74**	**−3956.74**	**−3956.74**
		$t_{\text{fuse}}(s)$	0.058	0.024	0.024	0.024	0.024	0.025
dd-ls4	**−3956.74**	*best generated*						
	0.017	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.068	0.028	0.028	0.028	0.028	0.029
		best fused	**−3956.74**	**−3956.74**	**−3956.74**	**−3956.74**	**−3956.74**	**−3956.74**
		$t_{\text{fuse}}(s)$	0.068	0.028	0.028	0.028	0.028	0.029
bca-lap	**−3956.74**	*best generated*						
	3.854	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.661	2.502	2.508	2.507	2.506	2.536
		best fused	**−3956.74**	**−3956.74**	**−3956.74**	**−3956.74**	**−3956.74**	**−3956.74**
		$t_{\text{fuse}}(s)$	2.661	2.502	2.508	2.507	2.506	2.536
bca-greedy	**−3956.74**	*best generated*						
	0.843	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.077	0.031	0.031	0.039	0.038	0.056
		best fused	**−3956.74**	**−3956.74**	**−3956.74**	**−3956.74**	**−3956.74**	**−3956.74**
		$t_{\text{fuse}}(s)$	0.077	0.031	0.031	0.039	0.038	0.056
greedy	**−3956.74**	*best generated*						
	0.011	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.147	0.012	0.013	0.037	0.038	0.144
		best fused	**−3956.74**	**−3956.74**	**−3956.74**	**−3956.74**	**−3956.74**	**−3956.74**
		$t_{\text{fuse}}(s)$	0.147	0.012	0.013	0.037	0.038	0.144

hotel51 (*energy_hotel_frame29frame36*), known optimum: -4605.48

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4605.48**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.046	0.001	0.001	0.001	0.001	0.001
		best fused	**−4605.48**	**−4605.48**	**−4605.48**	**−4605.48**	**−4605.48**	**−4605.48**
		$t_{\text{fuse}}(s)$	0.046	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4605.48**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.002	0.002	0.002	0.003	0.003
		best fused	**−4605.48**	**−4605.48**	**−4605.48**	**−4605.48**	**−4605.48**	**−4605.48**
		$t_{\text{fuse}}(s)$	0.029	0.002	0.002	0.002	0.003	0.003
dd-ls4	**−4605.48**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.003	0.003	0.003	0.003	0.003
		best fused	**−4605.48**	**−4605.48**	**−4605.48**	**−4605.48**	**−4605.48**	**−4605.48**
		$t_{\text{fuse}}(s)$	0.030	0.003	0.003	0.003	0.003	0.003
bca-lap	**−4605.48**	*best generated*						
	0.037	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.082	0.048	0.048	0.048	0.048	0.049
		best fused	**−4605.48**	**−4605.48**	**−4605.48**	**−4605.48**	**−4605.48**	**−4605.48**
		$t_{\text{fuse}}(s)$	0.082	0.048	0.048	0.048	0.048	0.049
bca-greedy	**−4605.48**	*best generated*						
	0.589	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.034	0.008	0.008	0.008	0.008	0.008
		best fused	**−4605.48**	**−4605.48**	**−4605.48**	**−4605.48**	**−4605.48**	**−4605.48**
		$t_{\text{fuse}}(s)$	0.034	0.008	0.008	0.008	0.008	0.008
greedy	**−4605.48**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.001	0.001	0.001	0.001	0.001
		best fused	**−4605.48**	**−4605.48**	**−4605.48**	**−4605.48**	**−4605.48**	**−4605.48**
		$t_{\text{fuse}}(s)$	0.030	0.001	0.001	0.001	0.001	0.001

hotel52 (*energy_hotel_frame29frame43*), known optimum: -4493.70

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4493.70**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.001	0.001	0.001	0.001	0.001
		best fused	**−4493.70**	**−4493.70**	**−4493.70**	**−4493.70**	**−4493.70**	**−4493.70**
		$t_{\text{fuse}}(s)$	0.028	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4493.70**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.003	0.003	0.003	0.003	0.003
		best fused	**−4493.70**	**−4493.70**	**−4493.70**	**−4493.70**	**−4493.70**	**−4493.70**
		$t_{\text{fuse}}(s)$	0.029	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4493.70**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.004	0.004	0.004	0.004	0.004
		best fused	**−4493.70**	**−4493.70**	**−4493.70**	**−4493.70**	**−4493.70**	**−4493.70**
		$t_{\text{fuse}}(s)$	0.030	0.004	0.004	0.004	0.004	0.004
bca-lap	**−4493.70**	*best generated*						
	0.036	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.073	0.048	0.048	0.048	0.048	0.048
		best fused	**−4493.70**	**−4493.70**	**−4493.70**	**−4493.70**	**−4493.70**	**−4493.70**
		$t_{\text{fuse}}(s)$	0.073	0.048	0.048	0.048	0.048	0.048
bca-greedy	**−4493.70**	*best generated*						
	1.125	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
		best fused	**−4493.70**	**−4493.70**	**−4493.70**	**−4493.70**	**−4493.70**	**−4493.70**
		$t_{\text{fuse}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
greedy	**−4493.70**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.026	0.001	0.001	0.001	0.001	0.001
		best fused	**−4493.70**	**−4493.70**	**−4493.70**	**−4493.70**	**−4493.70**	**−4493.70**
		$t_{\text{fuse}}(s)$	0.026	0.001	0.001	0.001	0.001	0.001

hotel53 (*energy_hotel_frame29frame50*), known optimum: -4408.69

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4408.69**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.001	0.001	0.001	0.001	0.001
		best fused	**−4408.69**	**−4408.69**	**−4408.69**	**−4408.69**	**−4408.69**	**−4408.69**
		$t_{\text{fuse}}(s)$	0.028	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4408.69**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.003	0.003	0.003	0.003	0.003
		best fused	**−4408.69**	**−4408.69**	**−4408.69**	**−4408.69**	**−4408.69**	**−4408.69**
		$t_{\text{fuse}}(s)$	0.030	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4408.69**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.004	0.004	0.004	0.004	0.004
		best fused	**−4408.69**	**−4408.69**	**−4408.69**	**−4408.69**	**−4408.69**	**−4408.69**
		$t_{\text{fuse}}(s)$	0.029	0.004	0.004	0.004	0.004	0.004
bca-lap	**−4408.69**	*best generated*						
	5.621	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.076	0.048	0.048	0.048	0.048	0.048
		best fused	**−4408.69**	**−4408.69**	**−4408.69**	**−4408.69**	**−4408.69**	**−4408.69**
		$t_{\text{fuse}}(s)$	0.076	0.048	0.048	0.048	0.048	0.048
bca-greedy	**−4408.69**	*best generated*						
	1.618	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.032	0.005	0.005	0.005	0.005	0.005
		best fused	**−4408.69**	**−4408.69**	**−4408.69**	**−4408.69**	**−4408.69**	**−4408.69**
		$t_{\text{fuse}}(s)$	0.032	0.005	0.005	0.005	0.005	0.005
greedy	**−4408.69**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.033	0.003	0.003	0.003	0.003	0.003
		best fused	**−4408.69**	**−4408.69**	**−4408.69**	**−4408.69**	**−4408.69**	**−4408.69**
		$t_{\text{fuse}}(s)$	0.033	0.003	0.003	0.003	0.003	0.003

hotel54 (*energy_hotel_frame29frame57*), known optimum: -4373.36

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4373.36**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001
		best fused	**−4373.36**	**−4373.36**	**−4373.36**	**−4373.36**	**−4373.36**	**−4373.36**
		$t_{\text{fuse}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4373.36**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.003	0.003	0.003	0.003	0.003
		best fused	**−4373.36**	**−4373.36**	**−4373.36**	**−4373.36**	**−4373.36**	**−4373.36**
		$t_{\text{fuse}}(s)$	0.029	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4373.36**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.004	0.004	0.004	0.004	0.004
		best fused	**−4373.36**	**−4373.36**	**−4373.36**	**−4373.36**	**−4373.36**	**−4373.36**
		$t_{\text{fuse}}(s)$	0.031	0.004	0.004	0.004	0.004	0.004
bca-lap	**−4373.36**	*best generated*						
	5.143	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.078	0.053	0.053	0.053	0.053	0.053
		best fused	**−4373.36**	**−4373.36**	**−4373.36**	**−4373.36**	**−4373.36**	**−4373.36**
		$t_{\text{fuse}}(s)$	0.078	0.053	0.053	0.053	0.053	0.053
bca-greedy	**−4373.36**	*best generated*						
	1.457	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.032	0.005	0.005	0.005	0.005	0.005
		best fused	**−4373.36**	**−4373.36**	**−4373.36**	**−4373.36**	**−4373.36**	**−4373.36**
		$t_{\text{fuse}}(s)$	0.032	0.005	0.005	0.005	0.005	0.005
greedy	**−4373.36**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.003	0.002	0.002	0.003	0.003
		best fused	**−4373.36**	**−4373.36**	**−4373.36**	**−4373.36**	**−4373.36**	**−4373.36**
		$t_{\text{fuse}}(s)$	0.031	0.003	0.002	0.002	0.003	0.003

hotel55 (*energy_hotel_frame29frame64*), known optimum: -4295.62

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4295.62**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001
		best fused	**−4295.62**	**−4295.62**	**−4295.62**	**−4295.62**	**−4295.62**	**−4295.62**
		$t_{\text{fuse}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4295.62**	*best generated*						
	0.003	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.035	0.007	0.007	0.007	0.007	0.008
		best fused	**−4295.62**	**−4295.62**	**−4295.62**	**−4295.62**	**−4295.62**	**−4295.62**
		$t_{\text{fuse}}(s)$	0.035	0.007	0.007	0.007	0.007	0.008
dd-ls4	**−4295.62**	*best generated*						
	0.004	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.036	0.010	0.010	0.010	0.010	0.010
		best fused	**−4295.62**	**−4295.62**	**−4295.62**	**−4295.62**	**−4295.62**	**−4295.62**
		$t_{\text{fuse}}(s)$	0.036	0.010	0.010	0.010	0.010	0.010
bca-lap	**−4295.62**	*best generated*						
	5.418	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.076	0.048	0.048	0.049	0.048	0.049
		best fused	**−4295.62**	**−4295.62**	**−4295.62**	**−4295.62**	**−4295.62**	**−4295.62**
		$t_{\text{fuse}}(s)$	0.076	0.048	0.048	0.049	0.048	0.049
bca-greedy	**−4295.62**	*best generated*						
	1.540	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.036	0.009	0.009	0.010	0.010	0.010
		best fused	**−4295.62**	**−4295.62**	**−4295.62**	**−4295.62**	**−4295.62**	**−4295.62**
		$t_{\text{fuse}}(s)$	0.036	0.009	0.009	0.010	0.010	0.010
greedy	**−4295.62**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.033	0.002	0.002	0.003	0.002	0.003
		best fused	**−4295.62**	**−4295.62**	**−4295.62**	**−4295.62**	**−4295.62**	**−4295.62**
		$t_{\text{fuse}}(s)$	0.033	0.002	0.002	0.003	0.002	0.003

hotel56 (*energy_hotel_frame29frame71*), known optimum: -4253.97

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4253.97**	*best generated*						
	0.002	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.059	0.004	0.004	0.004	0.004	0.005
		best fused	**−4253.97**	**−4253.97**	**−4253.97**	**−4253.97**	**−4253.97**	**−4253.97**
		$t_{\text{fuse}}(s)$	0.059	0.004	0.004	0.004	0.004	0.005
dd-ls3	**−4253.97**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.003	0.003	0.003	0.003	0.003
		best fused	**−4253.97**	**−4253.97**	**−4253.97**	**−4253.97**	**−4253.97**	**−4253.97**
		$t_{\text{fuse}}(s)$	0.030	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4253.97**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.032	0.006	0.006	0.006	0.006	0.007
		best fused	**−4253.97**	**−4253.97**	**−4253.97**	**−4253.97**	**−4253.97**	**−4253.97**
		$t_{\text{fuse}}(s)$	0.032	0.006	0.006	0.006	0.006	0.007
bca-lap	**−4253.97**	*best generated*						
	0.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.083	0.047	0.047	0.047	0.047	0.047
		best fused	**−4253.97**	**−4253.97**	**−4253.97**	**−4253.97**	**−4253.97**	**−4253.97**
		$t_{\text{fuse}}(s)$	0.083	0.047	0.047	0.047	0.047	0.047
bca-greedy	**−4253.97**	*best generated*						
	1.632	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.040	0.013	0.013	0.013	0.013	0.014
		best fused	**−4253.97**	**−4253.97**	**−4253.97**	**−4253.97**	**−4253.97**	**−4253.97**
		$t_{\text{fuse}}(s)$	0.040	0.013	0.013	0.013	0.013	0.014
greedy	**−4253.97**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.002	0.003	0.002	0.002	0.003
		best fused	**−4253.97**	**−4253.97**	**−4253.97**	**−4253.97**	**−4253.97**	**−4253.97**
		$t_{\text{fuse}}(s)$	0.030	0.002	0.003	0.002	0.002	0.003

hotel57 (*energy_hotel_frame29frame78*), known optimum: -4167.70

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4167.70**	*best generated*						
	0.004	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.062	0.005	0.006	0.008	0.008	0.007
		best fused	**−4167.70**	**−4167.70**	**−4167.70**	**−4167.70**	**−4167.70**	**−4167.70**
		$t_{\text{fuse}}(s)$	0.062	0.005	0.006	0.008	0.008	0.007
dd-ls3	**−4167.70**	*best generated*						
	0.014	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.048	0.019	0.020	0.020	0.020	0.020
		best fused	**−4167.70**	**−4167.70**	**−4167.70**	**−4167.70**	**−4167.70**	**−4167.70**
		$t_{\text{fuse}}(s)$	0.048	0.019	0.020	0.020	0.020	0.020
dd-ls4	**−4167.70**	*best generated*						
	0.031	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.067	0.039	0.040	0.040	0.040	0.041
		best fused	**−4167.70**	**−4167.70**	**−4167.70**	**−4167.70**	**−4167.70**	**−4167.70**
		$t_{\text{fuse}}(s)$	0.067	0.039	0.040	0.040	0.040	0.041
bca-lap	**−4167.70**	*best generated*						
	4.667	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.359	0.323	0.324	0.324	0.324	0.328
		best fused	**−4167.70**	**−4167.70**	**−4167.70**	**−4167.70**	**−4167.70**	**−4167.70**
		$t_{\text{fuse}}(s)$	0.359	0.323	0.324	0.324	0.324	0.328
bca-greedy	**−4167.70**	*best generated*						
	1.339	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.081	0.042	0.043	0.043	0.043	0.045
		best fused	**−4167.70**	**−4167.70**	**−4167.70**	**−4167.70**	**−4167.70**	**−4167.70**
		$t_{\text{fuse}}(s)$	0.081	0.042	0.043	0.043	0.043	0.045
greedy	**−4167.70**	*best generated*						
	0.006	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.070	0.007	0.008	0.022	0.023	0.056
		best fused	**−4167.70**	**−4167.70**	**−4167.70**	**−4167.70**	**−4167.70**	**−4167.70**
		$t_{\text{fuse}}(s)$	0.070	0.007	0.008	0.022	0.023	0.056

hotel58 (*energy_hotel_frame29frame85*), known optimum: -4118.45

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4118.45**	*best generated*						
	0.004	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.052	0.008	0.008	0.009	0.010	0.010
		best fused	**−4118.45**	**−4118.45**	**−4118.45**	**−4118.45**	**−4118.45**	**−4118.45**
		$t_{\text{fuse}}(s)$	0.052	0.008	0.008	0.009	0.010	0.010
dd-ls3	**−4118.45**	*best generated*						
	0.008	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.042	0.013	0.013	0.013	0.014	0.014
		best fused	**−4118.45**	**−4118.45**	**−4118.45**	**−4118.45**	**−4118.45**	**−4118.45**
		$t_{\text{fuse}}(s)$	0.042	0.013	0.013	0.013	0.014	0.014
dd-ls4	**−4118.45**	*best generated*						
	0.039	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.082	0.049	0.049	0.049	0.049	0.050
		best fused	**−4118.45**	**−4118.45**	**−4118.45**	**−4118.45**	**−4118.45**	**−4118.45**
		$t_{\text{fuse}}(s)$	0.082	0.049	0.049	0.049	0.049	0.050
bca-lap	**−4118.45**	*best generated*						
	5.373	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.119	0.091	0.091	0.248	0.248	0.092
		best fused	**−4118.45**	**−4118.45**	**−4118.45**	**−4118.45**	**−4118.45**	**−4118.45**
		$t_{\text{fuse}}(s)$	0.119	0.091	0.091	0.248	0.248	0.092
bca-greedy	**−4118.45**	*best generated*						
	1.533	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.064	0.031	0.031	0.042	0.042	0.045
		best fused	**−4118.45**	**−4118.45**	**−4118.45**	**−4118.45**	**−4118.45**	**−4118.45**
		$t_{\text{fuse}}(s)$	0.064	0.031	0.031	0.042	0.042	0.045
greedy	**−4118.45**	*best generated*						
	0.031	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.056	0.004	0.005	0.094	0.093	0.293
		best fused	**−4118.45**	**−4118.45**	**−4118.45**	**−4118.45**	**−4118.45**	**−4118.45**
		$t_{\text{fuse}}(s)$	0.056	0.004	0.005	0.094	0.093	0.293

hotel59 (*energy_hotel_frame29frame92*), known optimum: -4037.12

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4037.12**	*best generated*						
	0.004	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.053	0.006	0.006	0.009	0.009	0.008
		best fused	**−4037.12**	**−4037.12**	**−4037.12**	**−4037.12**	**−4037.12**	**−4037.12**
		$t_{\text{fuse}}(s)$	0.053	0.006	0.006	0.009	0.009	0.008
dd-ls3	**−4037.12**	*best generated*						
	0.003	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.036	0.009	0.008	0.008	0.008	0.009
		best fused	**−4037.12**	**−4037.12**	**−4037.12**	**−4037.12**	**−4037.12**	**−4037.12**
		$t_{\text{fuse}}(s)$	0.036	0.009	0.008	0.008	0.008	0.009
dd-ls4	**−4037.12**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.034	0.008	0.008	0.008	0.008	0.008
		best fused	**−4037.12**	**−4037.12**	**−4037.12**	**−4037.12**	**−4037.12**	**−4037.12**
		$t_{\text{fuse}}(s)$	0.034	0.008	0.008	0.008	0.008	0.008
bca-lap	**−4037.12**	*best generated*						
	3.945	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.107	0.076	0.075	0.552	0.552	0.076
		best fused	**−4037.12**	**−4037.12**	**−4037.12**	**−4037.12**	**−4037.12**	**−4037.12**
		$t_{\text{fuse}}(s)$	0.107	0.076	0.075	0.552	0.552	0.076
bca-greedy	**−4037.12**	*best generated*						
	1.020	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.049	0.017	0.016	0.073	0.073	0.093
		best fused	**−4037.12**	**−4037.12**	**−4037.12**	**−4037.12**	**−4037.12**	**−4037.12**
		$t_{\text{fuse}}(s)$	0.049	0.017	0.016	0.073	0.073	0.093
greedy	**−4037.12**	*best generated*						
	0.007	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.045	0.003	0.003	0.025	0.025	0.111
		best fused	**−4037.12**	**−4037.12**	**−4037.12**	**−4037.12**	**−4037.12**	**−4037.12**
		$t_{\text{fuse}}(s)$	0.045	0.003	0.003	0.025	0.025	0.111

hotel60 (*energy_hotel_frame29frame99*), known optimum: -4007.34

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4007.34**	*best generated*						
	0.012	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.045	0.008	0.009	0.022	0.022	0.009
		best fused	**−4007.34**	**−4007.34**	**−4007.34**	**−4007.34**	**−4007.34**	**−4007.34**
		$t_{\text{fuse}}(s)$	0.045	0.008	0.009	0.022	0.022	0.009
dd-ls3	**−4007.34**	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.048	0.019	0.019	0.019	0.019	0.020
		best fused	**−4007.34**	**−4007.34**	**−4007.34**	**−4007.34**	**−4007.34**	**−4007.34**
		$t_{\text{fuse}}(s)$	0.048	0.019	0.019	0.019	0.019	0.020
dd-ls4	**−4007.34**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.047	0.008	0.008	0.008	0.008	0.008
		best fused	**−4007.34**	**−4007.34**	**−4007.34**	**−4007.34**	**−4007.34**	**−4007.34**
		$t_{\text{fuse}}(s)$	0.047	0.008	0.008	0.008	0.008	0.008
bca-lap	**−4007.34**	*best generated*						
	6.329	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.242	2.108	2.115	2.113	2.114	2.141
		best fused	**−4007.34**	**−4007.34**	**−4007.34**	**−4007.34**	**−4007.34**	**−4007.34**
		$t_{\text{fuse}}(s)$	2.242	2.108	2.115	2.113	2.114	2.141
bca-greedy	**−4007.34**	*best generated*						
	1.409	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.086	0.038	0.038	0.038	0.038	0.045
		best fused	**−4007.34**	**−4007.34**	**−4007.34**	**−4007.34**	**−4007.34**	**−4007.34**
		$t_{\text{fuse}}(s)$	0.086	0.038	0.038	0.038	0.038	0.045
greedy	**−4007.34**	*best generated*						
	0.005	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.114	0.010	0.011	0.018	0.018	0.080
		best fused	**−4007.34**	**−4007.34**	**−4007.34**	**−4007.34**	**−4007.34**	**−4007.34**
		$t_{\text{fuse}}(s)$	0.114	0.010	0.011	0.018	0.018	0.080

hotel61 (*energy_hotel_frame36frame43*), known optimum: -4571.30

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4571.30**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.001	0.001	0.001	0.001	0.001
		best fused	**−4571.30**	**−4571.30**	**−4571.30**	**−4571.30**	**−4571.30**	**−4571.30**
		$t_{\text{fuse}}(s)$	0.029	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4571.30**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.002	0.003	0.003	0.003	0.003
		best fused	**−4571.30**	**−4571.30**	**−4571.30**	**−4571.30**	**−4571.30**	**−4571.30**
		$t_{\text{fuse}}(s)$	0.028	0.002	0.003	0.003	0.003	0.003
dd-ls4	**−4571.30**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.003	0.003	0.003	0.003	0.003
		best fused	**−4571.30**	**−4571.30**	**−4571.30**	**−4571.30**	**−4571.30**	**−4571.30**
		$t_{\text{fuse}}(s)$	0.029	0.003	0.003	0.003	0.003	0.003
bca-lap	**−4571.30**	*best generated*						
	5.678	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.084	0.055	0.055	0.055	0.055	0.055
		best fused	**−4571.30**	**−4571.30**	**−4571.30**	**−4571.30**	**−4571.30**	**−4571.30**
		$t_{\text{fuse}}(s)$	0.084	0.055	0.055	0.055	0.055	0.055
bca-greedy	**−4571.30**	*best generated*						
	1.603	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
		best fused	**−4571.30**	**−4571.30**	**−4571.30**	**−4571.30**	**−4571.30**	**−4571.30**
		$t_{\text{fuse}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
greedy	**−4571.30**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.001	0.001	0.001	0.001	0.001
		best fused	**−4571.30**	**−4571.30**	**−4571.30**	**−4571.30**	**−4571.30**	**−4571.30**
		$t_{\text{fuse}}(s)$	0.028	0.001	0.001	0.001	0.001	0.001

hotel62 (*energy_hotel_frame36frame50*), known optimum: -4489.95

	generation		+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4489.95**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.032	0.001	0.001	0.001	0.001	0.001
		best fused	**−4489.95**	**−4489.95**	**−4489.95**	**−4489.95**	**−4489.95**	**−4489.95**
		$t_{\text{fuse}}(s)$	0.032	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4489.95**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.003	0.003	0.003	0.003	0.003
		best fused	**−4489.95**	**−4489.95**	**−4489.95**	**−4489.95**	**−4489.95**	**−4489.95**
		$t_{\text{fuse}}(s)$	0.031	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4489.95**	*best generated*						
	0.009	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.046	0.014	0.014	0.014	0.014	0.015
		best fused	**−4489.95**	**−4489.95**	**−4489.95**	**−4489.95**	**−4489.95**	**−4489.95**
		$t_{\text{fuse}}(s)$	0.046	0.014	0.014	0.014	0.014	0.015
bca-lap	**−4489.95**	*best generated*						
	0.049	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.090	0.061	0.061	0.061	0.061	0.061
		best fused	**−4489.95**	**−4489.95**	**−4489.95**	**−4489.95**	**−4489.95**	**−4489.95**
		$t_{\text{fuse}}(s)$	0.090	0.061	0.061	0.061	0.061	0.061
bca-greedy	**−4489.95**	*best generated*						
	0.856	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.053	0.005	0.005	0.005	0.005	0.005
		best fused	**−4489.95**	**−4489.95**	**−4489.95**	**−4489.95**	**−4489.95**	**−4489.95**
		$t_{\text{fuse}}(s)$	0.053	0.005	0.005	0.005	0.005	0.005
greedy	**−4489.95**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.003	0.003	0.004	0.003	0.004
		best fused	**−4489.95**	**−4489.95**	**−4489.95**	**−4489.95**	**−4489.95**	**−4489.95**
		$t_{\text{fuse}}(s)$	0.031	0.003	0.003	0.004	0.003	0.004

hotel63 (*energy_hotel_frame36frame57*), known optimum: -4451.32

	generation		+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4451.32**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.001	0.001	0.001	0.001	0.001
		best fused	**−4451.32**	**−4451.32**	**−4451.32**	**−4451.32**	**−4451.32**	**−4451.32**
		$t_{\text{fuse}}(s)$	0.029	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4451.32**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.002	0.002	0.003	0.003	0.003
		best fused	**−4451.32**	**−4451.32**	**−4451.32**	**−4451.32**	**−4451.32**	**−4451.32**
		$t_{\text{fuse}}(s)$	0.028	0.002	0.002	0.003	0.003	0.003
dd-ls4	**−4451.32**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.004	0.004	0.004	0.004	0.004
		best fused	**−4451.32**	**−4451.32**	**−4451.32**	**−4451.32**	**−4451.32**	**−4451.32**
		$t_{\text{fuse}}(s)$	0.029	0.004	0.004	0.004	0.004	0.004
bca-lap	**−4451.32**	*best generated*						
	4.140	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.073	0.047	0.047	0.047	0.047	0.047
		best fused	**−4451.32**	**−4451.32**	**−4451.32**	**−4451.32**	**−4451.32**	**−4451.32**
		$t_{\text{fuse}}(s)$	0.073	0.047	0.047	0.047	0.047	0.047
bca-greedy	**−4451.32**	*best generated*						
	1.203	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.037	0.010	0.010	0.010	0.010	0.011
		best fused	**−4451.32**	**−4451.32**	**−4451.32**	**−4451.32**	**−4451.32**	**−4451.32**
		$t_{\text{fuse}}(s)$	0.037	0.010	0.010	0.010	0.010	0.011
greedy	**−4451.32**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.001	0.001	0.001	0.001	0.001
		best fused	**−4451.32**	**−4451.32**	**−4451.32**	**−4451.32**	**−4451.32**	**−4451.32**
		$t_{\text{fuse}}(s)$	0.031	0.001	0.001	0.001	0.001	0.001

hotel64 (*energy_hotel_frame36frame64*), known optimum: -4373.51

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4373.51**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.001	0.001	0.001	0.001	0.001
		best fused	**−4373.51**	**−4373.51**	**−4373.51**	**−4373.51**	**−4373.51**	**−4373.51**
		$t_{\text{fuse}}(s)$	0.031	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4373.51**	*best generated*						
	0.005	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.036	0.009	0.009	0.009	0.009	0.009
		best fused	**−4373.51**	**−4373.51**	**−4373.51**	**−4373.51**	**−4373.51**	**−4373.51**
		$t_{\text{fuse}}(s)$	0.036	0.009	0.009	0.009	0.009	0.009
dd-ls4	**−4373.51**	*best generated*						
	0.007	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.040	0.013	0.013	0.013	0.013	0.014
		best fused	**−4373.51**	**−4373.51**	**−4373.51**	**−4373.51**	**−4373.51**	**−4373.51**
		$t_{\text{fuse}}(s)$	0.040	0.013	0.013	0.013	0.013	0.014
bca-lap	**−4373.51**	*best generated*						
	0.036	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.078	0.048	0.048	0.048	0.048	0.048
		best fused	**−4373.51**	**−4373.51**	**−4373.51**	**−4373.51**	**−4373.51**	**−4373.51**
		$t_{\text{fuse}}(s)$	0.078	0.048	0.048	0.048	0.048	0.048
bca-greedy	**−4373.51**	*best generated*						
	1.630	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.036	0.010	0.010	0.010	0.010	0.011
		best fused	**−4373.51**	**−4373.51**	**−4373.51**	**−4373.51**	**−4373.51**	**−4373.51**
		$t_{\text{fuse}}(s)$	0.036	0.010	0.010	0.010	0.010	0.011
greedy	**−4373.51**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.041	0.003	0.003	0.004	0.004	0.006
		best fused	**−4373.51**	**−4373.51**	**−4373.51**	**−4373.51**	**−4373.51**	**−4373.51**
		$t_{\text{fuse}}(s)$	0.041	0.003	0.003	0.004	0.004	0.006

hotel65 (*energy_hotel_frame36frame71*), known optimum: -4326.74

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4326.74**	*best generated*						
	0.002	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.033	0.005	0.005	0.005	0.006	0.006
		best fused	**−4326.74**	**−4326.74**	**−4326.74**	**−4326.74**	**−4326.74**	**−4326.74**
		$t_{\text{fuse}}(s)$	0.033	0.005	0.005	0.005	0.006	0.006
dd-ls3	**−4326.74**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.003	0.003	0.003	0.003	0.003
		best fused	**−4326.74**	**−4326.74**	**−4326.74**	**−4326.74**	**−4326.74**	**−4326.74**
		$t_{\text{fuse}}(s)$	0.029	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4326.74**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.048	0.006	0.006	0.006	0.006	0.006
		best fused	**−4326.74**	**−4326.74**	**−4326.74**	**−4326.74**	**−4326.74**	**−4326.74**
		$t_{\text{fuse}}(s)$	0.048	0.006	0.006	0.006	0.006	0.006
bca-lap	**−4326.74**	*best generated*						
	4.662	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.074	0.046	0.046	0.046	0.046	0.046
		best fused	**−4326.74**	**−4326.74**	**−4326.74**	**−4326.74**	**−4326.74**	**−4326.74**
		$t_{\text{fuse}}(s)$	0.074	0.046	0.046	0.046	0.046	0.046
bca-greedy	**−4326.74**	*best generated*						
	1.381	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.039	0.012	0.012	0.022	0.022	0.023
		best fused	**−4326.74**	**−4326.74**	**−4326.74**	**−4326.74**	**−4326.74**	**−4326.74**
		$t_{\text{fuse}}(s)$	0.039	0.012	0.012	0.022	0.022	0.023
greedy	**−4326.74**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.032	0.003	0.003	0.005	0.006	0.007
		best fused	**−4326.74**	**−4326.74**	**−4326.74**	**−4326.74**	**−4326.74**	**−4326.74**
		$t_{\text{fuse}}(s)$	0.032	0.003	0.003	0.005	0.006	0.007

hotel66 (*energy_hotel_frame36frame78*), known optimum: -4249.20

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4249.20**	*best generated*						
	0.002	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.058	0.005	0.006	0.006	0.006	0.007
		best fused	**−4249.20**	**−4249.20**	**−4249.20**	**−4249.20**	**−4249.20**	**−4249.20**
		$t_{\text{fuse}}(s)$	0.058	0.005	0.006	0.006	0.006	0.007
dd-ls3	**−4249.20**	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.047	0.018	0.019	0.019	0.018	0.020
		best fused	**−4249.20**	**−4249.20**	**−4249.20**	**−4249.20**	**−4249.20**	**−4249.20**
		$t_{\text{fuse}}(s)$	0.047	0.018	0.019	0.019	0.018	0.020
dd-ls4	**−4249.20**	*best generated*						
	0.018	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.054	0.026	0.026	0.026	0.026	0.027
		best fused	**−4249.20**	**−4249.20**	**−4249.20**	**−4249.20**	**−4249.20**	**−4249.20**
		$t_{\text{fuse}}(s)$	0.054	0.026	0.026	0.026	0.026	0.027
bca-lap	**−4249.20**	*best generated*						
	0.599	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.332	0.297	0.297	0.297	0.297	0.301
		best fused	**−4249.20**	**−4249.20**	**−4249.20**	**−4249.20**	**−4249.20**	**−4249.20**
		$t_{\text{fuse}}(s)$	0.332	0.297	0.297	0.297	0.297	0.301
bca-greedy	**−4249.20**	*best generated*						
	0.161	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.047	0.017	0.017	0.037	0.038	0.018
		best fused	**−4249.20**	**−4249.20**	**−4249.20**	**−4249.20**	**−4249.20**	**−4249.20**
		$t_{\text{fuse}}(s)$	0.047	0.017	0.017	0.037	0.038	0.018
greedy	−4214.05	*best generated*						
	0.012	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.061	0.007	0.008	0.038	0.038	0.089
		best fused	−4214.05	−4214.05	−4214.05	−4214.05	−4214.05	−4214.05
		$t_{\text{fuse}}(s)$	0.061	0.007	0.008	0.038	0.038	0.089

hotel67 (*energy_hotel_frame36frame85*), known optimum: -4192.38

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4192.38**	*best generated*						
	0.003	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.056	0.006	0.006	0.006	0.006	0.008
		best fused	**−4192.38**	**−4192.38**	**−4192.38**	**−4192.38**	**−4192.38**	**−4192.38**
		$t_{\text{fuse}}(s)$	0.056	0.006	0.006	0.006	0.006	0.008
dd-ls3	**−4192.38**	*best generated*						
	0.008	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.041	0.013	0.013	0.013	0.013	0.014
		best fused	**−4192.38**	**−4192.38**	**−4192.38**	**−4192.38**	**−4192.38**	**−4192.38**
		$t_{\text{fuse}}(s)$	0.041	0.013	0.013	0.013	0.013	0.014
dd-ls4	**−4192.38**	*best generated*						
	0.036	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.095	0.045	0.046	0.046	0.046	0.047
		best fused	**−4192.38**	**−4192.38**	**−4192.38**	**−4192.38**	**−4192.38**	**−4192.38**
		$t_{\text{fuse}}(s)$	0.095	0.045	0.046	0.046	0.046	0.047
bca-lap	**−4192.38**	*best generated*						
	5.844	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.201	0.098	0.099	0.160	0.161	0.099
		best fused	**−4192.38**	**−4192.38**	**−4192.38**	**−4192.38**	**−4192.38**	**−4192.38**
		$t_{\text{fuse}}(s)$	0.201	0.098	0.099	0.160	0.161	0.099
bca-greedy	**−4192.38**	*best generated*						
	1.682	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.070	0.026	0.026	0.045	0.045	0.055
		best fused	**−4192.38**	**−4192.38**	**−4192.38**	**−4192.38**	**−4192.38**	**−4192.38**
		$t_{\text{fuse}}(s)$	0.070	0.026	0.026	0.045	0.045	0.055
greedy	−4160.88	*best generated*						
	0.009	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.036	0.002	0.003	0.031	0.032	0.064
		best fused	−4160.88	−4160.88	−4160.88	−4160.88	−4160.88	−4160.88
		$t_{\text{fuse}}(s)$	0.036	0.002	0.003	0.031	0.032	0.064

hotel68 (*energy_hotel_frame36frame92*), known optimum: -4124.33

	generation		+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4124.33**	*best generated*						
	0.006	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.040	0.006	0.007	0.011	0.012	0.009
		best fused	**−4124.33**	**−4124.33**	**−4124.33**	**−4124.33**	**−4124.33**	**−4124.33**
		$t_{\text{fuse}}(s)$	0.040	0.006	0.007	0.011	0.012	0.009
dd-ls3	**−4124.33**	*best generated*						
	0.015	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.051	0.020	0.021	0.021	0.021	0.022
		best fused	**−4124.33**	**−4124.33**	**−4124.33**	**−4124.33**	**−4124.33**	**−4124.33**
		$t_{\text{fuse}}(s)$	0.051	0.020	0.021	0.021	0.021	0.022
dd-ls4	**−4124.33**	*best generated*						
	0.073	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.114	0.067	0.068	0.085	0.086	0.069
		best fused	**−4124.33**	**−4124.33**	**−4124.33**	**−4124.33**	**−4124.33**	**−4124.33**
		$t_{\text{fuse}}(s)$	0.114	0.067	0.068	0.085	0.086	0.069
bca-lap	**−4124.33**	*best generated*						
	4.759	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.202	0.163	0.164	0.164	0.163	0.165
		best fused	**−4124.33**	**−4124.33**	**−4124.33**	**−4124.33**	**−4124.33**	**−4124.33**
		$t_{\text{fuse}}(s)$	0.202	0.163	0.164	0.164	0.163	0.165
bca-greedy	**−4124.33**	*best generated*						
	1.340	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.069	0.033	0.033	0.033	0.033	0.038
		best fused	**−4124.33**	**−4124.33**	**−4124.33**	**−4124.33**	**−4124.33**	**−4124.33**
		$t_{\text{fuse}}(s)$	0.069	0.033	0.033	0.033	0.033	0.038
greedy	**−4124.33**	*best generated*						
	0.011	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.047	0.005	0.005	0.037	0.039	0.041
		best fused	**−4124.33**	**−4124.33**	**−4124.33**	**−4124.33**	**−4124.33**	**−4124.33**
		$t_{\text{fuse}}(s)$	0.047	0.005	0.005	0.037	0.039	0.041

hotel69 (*energy_hotel_frame36frame99*), known optimum: -4094.55

	generation		+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4094.55**	*best generated*						
	0.008	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.063	0.009	0.010	0.016	0.016	0.012
		best fused	**−4094.55**	**−4094.55**	**−4094.55**	**−4094.55**	**−4094.55**	**−4094.55**
		$t_{\text{fuse}}(s)$	0.063	0.009	0.010	0.016	0.016	0.012
dd-ls3	**−4094.55**	*best generated*						
	0.045	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.057	0.025	0.025	0.054	0.055	0.026
		best fused	**−4094.55**	**−4094.55**	**−4094.55**	**−4094.55**	**−4094.55**	**−4094.55**
		$t_{\text{fuse}}(s)$	0.057	0.025	0.025	0.054	0.055	0.026
dd-ls4	**−4094.55**	*best generated*						
	0.190	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.098	0.063	0.063	0.207	0.207	0.065
		best fused	**−4094.55**	**−4094.55**	**−4094.55**	**−4094.55**	**−4094.55**	**−4094.55**
		$t_{\text{fuse}}(s)$	0.098	0.063	0.063	0.207	0.207	0.065
bca-lap	**−4094.55**	*best generated*						
	3.774	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.461	1.357	1.359	1.359	1.359	1.378
		best fused	**−4094.55**	**−4094.55**	**−4094.55**	**−4094.55**	**−4094.55**	**−4094.55**
		$t_{\text{fuse}}(s)$	1.461	1.357	1.359	1.359	1.359	1.378
bca-greedy	**−4094.55**	*best generated*						
	0.830	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.072	0.031	0.031	0.173	0.173	0.207
		best fused	**−4094.55**	**−4094.55**	**−4094.55**	**−4094.55**	**−4094.55**	**−4094.55**
		$t_{\text{fuse}}(s)$	0.072	0.031	0.031	0.173	0.173	0.207
greedy	**−4094.55**	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.057	0.005	0.005	0.042	0.043	0.028
		best fused	**−4094.55**	**−4094.55**	**−4094.55**	**−4094.55**	**−4094.55**	**−4094.55**
		$t_{\text{fuse}}(s)$	0.057	0.005	0.005	0.042	0.043	0.028

hotel70 (*energy_hotel_frame43frame50*), known optimum: -4563.61

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4563.61**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.001	0.001	0.001	0.001	0.001
		best fused	**−4563.61**	**−4563.61**	**−4563.61**	**−4563.61**	**−4563.61**	**−4563.61**
		$t_{\text{fuse}}(s)$	0.029	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4563.61**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.081	0.003	0.002	0.003	0.003	0.003
		best fused	**−4563.61**	**−4563.61**	**−4563.61**	**−4563.61**	**−4563.61**	**−4563.61**
		$t_{\text{fuse}}(s)$	0.081	0.003	0.002	0.003	0.003	0.003
dd-ls4	**−4563.61**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.003	0.003	0.003	0.003	0.003
		best fused	**−4563.61**	**−4563.61**	**−4563.61**	**−4563.61**	**−4563.61**	**−4563.61**
		$t_{\text{fuse}}(s)$	0.031	0.003	0.003	0.003	0.003	0.003
bca-lap	**−4563.61**	*best generated*						
	0.575	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.074	0.048	0.048	0.048	0.048	0.048
		best fused	**−4563.61**	**−4563.61**	**−4563.61**	**−4563.61**	**−4563.61**	**−4563.61**
		$t_{\text{fuse}}(s)$	0.074	0.048	0.048	0.048	0.048	0.048
bca-greedy	**−4563.61**	*best generated*						
	0.156	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.032	0.005	0.005	0.005	0.005	0.005
		best fused	**−4563.61**	**−4563.61**	**−4563.61**	**−4563.61**	**−4563.61**	**−4563.61**
		$t_{\text{fuse}}(s)$	0.032	0.005	0.005	0.005	0.005	0.005
greedy	**−4563.61**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001
		best fused	**−4563.61**	**−4563.61**	**−4563.61**	**−4563.61**	**−4563.61**	**−4563.61**
		$t_{\text{fuse}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001

hotel71 (*energy_hotel_frame43frame57*), known optimum: -4532.17

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4532.17**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.052	0.001	0.001	0.001	0.001	0.001
		best fused	**−4532.17**	**−4532.17**	**−4532.17**	**−4532.17**	**−4532.17**	**−4532.17**
		$t_{\text{fuse}}(s)$	0.052	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4532.17**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.003	0.002	0.003	0.003	0.003
		best fused	**−4532.17**	**−4532.17**	**−4532.17**	**−4532.17**	**−4532.17**	**−4532.17**
		$t_{\text{fuse}}(s)$	0.028	0.003	0.002	0.003	0.003	0.003
dd-ls4	**−4532.17**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.004	0.004	0.004	0.004	0.004
		best fused	**−4532.17**	**−4532.17**	**−4532.17**	**−4532.17**	**−4532.17**	**−4532.17**
		$t_{\text{fuse}}(s)$	0.030	0.004	0.004	0.004	0.004	0.004
bca-lap	**−4532.17**	*best generated*						
	0.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.072	0.046	0.046	0.046	0.046	0.047
		best fused	**−4532.17**	**−4532.17**	**−4532.17**	**−4532.17**	**−4532.17**	**−4532.17**
		$t_{\text{fuse}}(s)$	0.072	0.046	0.046	0.046	0.046	0.047
bca-greedy	**−4532.17**	*best generated*						
	1.319	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.046	0.005	0.005	0.005	0.005	0.005
		best fused	**−4532.17**	**−4532.17**	**−4532.17**	**−4532.17**	**−4532.17**	**−4532.17**
		$t_{\text{fuse}}(s)$	0.046	0.005	0.005	0.005	0.005	0.005
greedy	**−4532.17**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001
		best fused	**−4532.17**	**−4532.17**	**−4532.17**	**−4532.17**	**−4532.17**	**−4532.17**
		$t_{\text{fuse}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001

hotel72 (*energy_hotel_frame43frame64*), known optimum: -4450.44

	generation		+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4450.44**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.032	0.001	0.001	0.001	0.001	0.001
		best fused	**−4450.44**	**−4450.44**	**−4450.44**	**−4450.44**	**−4450.44**	**−4450.44**
		$t_{\text{fuse}}(s)$	0.032	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4450.44**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.003	0.003	0.003	0.003	0.003
		best fused	**−4450.44**	**−4450.44**	**−4450.44**	**−4450.44**	**−4450.44**	**−4450.44**
		$t_{\text{fuse}}(s)$	0.029	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4450.44**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.032	0.005	0.005	0.005	0.005	0.005
		best fused	**−4450.44**	**−4450.44**	**−4450.44**	**−4450.44**	**−4450.44**	**−4450.44**
		$t_{\text{fuse}}(s)$	0.032	0.005	0.005	0.005	0.005	0.005
bca-lap	**−4450.44**	*best generated*						
	0.039	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.076	0.051	0.051	0.051	0.051	0.051
		best fused	**−4450.44**	**−4450.44**	**−4450.44**	**−4450.44**	**−4450.44**	**−4450.44**
		$t_{\text{fuse}}(s)$	0.076	0.051	0.051	0.051	0.051	0.051
bca-greedy	**−4450.44**	*best generated*						
	1.068	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.041	0.005	0.005	0.005	0.005	0.005
		best fused	**−4450.44**	**−4450.44**	**−4450.44**	**−4450.44**	**−4450.44**	**−4450.44**
		$t_{\text{fuse}}(s)$	0.041	0.005	0.005	0.005	0.005	0.005
greedy	**−4450.44**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.002	0.003	0.002	0.003	0.004
		best fused	**−4450.44**	**−4450.44**	**−4450.44**	**−4450.44**	**−4450.44**	**−4450.44**
		$t_{\text{fuse}}(s)$	0.031	0.002	0.003	0.002	0.003	0.004

hotel73 (*energy_hotel_frame43frame71*), known optimum: -4422.17

	generation		+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4422.17**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.126	0.001	0.001	0.001	0.001	0.001
		best fused	**−4422.17**	**−4422.17**	**−4422.17**	**−4422.17**	**−4422.17**	**−4422.17**
		$t_{\text{fuse}}(s)$	0.126	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4422.17**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.003	0.003	0.003	0.003	0.003
		best fused	**−4422.17**	**−4422.17**	**−4422.17**	**−4422.17**	**−4422.17**	**−4422.17**
		$t_{\text{fuse}}(s)$	0.028	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4422.17**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.006	0.006	0.006	0.006	0.006
		best fused	**−4422.17**	**−4422.17**	**−4422.17**	**−4422.17**	**−4422.17**	**−4422.17**
		$t_{\text{fuse}}(s)$	0.031	0.006	0.006	0.006	0.006	0.006
bca-lap	**−4422.17**	*best generated*						
	0.074	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.100	0.074	0.074	0.075	0.074	0.075
		best fused	**−4422.17**	**−4422.17**	**−4422.17**	**−4422.17**	**−4422.17**	**−4422.17**
		$t_{\text{fuse}}(s)$	0.100	0.074	0.074	0.075	0.074	0.075
bca-greedy	**−4422.17**	*best generated*						
	0.005	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.041	0.011	0.011	0.011	0.011	0.011
		best fused	**−4422.17**	**−4422.17**	**−4422.17**	**−4422.17**	**−4422.17**	**−4422.17**
		$t_{\text{fuse}}(s)$	0.041	0.011	0.011	0.011	0.011	0.011
greedy	**−4422.17**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.003	0.003	0.003	0.004	0.005
		best fused	**−4422.17**	**−4422.17**	**−4422.17**	**−4422.17**	**−4422.17**	**−4422.17**
		$t_{\text{fuse}}(s)$	0.031	0.003	0.003	0.003	0.004	0.005

hotel74 (*energy_hotel_frame43frame78*), known optimum: -4351.89

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4351.89**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.052	0.003	0.003	0.004	0.004	0.004
		best fused	**−4351.89**	**−4351.89**	**−4351.89**	**−4351.89**	**−4351.89**	**−4351.89**
		$t_{\text{fuse}}(s)$	0.052	0.003	0.003	0.004	0.004	0.004
dd-ls3	**−4351.89**	*best generated*						
	0.007	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.040	0.012	0.012	0.012	0.012	0.013
		best fused	**−4351.89**	**−4351.89**	**−4351.89**	**−4351.89**	**−4351.89**	**−4351.89**
		$t_{\text{fuse}}(s)$	0.040	0.012	0.012	0.012	0.012	0.013
dd-ls4	**−4351.89**	*best generated*						
	0.014	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.050	0.021	0.022	0.021	0.021	0.022
		best fused	**−4351.89**	**−4351.89**	**−4351.89**	**−4351.89**	**−4351.89**	**−4351.89**
		$t_{\text{fuse}}(s)$	0.050	0.021	0.022	0.021	0.021	0.022
bca-lap	**−4351.89**	*best generated*						
	0.323	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.115	0.088	0.089	0.088	0.089	0.089
		best fused	**−4351.89**	**−4351.89**	**−4351.89**	**−4351.89**	**−4351.89**	**−4351.89**
		$t_{\text{fuse}}(s)$	0.115	0.088	0.089	0.088	0.089	0.089
bca-greedy	**−4351.89**	*best generated*						
	0.087	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.046	0.017	0.017	0.018	0.017	0.018
		best fused	**−4351.89**	**−4351.89**	**−4351.89**	**−4351.89**	**−4351.89**	**−4351.89**
		$t_{\text{fuse}}(s)$	0.046	0.017	0.017	0.018	0.017	0.018
greedy	**−4351.89**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001
		best fused	**−4351.89**	**−4351.89**	**−4351.89**	**−4351.89**	**−4351.89**	**−4351.89**
		$t_{\text{fuse}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001

hotel75 (*energy_hotel_frame43frame85*), known optimum: -4295.89

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4295.89**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.071	0.002	0.003	0.003	0.003	0.003
		best fused	**−4295.89**	**−4295.89**	**−4295.89**	**−4295.89**	**−4295.89**	**−4295.89**
		$t_{\text{fuse}}(s)$	0.071	0.002	0.003	0.003	0.003	0.003
dd-ls3	**−4295.89**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.003	0.003	0.003	0.003	0.003
		best fused	**−4295.89**	**−4295.89**	**−4295.89**	**−4295.89**	**−4295.89**	**−4295.89**
		$t_{\text{fuse}}(s)$	0.029	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4295.89**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.033	0.007	0.007	0.007	0.007	0.007
		best fused	**−4295.89**	**−4295.89**	**−4295.89**	**−4295.89**	**−4295.89**	**−4295.89**
		$t_{\text{fuse}}(s)$	0.033	0.007	0.007	0.007	0.007	0.007
bca-lap	**−4295.89**	*best generated*						
	5.235	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.077	0.052	0.052	0.052	0.052	0.052
		best fused	**−4295.89**	**−4295.89**	**−4295.89**	**−4295.89**	**−4295.89**	**−4295.89**
		$t_{\text{fuse}}(s)$	0.077	0.052	0.052	0.052	0.052	0.052
bca-greedy	**−4295.89**	*best generated*						
	1.512	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.040	0.013	0.013	0.014	0.014	0.014
		best fused	**−4295.89**	**−4295.89**	**−4295.89**	**−4295.89**	**−4295.89**	**−4295.89**
		$t_{\text{fuse}}(s)$	0.040	0.013	0.013	0.014	0.014	0.014
greedy	**−4295.89**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.043	0.003	0.003	0.004	0.005	0.005
		best fused	**−4295.89**	**−4295.89**	**−4295.89**	**−4295.89**	**−4295.89**	**−4295.89**
		$t_{\text{fuse}}(s)$	0.043	0.003	0.003	0.004	0.005	0.005

hotel76 (*energy_hotel_frame43frame92*), known optimum: -4221.52

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4221.52**	*best generated*						
	0.003	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.049	0.005	0.004	0.007	0.007	0.006
		best fused	**−4221.52**	**−4221.52**	**−4221.52**	**−4221.52**	**−4221.52**	**−4221.52**
		$t_{\text{fuse}}(s)$	0.049	0.005	0.004	0.007	0.007	0.006
dd-ls3	**−4221.52**	*best generated*						
	0.011	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.044	0.016	0.016	0.016	0.016	0.017
		best fused	**−4221.52**	**−4221.52**	**−4221.52**	**−4221.52**	**−4221.52**	**−4221.52**
		$t_{\text{fuse}}(s)$	0.044	0.016	0.016	0.016	0.016	0.017
dd-ls4	**−4221.52**	*best generated*						
	0.019	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.055	0.028	0.028	0.028	0.028	0.029
		best fused	**−4221.52**	**−4221.52**	**−4221.52**	**−4221.52**	**−4221.52**	**−4221.52**
		$t_{\text{fuse}}(s)$	0.055	0.028	0.028	0.028	0.028	0.029
bca-lap	**−4221.52**	*best generated*						
	4.349	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.140	0.112	0.113	0.112	0.112	0.113
		best fused	**−4221.52**	**−4221.52**	**−4221.52**	**−4221.52**	**−4221.52**	**−4221.52**
		$t_{\text{fuse}}(s)$	0.140	0.112	0.113	0.112	0.112	0.113
bca-greedy	**−4221.52**	*best generated*						
	1.252	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.036	0.006	0.006	0.006	0.006	0.006
		best fused	**−4221.52**	**−4221.52**	**−4221.52**	**−4221.52**	**−4221.52**	**−4221.52**
		$t_{\text{fuse}}(s)$	0.036	0.006	0.006	0.006	0.006	0.006
greedy	**−4221.52**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.001	0.001	0.001	0.001	0.001
		best fused	**−4221.52**	**−4221.52**	**−4221.52**	**−4221.52**	**−4221.52**	**−4221.52**
		$t_{\text{fuse}}(s)$	0.031	0.001	0.001	0.001	0.001	0.001

hotel77 (*energy_hotel_frame43frame99*), known optimum: -4190.13

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4190.13**	*best generated*						
	0.003	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.083	0.005	0.005	0.007	0.007	0.007
		best fused	**−4190.13**	**−4190.13**	**−4190.13**	**−4190.13**	**−4190.13**	**−4190.13**
		$t_{\text{fuse}}(s)$	0.083	0.005	0.005	0.007	0.007	0.007
dd-ls3	**−4190.13**	*best generated*						
	0.017	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.051	0.022	0.022	0.022	0.022	0.024
		best fused	**−4190.13**	**−4190.13**	**−4190.13**	**−4190.13**	**−4190.13**	**−4190.13**
		$t_{\text{fuse}}(s)$	0.051	0.022	0.022	0.022	0.022	0.024
dd-ls4	**−4190.13**	*best generated*						
	0.037	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.076	0.048	0.048	0.048	0.048	0.049
		best fused	**−4190.13**	**−4190.13**	**−4190.13**	**−4190.13**	**−4190.13**	**−4190.13**
		$t_{\text{fuse}}(s)$	0.076	0.048	0.048	0.048	0.048	0.049
bca-lap	**−4190.13**	*best generated*						
	2.366	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.468	0.428	0.430	0.430	0.430	0.436
		best fused	**−4190.13**	**−4190.13**	**−4190.13**	**−4190.13**	**−4190.13**	**−4190.13**
		$t_{\text{fuse}}(s)$	0.468	0.428	0.430	0.430	0.430	0.436
bca-greedy	**−4190.13**	*best generated*						
	0.040	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.044	0.015	0.014	0.037	0.037	0.016
		best fused	**−4190.13**	**−4190.13**	**−4190.13**	**−4190.13**	**−4190.13**	**−4190.13**
		$t_{\text{fuse}}(s)$	0.044	0.015	0.014	0.037	0.037	0.016
greedy	**−4190.13**	*best generated*						
	0.004	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.036	0.003	0.003	0.013	0.014	0.027
		best fused	**−4190.13**	**−4190.13**	**−4190.13**	**−4190.13**	**−4190.13**	**−4190.13**
		$t_{\text{fuse}}(s)$	0.036	0.003	0.003	0.013	0.014	0.027

hotel78 (*energy_hotel_frame50frame57*), known optimum: -4566.79

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4566.79**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.098	0.001	0.001	0.001	0.001	0.001
		best fused	**−4566.79**	**−4566.79**	**−4566.79**	**−4566.79**	**−4566.79**	**−4566.79**
		$t_{\text{fuse}}(s)$	0.098	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4566.79**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.002	0.003	0.003	0.003	0.003
		best fused	**−4566.79**	**−4566.79**	**−4566.79**	**−4566.79**	**−4566.79**	**−4566.79**
		$t_{\text{fuse}}(s)$	0.028	0.002	0.003	0.003	0.003	0.003
dd-ls4	**−4566.79**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.003	0.003	0.003	0.003	0.004
		best fused	**−4566.79**	**−4566.79**	**−4566.79**	**−4566.79**	**−4566.79**	**−4566.79**
		$t_{\text{fuse}}(s)$	0.029	0.003	0.003	0.003	0.003	0.004
bca-lap	**−4566.79**	*best generated*						
	0.041	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.078	0.053	0.053	0.053	0.053	0.053
		best fused	**−4566.79**	**−4566.79**	**−4566.79**	**−4566.79**	**−4566.79**	**−4566.79**
		$t_{\text{fuse}}(s)$	0.078	0.053	0.053	0.053	0.053	0.053
bca-greedy	**−4566.79**	*best generated*						
	1.012	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.033	0.005	0.005	0.005	0.005	0.006
		best fused	**−4566.79**	**−4566.79**	**−4566.79**	**−4566.79**	**−4566.79**	**−4566.79**
		$t_{\text{fuse}}(s)$	0.033	0.005	0.005	0.005	0.005	0.006
greedy	**−4566.79**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001
		best fused	**−4566.79**	**−4566.79**	**−4566.79**	**−4566.79**	**−4566.79**	**−4566.79**
		$t_{\text{fuse}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001

hotel79 (*energy_hotel_frame50frame64*), known optimum: -4517.31

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4517.31**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.044	0.001	0.001	0.001	0.001	0.001
		best fused	**−4517.31**	**−4517.31**	**−4517.31**	**−4517.31**	**−4517.31**	**−4517.31**
		$t_{\text{fuse}}(s)$	0.044	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4517.31**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.003	0.003	0.003	0.003	0.003
		best fused	**−4517.31**	**−4517.31**	**−4517.31**	**−4517.31**	**−4517.31**	**−4517.31**
		$t_{\text{fuse}}(s)$	0.029	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4517.31**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.004	0.004	0.004	0.004	0.004
		best fused	**−4517.31**	**−4517.31**	**−4517.31**	**−4517.31**	**−4517.31**	**−4517.31**
		$t_{\text{fuse}}(s)$	0.030	0.004	0.004	0.004	0.004	0.004
bca-lap	**−4517.31**	*best generated*						
	3.922	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.075	0.050	0.050	0.050	0.050	0.050
		best fused	**−4517.31**	**−4517.31**	**−4517.31**	**−4517.31**	**−4517.31**	**−4517.31**
		$t_{\text{fuse}}(s)$	0.075	0.050	0.050	0.050	0.050	0.050
bca-greedy	**−4517.31**	*best generated*						
	1.111	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
		best fused	**−4517.31**	**−4517.31**	**−4517.31**	**−4517.31**	**−4517.31**	**−4517.31**
		$t_{\text{fuse}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
greedy	**−4517.31**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001
		best fused	**−4517.31**	**−4517.31**	**−4517.31**	**−4517.31**	**−4517.31**	**−4517.31**
		$t_{\text{fuse}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001

hotel80 (*energy_hotel_frame50frame71*), known optimum: -4463.52

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4463.52**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.001	0.001	0.001	0.001	0.001
		best fused	**−4463.52**	**−4463.52**	**−4463.52**	**−4463.52**	**−4463.52**	**−4463.52**
		$t_{\text{fuse}}(s)$	0.028	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4463.52**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.003	0.003	0.003	0.003	0.003
		best fused	**−4463.52**	**−4463.52**	**−4463.52**	**−4463.52**	**−4463.52**	**−4463.52**
		$t_{\text{fuse}}(s)$	0.028	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4463.52**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.005	0.005	0.005	0.005	0.006
		best fused	**−4463.52**	**−4463.52**	**−4463.52**	**−4463.52**	**−4463.52**	**−4463.52**
		$t_{\text{fuse}}(s)$	0.031	0.005	0.005	0.005	0.005	0.006
bca-lap	**−4463.52**	*best generated*						
	0.508	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.079	0.053	0.053	0.053	0.053	0.053
		best fused	**−4463.52**	**−4463.52**	**−4463.52**	**−4463.52**	**−4463.52**	**−4463.52**
		$t_{\text{fuse}}(s)$	0.079	0.053	0.053	0.053	0.053	0.053
bca-greedy	**−4463.52**	*best generated*						
	0.142	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.111	0.016	0.015	0.015	0.016	0.017
		best fused	**−4463.52**	**−4463.52**	**−4463.52**	**−4463.52**	**−4463.52**	**−4463.52**
		$t_{\text{fuse}}(s)$	0.111	0.016	0.015	0.015	0.016	0.017
greedy	**−4463.52**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.003	0.003	0.003	0.003	0.005
		best fused	**−4463.52**	**−4463.52**	**−4463.52**	**−4463.52**	**−4463.52**	**−4463.52**
		$t_{\text{fuse}}(s)$	0.031	0.003	0.003	0.003	0.003	0.005

hotel81 (*energy_hotel_frame50frame78*), known optimum: -4400.83

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4400.83**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.033	0.001	0.001	0.001	0.001	0.001
		best fused	**−4400.83**	**−4400.83**	**−4400.83**	**−4400.83**	**−4400.83**	**−4400.83**
		$t_{\text{fuse}}(s)$	0.033	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4400.83**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.047	0.003	0.003	0.003	0.003	0.003
		best fused	**−4400.83**	**−4400.83**	**−4400.83**	**−4400.83**	**−4400.83**	**−4400.83**
		$t_{\text{fuse}}(s)$	0.047	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4400.83**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.032	0.005	0.005	0.005	0.006	0.006
		best fused	**−4400.83**	**−4400.83**	**−4400.83**	**−4400.83**	**−4400.83**	**−4400.83**
		$t_{\text{fuse}}(s)$	0.032	0.005	0.005	0.005	0.006	0.006
bca-lap	**−4400.83**	*best generated*						
	0.041	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.078	0.053	0.053	0.053	0.053	0.053
		best fused	**−4400.83**	**−4400.83**	**−4400.83**	**−4400.83**	**−4400.83**	**−4400.83**
		$t_{\text{fuse}}(s)$	0.078	0.053	0.053	0.053	0.053	0.053
bca-greedy	**−4400.83**	*best generated*						
	0.107	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.050	0.010	0.010	0.009	0.010	0.010
		best fused	**−4400.83**	**−4400.83**	**−4400.83**	**−4400.83**	**−4400.83**	**−4400.83**
		$t_{\text{fuse}}(s)$	0.050	0.010	0.010	0.009	0.010	0.010
greedy	**−4400.83**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.002	0.002	0.016	0.003	0.002
		best fused	**−4400.83**	**−4400.83**	**−4400.83**	**−4400.83**	**−4400.83**	**−4400.83**
		$t_{\text{fuse}}(s)$	0.029	0.002	0.002	0.016	0.003	0.002

hotel82 (*energy_hotel_frame50frame85*), known optimum: -4342.35

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4342.35**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.041	0.001	0.001	0.001	0.001	0.001
		best fused	**−4342.35**	**−4342.35**	**−4342.35**	**−4342.35**	**−4342.35**	**−4342.35**
		$t_{\text{fuse}}(s)$	0.041	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4342.35**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.048	0.003	0.003	0.003	0.003	0.003
		best fused	**−4342.35**	**−4342.35**	**−4342.35**	**−4342.35**	**−4342.35**	**−4342.35**
		$t_{\text{fuse}}(s)$	0.048	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4342.35**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.032	0.006	0.006	0.006	0.006	0.006
		best fused	**−4342.35**	**−4342.35**	**−4342.35**	**−4342.35**	**−4342.35**	**−4342.35**
		$t_{\text{fuse}}(s)$	0.032	0.006	0.006	0.006	0.006	0.006
bca-lap	**−4342.35**	*best generated*						
	3.538	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.079	0.052	0.052	0.052	0.052	0.052
		best fused	**−4342.35**	**−4342.35**	**−4342.35**	**−4342.35**	**−4342.35**	**−4342.35**
		$t_{\text{fuse}}(s)$	0.079	0.052	0.052	0.052	0.052	0.052
bca-greedy	**−4342.35**	*best generated*						
	1.040	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.049	0.005	0.005	0.005	0.005	0.005
		best fused	**−4342.35**	**−4342.35**	**−4342.35**	**−4342.35**	**−4342.35**	**−4342.35**
		$t_{\text{fuse}}(s)$	0.049	0.005	0.005	0.005	0.005	0.005
greedy	**−4342.35**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.033	0.003	0.004	0.026	0.003	0.004
		best fused	**−4342.35**	**−4342.35**	**−4342.35**	**−4342.35**	**−4342.35**	**−4342.35**
		$t_{\text{fuse}}(s)$	0.033	0.003	0.004	0.026	0.003	0.004

hotel83 (*energy_hotel_frame50frame92*), known optimum: -4260.01

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4260.01**	*best generated*						
	0.002	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.111	0.004	0.004	0.005	0.005	0.005
		best fused	**−4260.01**	**−4260.01**	**−4260.01**	**−4260.01**	**−4260.01**	**−4260.01**
		$t_{\text{fuse}}(s)$	0.111	0.004	0.004	0.005	0.005	0.005
dd-ls3	**−4260.01**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.040	0.003	0.003	0.003	0.003	0.003
		best fused	**−4260.01**	**−4260.01**	**−4260.01**	**−4260.01**	**−4260.01**	**−4260.01**
		$t_{\text{fuse}}(s)$	0.040	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4260.01**	*best generated*						
	0.012	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.048	0.021	0.021	0.020	0.021	0.021
		best fused	**−4260.01**	**−4260.01**	**−4260.01**	**−4260.01**	**−4260.01**	**−4260.01**
		$t_{\text{fuse}}(s)$	0.048	0.021	0.021	0.020	0.021	0.021
bca-lap	**−4260.01**	*best generated*						
	4.995	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.132	0.101	0.102	0.101	0.102	0.102
		best fused	**−4260.01**	**−4260.01**	**−4260.01**	**−4260.01**	**−4260.01**	**−4260.01**
		$t_{\text{fuse}}(s)$	0.132	0.101	0.102	0.101	0.102	0.102
bca-greedy	**−4260.01**	*best generated*						
	1.412	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.059	0.010	0.010	0.024	0.024	0.011
		best fused	**−4260.01**	**−4260.01**	**−4260.01**	**−4260.01**	**−4260.01**	**−4260.01**
		$t_{\text{fuse}}(s)$	0.059	0.010	0.010	0.024	0.024	0.011
greedy	**−4260.01**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.034	0.003	0.003	0.029	0.003	0.005
		best fused	**−4260.01**	**−4260.01**	**−4260.01**	**−4260.01**	**−4260.01**	**−4260.01**
		$t_{\text{fuse}}(s)$	0.034	0.003	0.003	0.029	0.003	0.005

hotel84 (*energy_hotel_frame50frame99*), known optimum: -4240.95

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4240.95**	*best generated*						
	0.003	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.045	0.005	0.005	0.006	0.006	0.006
		best fused	**−4240.95**	**−4240.95**	**−4240.95**	**−4240.95**	**−4240.95**	**−4240.95**
		$t_{\text{fuse}}(s)$	0.045	0.005	0.005	0.006	0.006	0.006
dd-ls3	**−4240.95**	*best generated*						
	0.011	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.050	0.016	0.017	0.016	0.017	0.018
		best fused	**−4240.95**	**−4240.95**	**−4240.95**	**−4240.95**	**−4240.95**	**−4240.95**
		$t_{\text{fuse}}(s)$	0.050	0.016	0.017	0.016	0.017	0.018
dd-ls4	**−4240.95**	*best generated*						
	0.026	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.063	0.035	0.034	0.035	0.035	0.036
		best fused	**−4240.95**	**−4240.95**	**−4240.95**	**−4240.95**	**−4240.95**	**−4240.95**
		$t_{\text{fuse}}(s)$	0.063	0.035	0.034	0.035	0.035	0.036
bca-lap	**−4240.95**	*best generated*						
	2.021	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.434	0.382	0.384	0.383	0.383	0.388
		best fused	**−4240.95**	**−4240.95**	**−4240.95**	**−4240.95**	**−4240.95**	**−4240.95**
		$t_{\text{fuse}}(s)$	0.434	0.382	0.384	0.383	0.383	0.388
bca-greedy	**−4240.95**	*best generated*						
	0.589	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.005	0.005	0.005	0.005	0.005
		best fused	**−4240.95**	**−4240.95**	**−4240.95**	**−4240.95**	**−4240.95**	**−4240.95**
		$t_{\text{fuse}}(s)$	0.030	0.005	0.005	0.005	0.005	0.005
greedy	**−4240.95**	*best generated*						
	0.004	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.085	0.007	0.007	0.227	0.017	0.010
		best fused	**−4240.95**	**−4240.95**	**−4240.95**	**−4240.95**	**−4240.95**	**−4240.95**
		$t_{\text{fuse}}(s)$	0.085	0.007	0.007	0.227	0.017	0.010

hotel85 (*energy_hotel_frame57frame64*), known optimum: -4567.13

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4567.13**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.001	0.001	0.001	0.001	0.001
		best fused	**−4567.13**	**−4567.13**	**−4567.13**	**−4567.13**	**−4567.13**	**−4567.13**
		$t_{\text{fuse}}(s)$	0.031	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4567.13**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.002	0.002	0.003	0.002	0.003
		best fused	**−4567.13**	**−4567.13**	**−4567.13**	**−4567.13**	**−4567.13**	**−4567.13**
		$t_{\text{fuse}}(s)$	0.030	0.002	0.002	0.003	0.002	0.003
dd-ls4	**−4567.13**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.004	0.004	0.004	0.004	0.004
		best fused	**−4567.13**	**−4567.13**	**−4567.13**	**−4567.13**	**−4567.13**	**−4567.13**
		$t_{\text{fuse}}(s)$	0.029	0.004	0.004	0.004	0.004	0.004
bca-lap	**−4567.13**	*best generated*						
	5.592	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.079	0.053	0.053	0.053	0.053	0.053
		best fused	**−4567.13**	**−4567.13**	**−4567.13**	**−4567.13**	**−4567.13**	**−4567.13**
		$t_{\text{fuse}}(s)$	0.079	0.053	0.053	0.053	0.053	0.053
bca-greedy	**−4567.13**	*best generated*						
	1.616	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.005	0.005	0.005	0.005	0.005
		best fused	**−4567.13**	**−4567.13**	**−4567.13**	**−4567.13**	**−4567.13**	**−4567.13**
		$t_{\text{fuse}}(s)$	0.030	0.005	0.005	0.005	0.005	0.005
greedy	**−4567.13**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.057	0.001	0.001	0.007	0.001	0.001
		best fused	**−4567.13**	**−4567.13**	**−4567.13**	**−4567.13**	**−4567.13**	**−4567.13**
		$t_{\text{fuse}}(s)$	0.057	0.001	0.001	0.007	0.001	0.001

hotel86 (*energy_hotel_frame57frame71*), known optimum: -4508.58

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4508.58**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.038	0.001	0.001	0.001	0.001	0.001
		best fused	**−4508.58**	**−4508.58**	**−4508.58**	**−4508.58**	**−4508.58**	**−4508.58**
		$t_{\text{fuse}}(s)$	0.038	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4508.58**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.041	0.003	0.003	0.003	0.003	0.003
		best fused	**−4508.58**	**−4508.58**	**−4508.58**	**−4508.58**	**−4508.58**	**−4508.58**
		$t_{\text{fuse}}(s)$	0.041	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4508.58**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.004	0.004	0.004	0.004	0.005
		best fused	**−4508.58**	**−4508.58**	**−4508.58**	**−4508.58**	**−4508.58**	**−4508.58**
		$t_{\text{fuse}}(s)$	0.030	0.004	0.004	0.004	0.004	0.005
bca-lap	**−4508.58**	*best generated*						
	0.039	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.078	0.051	0.051	0.051	0.051	0.051
		best fused	**−4508.58**	**−4508.58**	**−4508.58**	**−4508.58**	**−4508.58**	**−4508.58**
		$t_{\text{fuse}}(s)$	0.078	0.051	0.051	0.051	0.051	0.051
bca-greedy	**−4508.58**	*best generated*						
	0.445	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.073	0.016	0.017	0.016	0.017	0.018
		best fused	**−4508.58**	**−4508.58**	**−4508.58**	**−4508.58**	**−4508.58**	**−4508.58**
		$t_{\text{fuse}}(s)$	0.073	0.016	0.017	0.016	0.017	0.018
greedy	**−4508.58**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.027	0.001	0.001	0.006	0.001	0.001
		best fused	**−4508.58**	**−4508.58**	**−4508.58**	**−4508.58**	**−4508.58**	**−4508.58**
		$t_{\text{fuse}}(s)$	0.027	0.001	0.001	0.006	0.001	0.001

hotel87 (*energy_hotel_frame57frame78*), known optimum: -4475.54

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4475.54**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.033	0.001	0.001	0.001	0.001	0.001
		best fused	**−4475.54**	**−4475.54**	**−4475.54**	**−4475.54**	**−4475.54**	**−4475.54**
		$t_{\text{fuse}}(s)$	0.033	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4475.54**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.003	0.003	0.003	0.003	0.003
		best fused	**−4475.54**	**−4475.54**	**−4475.54**	**−4475.54**	**−4475.54**	**−4475.54**
		$t_{\text{fuse}}(s)$	0.028	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4475.54**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
		best fused	**−4475.54**	**−4475.54**	**−4475.54**	**−4475.54**	**−4475.54**	**−4475.54**
		$t_{\text{fuse}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
bca-lap	**−4475.54**	*best generated*						
	3.186	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.107	0.053	0.053	0.053	0.053	0.053
		best fused	**−4475.54**	**−4475.54**	**−4475.54**	**−4475.54**	**−4475.54**	**−4475.54**
		$t_{\text{fuse}}(s)$	0.107	0.053	0.053	0.053	0.053	0.053
bca-greedy	**−4475.54**	*best generated*						
	0.931	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.033	0.006	0.006	0.006	0.006	0.006
		best fused	**−4475.54**	**−4475.54**	**−4475.54**	**−4475.54**	**−4475.54**	**−4475.54**
		$t_{\text{fuse}}(s)$	0.033	0.006	0.006	0.006	0.006	0.006
greedy	**−4475.54**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.027	0.001	0.001	0.006	0.001	0.001
		best fused	**−4475.54**	**−4475.54**	**−4475.54**	**−4475.54**	**−4475.54**	**−4475.54**
		$t_{\text{fuse}}(s)$	0.027	0.001	0.001	0.006	0.001	0.001

hotel88 (*energy_hotel_frame57frame85*), known optimum: -4398.90

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4398.90**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.033	0.001	0.001	0.001	0.001	0.001
		best fused	**−4398.90**	**−4398.90**	**−4398.90**	**−4398.90**	**−4398.90**	**−4398.90**
		$t_{\text{fuse}}(s)$	0.033	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4398.90**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.056	0.003	0.003	0.003	0.003	0.003
		best fused	**−4398.90**	**−4398.90**	**−4398.90**	**−4398.90**	**−4398.90**	**−4398.90**
		$t_{\text{fuse}}(s)$	0.056	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4398.90**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.006	0.006	0.006	0.006	0.006
		best fused	**−4398.90**	**−4398.90**	**−4398.90**	**−4398.90**	**−4398.90**	**−4398.90**
		$t_{\text{fuse}}(s)$	0.031	0.006	0.006	0.006	0.006	0.006
bca-lap	**−4398.90**	*best generated*						
	0.043	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.097	0.055	0.055	0.055	0.055	0.055
		best fused	**−4398.90**	**−4398.90**	**−4398.90**	**−4398.90**	**−4398.90**	**−4398.90**
		$t_{\text{fuse}}(s)$	0.097	0.055	0.055	0.055	0.055	0.055
bca-greedy	**−4398.90**	*best generated*						
	1.288	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.005	0.005	0.005	0.005	0.005
		best fused	**−4398.90**	**−4398.90**	**−4398.90**	**−4398.90**	**−4398.90**	**−4398.90**
		$t_{\text{fuse}}(s)$	0.030	0.005	0.005	0.005	0.005	0.005
greedy	**−4398.90**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.002	0.003	0.016	0.002	0.003
		best fused	**−4398.90**	**−4398.90**	**−4398.90**	**−4398.90**	**−4398.90**	**−4398.90**
		$t_{\text{fuse}}(s)$	0.030	0.002	0.003	0.016	0.002	0.003

hotel89 (*energy_hotel_frame57frame92*), known optimum: -4344.52

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4344.52**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.054	0.002	0.003	0.003	0.003	0.004
		best fused	**−4344.52**	**−4344.52**	**−4344.52**	**−4344.52**	**−4344.52**	**−4344.52**
		$t_{\text{fuse}}(s)$	0.054	0.002	0.003	0.003	0.003	0.004
dd-ls3	**−4344.52**	*best generated*						
	0.003	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.034	0.007	0.007	0.007	0.007	0.007
		best fused	**−4344.52**	**−4344.52**	**−4344.52**	**−4344.52**	**−4344.52**	**−4344.52**
		$t_{\text{fuse}}(s)$	0.034	0.007	0.007	0.007	0.007	0.007
dd-ls4	**−4344.52**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.032	0.006	0.006	0.006	0.006	0.006
		best fused	**−4344.52**	**−4344.52**	**−4344.52**	**−4344.52**	**−4344.52**	**−4344.52**
		$t_{\text{fuse}}(s)$	0.032	0.006	0.006	0.006	0.006	0.006
bca-lap	**−4344.52**	*best generated*						
	0.736	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.083	0.052	0.052	0.052	0.052	0.053
		best fused	**−4344.52**	**−4344.52**	**−4344.52**	**−4344.52**	**−4344.52**	**−4344.52**
		$t_{\text{fuse}}(s)$	0.083	0.052	0.052	0.052	0.052	0.053
bca-greedy	**−4344.52**	*best generated*						
	0.205	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.039	0.011	0.011	0.014	0.015	0.015
		best fused	**−4344.52**	**−4344.52**	**−4344.52**	**−4344.52**	**−4344.52**	**−4344.52**
		$t_{\text{fuse}}(s)$	0.039	0.011	0.011	0.014	0.015	0.015
greedy	**−4344.52**	*best generated*						
	0.002	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.034	0.003	0.003	0.100	0.008	0.011
		best fused	**−4344.52**	**−4344.52**	**−4344.52**	**−4344.52**	**−4344.52**	**−4344.52**
		$t_{\text{fuse}}(s)$	0.034	0.003	0.003	0.100	0.008	0.011

hotel90 (*energy_hotel_frame57frame99*), known optimum: -4332.33

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4332.33**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.036	0.004	0.004	0.004	0.004	0.005
		best fused	**−4332.33**	**−4332.33**	**−4332.33**	**−4332.33**	**−4332.33**	**−4332.33**
		$t_{\text{fuse}}(s)$	0.036	0.004	0.004	0.004	0.004	0.005
dd-ls3	**−4332.33**	*best generated*						
	0.011	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.057	0.016	0.016	0.016	0.017	0.017
		best fused	**−4332.33**	**−4332.33**	**−4332.33**	**−4332.33**	**−4332.33**	**−4332.33**
		$t_{\text{fuse}}(s)$	0.057	0.016	0.016	0.016	0.017	0.017
dd-ls4	**−4332.33**	*best generated*						
	0.022	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.058	0.030	0.030	0.031	0.030	0.032
		best fused	**−4332.33**	**−4332.33**	**−4332.33**	**−4332.33**	**−4332.33**	**−4332.33**
		$t_{\text{fuse}}(s)$	0.058	0.030	0.030	0.031	0.030	0.032
bca-lap	**−4332.33**	*best generated*						
	5.374	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.145	0.107	0.108	0.108	0.107	0.109
		best fused	**−4332.33**	**−4332.33**	**−4332.33**	**−4332.33**	**−4332.33**	**−4332.33**
		$t_{\text{fuse}}(s)$	0.145	0.107	0.108	0.108	0.107	0.109
bca-greedy	**−4332.33**	*best generated*						
	1.571	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.045	0.015	0.015	0.019	0.019	0.020
		best fused	**−4332.33**	**−4332.33**	**−4332.33**	**−4332.33**	**−4332.33**	**−4332.33**
		$t_{\text{fuse}}(s)$	0.045	0.015	0.015	0.019	0.019	0.020
greedy	**−4332.33**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.034	0.003	0.004	0.053	0.005	0.004
		best fused	**−4332.33**	**−4332.33**	**−4332.33**	**−4332.33**	**−4332.33**	**−4332.33**
		$t_{\text{fuse}}(s)$	0.034	0.003	0.004	0.053	0.005	0.004

hotel91 (*energy_hotel_frame64frame71*), known optimum: -4578.65

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4578.65**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.034	0.001	0.001	0.001	0.001	0.001
		best fused	**−4578.65**	**−4578.65**	**−4578.65**	**−4578.65**	**−4578.65**	**−4578.65**
		$t_{\text{fuse}}(s)$	0.034	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4578.65**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.037	0.002	0.002	0.002	0.002	0.003
		best fused	**−4578.65**	**−4578.65**	**−4578.65**	**−4578.65**	**−4578.65**	**−4578.65**
		$t_{\text{fuse}}(s)$	0.037	0.002	0.002	0.002	0.002	0.003
dd-ls4	**−4578.65**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.003	0.003	0.003	0.003	0.004
		best fused	**−4578.65**	**−4578.65**	**−4578.65**	**−4578.65**	**−4578.65**	**−4578.65**
		$t_{\text{fuse}}(s)$	0.029	0.003	0.003	0.003	0.003	0.004
bca-lap	**−4578.65**	*best generated*						
	0.322	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.259	0.052	0.052	0.052	0.052	0.052
		best fused	**−4578.65**	**−4578.65**	**−4578.65**	**−4578.65**	**−4578.65**	**−4578.65**
		$t_{\text{fuse}}(s)$	0.259	0.052	0.052	0.052	0.052	0.052
bca-greedy	**−4578.65**	*best generated*						
	0.002	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.032	0.005	0.005	0.005	0.005	0.006
		best fused	**−4578.65**	**−4578.65**	**−4578.65**	**−4578.65**	**−4578.65**	**−4578.65**
		$t_{\text{fuse}}(s)$	0.032	0.005	0.005	0.005	0.005	0.006
greedy	**−4578.65**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.027	0.001	0.001	0.007	0.001	0.001
		best fused	**−4578.65**	**−4578.65**	**−4578.65**	**−4578.65**	**−4578.65**	**−4578.65**
		$t_{\text{fuse}}(s)$	0.027	0.001	0.001	0.007	0.001	0.001

hotel92 (*energy_hotel_frame64frame78*), known optimum: -4545.63

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4545.63**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.033	0.001	0.001	0.001	0.001	0.001
		best fused	**−4545.63**	**−4545.63**	**−4545.63**	**−4545.63**	**−4545.63**	**−4545.63**
		$t_{\text{fuse}}(s)$	0.033	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4545.63**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.002	0.003	0.002	0.002	0.003
		best fused	**−4545.63**	**−4545.63**	**−4545.63**	**−4545.63**	**−4545.63**	**−4545.63**
		$t_{\text{fuse}}(s)$	0.030	0.002	0.003	0.002	0.002	0.003
dd-ls4	**−4545.63**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.004	0.004	0.004	0.004	0.004
		best fused	**−4545.63**	**−4545.63**	**−4545.63**	**−4545.63**	**−4545.63**	**−4545.63**
		$t_{\text{fuse}}(s)$	0.031	0.004	0.004	0.004	0.004	0.004
bca-lap	**−4545.63**	*best generated*						
	0.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.205	0.047	0.047	0.047	0.047	0.047
		best fused	**−4545.63**	**−4545.63**	**−4545.63**	**−4545.63**	**−4545.63**	**−4545.63**
		$t_{\text{fuse}}(s)$	0.205	0.047	0.047	0.047	0.047	0.047
bca-greedy	**−4545.63**	*best generated*						
	0.003	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.033	0.007	0.007	0.007	0.007	0.008
		best fused	**−4545.63**	**−4545.63**	**−4545.63**	**−4545.63**	**−4545.63**	**−4545.63**
		$t_{\text{fuse}}(s)$	0.033	0.007	0.007	0.007	0.007	0.008
greedy	**−4545.63**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.026	0.001	0.001	0.006	0.001	0.001
		best fused	**−4545.63**	**−4545.63**	**−4545.63**	**−4545.63**	**−4545.63**	**−4545.63**
		$t_{\text{fuse}}(s)$	0.026	0.001	0.001	0.006	0.001	0.001

hotel93 (*energy_hotel_frame64frame85*), known optimum: -4481.13

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4481.13**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.032	0.001	0.001	0.001	0.001	0.001
		best fused	**−4481.13**	**−4481.13**	**−4481.13**	**−4481.13**	**−4481.13**	**−4481.13**
		$t_{\text{fuse}}(s)$	0.032	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4481.13**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.042	0.003	0.003	0.003	0.003	0.003
		best fused	**−4481.13**	**−4481.13**	**−4481.13**	**−4481.13**	**−4481.13**	**−4481.13**
		$t_{\text{fuse}}(s)$	0.042	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4481.13**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.005	0.005	0.005	0.005	0.005
		best fused	**−4481.13**	**−4481.13**	**−4481.13**	**−4481.13**	**−4481.13**	**−4481.13**
		$t_{\text{fuse}}(s)$	0.030	0.005	0.005	0.005	0.005	0.005
bca-lap	**−4481.13**	*best generated*						
	0.537	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.077	0.051	0.051	0.052	0.051	0.052
		best fused	**−4481.13**	**−4481.13**	**−4481.13**	**−4481.13**	**−4481.13**	**−4481.13**
		$t_{\text{fuse}}(s)$	0.077	0.051	0.051	0.052	0.051	0.052
bca-greedy	**−4481.13**	*best generated*						
	0.154	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.046	0.006	0.006	0.006	0.006	0.006
		best fused	**−4481.13**	**−4481.13**	**−4481.13**	**−4481.13**	**−4481.13**	**−4481.13**
		$t_{\text{fuse}}(s)$	0.046	0.006	0.006	0.006	0.006	0.006
greedy	**−4481.13**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.026	0.001	0.001	0.007	0.001	0.001
		best fused	**−4481.13**	**−4481.13**	**−4481.13**	**−4481.13**	**−4481.13**	**−4481.13**
		$t_{\text{fuse}}(s)$	0.026	0.001	0.001	0.007	0.001	0.001

hotel94 (*energy_hotel_frame64frame92*), known optimum: -4413.01

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4413.01**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.001	0.001	0.001	0.001	0.001
		best fused	**−4413.01**	**−4413.01**	**−4413.01**	**−4413.01**	**−4413.01**	**−4413.01**
		$t_{\text{fuse}}(s)$	0.031	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4413.01**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.003	0.003	0.003	0.003	0.003
		best fused	**−4413.01**	**−4413.01**	**−4413.01**	**−4413.01**	**−4413.01**	**−4413.01**
		$t_{\text{fuse}}(s)$	0.029	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4413.01**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
		best fused	**−4413.01**	**−4413.01**	**−4413.01**	**−4413.01**	**−4413.01**	**−4413.01**
		$t_{\text{fuse}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
bca-lap	**−4413.01**	*best generated*						
	0.040	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.078	0.052	0.052	0.052	0.052	0.052
		best fused	**−4413.01**	**−4413.01**	**−4413.01**	**−4413.01**	**−4413.01**	**−4413.01**
		$t_{\text{fuse}}(s)$	0.078	0.052	0.052	0.052	0.052	0.052
bca-greedy	**−4413.01**	*best generated*						
	1.126	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.032	0.007	0.007	0.007	0.007	0.007
		best fused	**−4413.01**	**−4413.01**	**−4413.01**	**−4413.01**	**−4413.01**	**−4413.01**
		$t_{\text{fuse}}(s)$	0.032	0.007	0.007	0.007	0.007	0.007
greedy	**−4413.01**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.027	0.001	0.001	0.006	0.001	0.001
		best fused	**−4413.01**	**−4413.01**	**−4413.01**	**−4413.01**	**−4413.01**	**−4413.01**
		$t_{\text{fuse}}(s)$	0.027	0.001	0.001	0.006	0.001	0.001

hotel95 (*energy_hotel_frame64frame99*), known optimum: -4385.51

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4385.51**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.035	0.001	0.001	0.001	0.001	0.001
		best fused	**−4385.51**	**−4385.51**	**−4385.51**	**−4385.51**	**−4385.51**	**−4385.51**
		$t_{\text{fuse}}(s)$	0.035	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4385.51**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.003	0.003	0.003	0.003	0.003
		best fused	**−4385.51**	**−4385.51**	**−4385.51**	**−4385.51**	**−4385.51**	**−4385.51**
		$t_{\text{fuse}}(s)$	0.029	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4385.51**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.005	0.005	0.005	0.005	0.005
		best fused	**−4385.51**	**−4385.51**	**−4385.51**	**−4385.51**	**−4385.51**	**−4385.51**
		$t_{\text{fuse}}(s)$	0.030	0.005	0.005	0.005	0.005	0.005
bca-lap	**−4385.51**	*best generated*						
	0.041	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.081	0.053	0.053	0.053	0.053	0.053
		best fused	**−4385.51**	**−4385.51**	**−4385.51**	**−4385.51**	**−4385.51**	**−4385.51**
		$t_{\text{fuse}}(s)$	0.081	0.053	0.053	0.053	0.053	0.053
bca-greedy	**−4385.51**	*best generated*						
	0.357	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.055	0.019	0.020	0.019	0.019	0.020
		best fused	**−4385.51**	**−4385.51**	**−4385.51**	**−4385.51**	**−4385.51**	**−4385.51**
		$t_{\text{fuse}}(s)$	0.055	0.019	0.020	0.019	0.019	0.020
greedy	**−4385.51**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.001	0.001	0.007	0.001	0.001
		best fused	**−4385.51**	**−4385.51**	**−4385.51**	**−4385.51**	**−4385.51**	**−4385.51**
		$t_{\text{fuse}}(s)$	0.028	0.001	0.001	0.007	0.001	0.001

hotel96 (*energy_hotel_frame71frame78*), known optimum: -4550.95

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4550.95**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.035	0.001	0.001	0.001	0.001	0.001
		best fused	**−4550.95**	**−4550.95**	**−4550.95**	**−4550.95**	**−4550.95**	**−4550.95**
		$t_{\text{fuse}}(s)$	0.035	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4550.95**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.046	0.002	0.003	0.002	0.002	0.003
		best fused	**−4550.95**	**−4550.95**	**−4550.95**	**−4550.95**	**−4550.95**	**−4550.95**
		$t_{\text{fuse}}(s)$	0.046	0.002	0.003	0.002	0.002	0.003
dd-ls4	**−4550.95**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
		best fused	**−4550.95**	**−4550.95**	**−4550.95**	**−4550.95**	**−4550.95**	**−4550.95**
		$t_{\text{fuse}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
bca-lap	**−4550.95**	*best generated*						
	0.480	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.187	0.053	0.053	0.053	0.053	0.053
		best fused	**−4550.95**	**−4550.95**	**−4550.95**	**−4550.95**	**−4550.95**	**−4550.95**
		$t_{\text{fuse}}(s)$	0.187	0.053	0.053	0.053	0.053	0.053
bca-greedy	**−4550.95**	*best generated*						
	0.129	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
		best fused	**−4550.95**	**−4550.95**	**−4550.95**	**−4550.95**	**−4550.95**	**−4550.95**
		$t_{\text{fuse}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
greedy	**−4550.95**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.026	0.001	0.001	0.007	0.001	0.001
		best fused	**−4550.95**	**−4550.95**	**−4550.95**	**−4550.95**	**−4550.95**	**−4550.95**
		$t_{\text{fuse}}(s)$	0.026	0.001	0.001	0.007	0.001	0.001

hotel97 (*energy_hotel_frame71frame85*), known optimum: -4552.71

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4552.71**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.001	0.001	0.001	0.001	0.001
		best fused	**−4552.71**	**−4552.71**	**−4552.71**	**−4552.71**	**−4552.71**	**−4552.71**
		$t_{\text{fuse}}(s)$	0.031	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4552.71**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.002	0.003	0.003	0.002	0.003
		best fused	**−4552.71**	**−4552.71**	**−4552.71**	**−4552.71**	**−4552.71**	**−4552.71**
		$t_{\text{fuse}}(s)$	0.028	0.002	0.003	0.003	0.002	0.003
dd-ls4	**−4552.71**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.005	0.005	0.005	0.005	0.005
		best fused	**−4552.71**	**−4552.71**	**−4552.71**	**−4552.71**	**−4552.71**	**−4552.71**
		$t_{\text{fuse}}(s)$	0.030	0.005	0.005	0.005	0.005	0.005
bca-lap	**−4552.71**	*best generated*						
	0.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.077	0.047	0.047	0.047	0.047	0.047
		best fused	**−4552.71**	**−4552.71**	**−4552.71**	**−4552.71**	**−4552.71**	**−4552.71**
		$t_{\text{fuse}}(s)$	0.077	0.047	0.047	0.047	0.047	0.047
bca-greedy	**−4552.71**	*best generated*						
	1.658	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.036	0.006	0.006	0.006	0.006	0.006
		best fused	**−4552.71**	**−4552.71**	**−4552.71**	**−4552.71**	**−4552.71**	**−4552.71**
		$t_{\text{fuse}}(s)$	0.036	0.006	0.006	0.006	0.006	0.006
greedy	**−4552.71**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.027	0.001	0.001	0.007	0.001	0.001
		best fused	**−4552.71**	**−4552.71**	**−4552.71**	**−4552.71**	**−4552.71**	**−4552.71**
		$t_{\text{fuse}}(s)$	0.027	0.001	0.001	0.007	0.001	0.001

hotel98 (*energy_hotel_frame71frame92*), known optimum: -4469.72

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4469.72**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.034	0.001	0.001	0.001	0.001	0.001
		best fused	**−4469.72**	**−4469.72**	**−4469.72**	**−4469.72**	**−4469.72**	**−4469.72**
		$t_{\text{fuse}}(s)$	0.034	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4469.72**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.038	0.003	0.003	0.003	0.003	0.003
		best fused	**−4469.72**	**−4469.72**	**−4469.72**	**−4469.72**	**−4469.72**	**−4469.72**
		$t_{\text{fuse}}(s)$	0.038	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4469.72**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.032	0.006	0.006	0.006	0.006	0.006
		best fused	**−4469.72**	**−4469.72**	**−4469.72**	**−4469.72**	**−4469.72**	**−4469.72**
		$t_{\text{fuse}}(s)$	0.032	0.006	0.006	0.006	0.006	0.006
bca-lap	**−4469.72**	*best generated*						
	0.283	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.085	0.054	0.054	0.054	0.054	0.054
		best fused	**−4469.72**	**−4469.72**	**−4469.72**	**−4469.72**	**−4469.72**	**−4469.72**
		$t_{\text{fuse}}(s)$	0.085	0.054	0.054	0.054	0.054	0.054
bca-greedy	**−4469.72**	*best generated*						
	0.081	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.040	0.010	0.010	0.010	0.010	0.011
		best fused	**−4469.72**	**−4469.72**	**−4469.72**	**−4469.72**	**−4469.72**	**−4469.72**
		$t_{\text{fuse}}(s)$	0.040	0.010	0.010	0.010	0.010	0.011
greedy	**−4469.72**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.027	0.001	0.001	0.007	0.001	0.001
		best fused	**−4469.72**	**−4469.72**	**−4469.72**	**−4469.72**	**−4469.72**	**−4469.72**
		$t_{\text{fuse}}(s)$	0.027	0.001	0.001	0.007	0.001	0.001

hotel99 (*energy_hotel_frame71frame99*), known optimum: -4413.34

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4413.34**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.001	0.001	0.001	0.001	0.001
		best fused	**−4413.34**	**−4413.34**	**−4413.34**	**−4413.34**	**−4413.34**	**−4413.34**
		$t_{\text{fuse}}(s)$	0.030	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4413.34**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.038	0.003	0.003	0.003	0.003	0.003
		best fused	**−4413.34**	**−4413.34**	**−4413.34**	**−4413.34**	**−4413.34**	**−4413.34**
		$t_{\text{fuse}}(s)$	0.038	0.003	0.003	0.003	0.003	0.003
dd-ls4	**−4413.34**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.032	0.006	0.006	0.006	0.006	0.006
		best fused	**−4413.34**	**−4413.34**	**−4413.34**	**−4413.34**	**−4413.34**	**−4413.34**
		$t_{\text{fuse}}(s)$	0.032	0.006	0.006	0.006	0.006	0.006
bca-lap	**−4413.34**	*best generated*						
	0.361	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.081	0.051	0.051	0.051	0.051	0.051
		best fused	**−4413.34**	**−4413.34**	**−4413.34**	**−4413.34**	**−4413.34**	**−4413.34**
		$t_{\text{fuse}}(s)$	0.081	0.051	0.051	0.051	0.051	0.051
bca-greedy	**−4413.34**	*best generated*						
	0.097	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.005	0.005	0.005	0.005	0.005
		best fused	**−4413.34**	**−4413.34**	**−4413.34**	**−4413.34**	**−4413.34**	**−4413.34**
		$t_{\text{fuse}}(s)$	0.030	0.005	0.005	0.005	0.005	0.005
greedy	**−4413.34**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.001	0.001	0.006	0.001	0.001
		best fused	**−4413.34**	**−4413.34**	**−4413.34**	**−4413.34**	**−4413.34**	**−4413.34**
		$t_{\text{fuse}}(s)$	0.028	0.001	0.001	0.006	0.001	0.001

hotel100 (*energy_hotel_frame78frame85*), known optimum: -4589.16

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4589.16**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.001	0.001	0.001	0.001	0.001
		best fused	**−4589.16**	**−4589.16**	**−4589.16**	**−4589.16**	**−4589.16**	**−4589.16**
		$t_{\text{fuse}}(s)$	0.030	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4589.16**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.002	0.003	0.002	0.003	0.003
		best fused	**−4589.16**	**−4589.16**	**−4589.16**	**−4589.16**	**−4589.16**	**−4589.16**
		$t_{\text{fuse}}(s)$	0.028	0.002	0.003	0.002	0.003	0.003
dd-ls4	**−4589.16**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.004	0.004	0.004	0.004	0.005
		best fused	**−4589.16**	**−4589.16**	**−4589.16**	**−4589.16**	**−4589.16**	**−4589.16**
		$t_{\text{fuse}}(s)$	0.030	0.004	0.004	0.004	0.004	0.005
bca-lap	**−4589.16**	*best generated*						
	0.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.090	0.046	0.046	0.046	0.046	0.047
		best fused	**−4589.16**	**−4589.16**	**−4589.16**	**−4589.16**	**−4589.16**	**−4589.16**
		$t_{\text{fuse}}(s)$	0.090	0.046	0.046	0.046	0.046	0.047
bca-greedy	**−4589.16**	*best generated*						
	0.389	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.033	0.006	0.006	0.006	0.006	0.006
		best fused	**−4589.16**	**−4589.16**	**−4589.16**	**−4589.16**	**−4589.16**	**−4589.16**
		$t_{\text{fuse}}(s)$	0.033	0.006	0.006	0.006	0.006	0.006
greedy	**−4589.16**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.002	0.002	0.018	0.002	0.003
		best fused	**−4589.16**	**−4589.16**	**−4589.16**	**−4589.16**	**−4589.16**	**−4589.16**
		$t_{\text{fuse}}(s)$	0.029	0.002	0.002	0.018	0.002	0.003

hotel101 (*energy_hotel_frame78frame92*), known optimum: -4545.04

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4545.04**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.001	0.001	0.001	0.001	0.001
		best fused	**−4545.04**	**−4545.04**	**−4545.04**	**−4545.04**	**−4545.04**	**−4545.04**
		$t_{\text{fuse}}(s)$	0.028	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4545.04**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.002	0.002	0.002	0.002	0.003
		best fused	**−4545.04**	**−4545.04**	**−4545.04**	**−4545.04**	**−4545.04**	**−4545.04**
		$t_{\text{fuse}}(s)$	0.029	0.002	0.002	0.002	0.002	0.003
dd-ls4	**−4545.04**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
		best fused	**−4545.04**	**−4545.04**	**−4545.04**	**−4545.04**	**−4545.04**	**−4545.04**
		$t_{\text{fuse}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
bca-lap	**−4545.04**	*best generated*						
	0.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.082	0.046	0.046	0.046	0.046	0.046
		best fused	**−4545.04**	**−4545.04**	**−4545.04**	**−4545.04**	**−4545.04**	**−4545.04**
		$t_{\text{fuse}}(s)$	0.082	0.046	0.046	0.046	0.046	0.046
bca-greedy	**−4545.04**	*best generated*						
	0.008	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.036	0.010	0.010	0.010	0.011	0.011
		best fused	**−4545.04**	**−4545.04**	**−4545.04**	**−4545.04**	**−4545.04**	**−4545.04**
		$t_{\text{fuse}}(s)$	0.036	0.010	0.010	0.010	0.011	0.011
greedy	**−4545.04**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.026	0.001	0.001	0.007	0.001	0.001
		best fused	**−4545.04**	**−4545.04**	**−4545.04**	**−4545.04**	**−4545.04**	**−4545.04**
		$t_{\text{fuse}}(s)$	0.026	0.001	0.001	0.007	0.001	0.001

hotel102 (*energy_hotel_frame78frame99*), known optimum: -4534.77

	generation		+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4534.77**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.001	0.001	0.001	0.001	0.001
		best fused	**−4534.77**	**−4534.77**	**−4534.77**	**−4534.77**	**−4534.77**	**−4534.77**
		$t_{\text{fuse}}(s)$	0.031	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4534.77**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.002	0.002	0.003	0.002	0.003
		best fused	**−4534.77**	**−4534.77**	**−4534.77**	**−4534.77**	**−4534.77**	**−4534.77**
		$t_{\text{fuse}}(s)$	0.029	0.002	0.002	0.003	0.002	0.003
dd-ls4	**−4534.77**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.004	0.004	0.004	0.004	0.004
		best fused	**−4534.77**	**−4534.77**	**−4534.77**	**−4534.77**	**−4534.77**	**−4534.77**
		$t_{\text{fuse}}(s)$	0.030	0.004	0.004	0.004	0.004	0.004
bca-lap	**−4534.77**	*best generated*						
	0.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.083	0.046	0.046	0.046	0.046	0.046
		best fused	**−4534.77**	**−4534.77**	**−4534.77**	**−4534.77**	**−4534.77**	**−4534.77**
		$t_{\text{fuse}}(s)$	0.083	0.046	0.046	0.046	0.046	0.046
bca-greedy	**−4534.77**	*best generated*						
	0.645	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.051	0.008	0.008	0.008	0.008	0.008
		best fused	**−4534.77**	**−4534.77**	**−4534.77**	**−4534.77**	**−4534.77**	**−4534.77**
		$t_{\text{fuse}}(s)$	0.051	0.008	0.008	0.008	0.008	0.008
greedy	**−4534.77**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.027	0.001	0.001	0.007	0.001	0.001
		best fused	**−4534.77**	**−4534.77**	**−4534.77**	**−4534.77**	**−4534.77**	**−4534.77**
		$t_{\text{fuse}}(s)$	0.027	0.001	0.001	0.007	0.001	0.001

hotel103 (*energy_hotel_frame85frame92*), known optimum: -4578.16

	generation		+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4578.16**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.037	0.001	0.001	0.001	0.001	0.001
		best fused	**−4578.16**	**−4578.16**	**−4578.16**	**−4578.16**	**−4578.16**	**−4578.16**
		$t_{\text{fuse}}(s)$	0.037	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4578.16**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.029	0.002	0.003	0.003	0.003	0.003
		best fused	**−4578.16**	**−4578.16**	**−4578.16**	**−4578.16**	**−4578.16**	**−4578.16**
		$t_{\text{fuse}}(s)$	0.029	0.002	0.003	0.003	0.003	0.003
dd-ls4	**−4578.16**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.004	0.004	0.004	0.004	0.004
		best fused	**−4578.16**	**−4578.16**	**−4578.16**	**−4578.16**	**−4578.16**	**−4578.16**
		$t_{\text{fuse}}(s)$	0.030	0.004	0.004	0.004	0.004	0.004
bca-lap	**−4578.16**	*best generated*						
	0.222	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.072	0.046	0.046	0.046	0.046	0.046
		best fused	**−4578.16**	**−4578.16**	**−4578.16**	**−4578.16**	**−4578.16**	**−4578.16**
		$t_{\text{fuse}}(s)$	0.072	0.046	0.046	0.046	0.046	0.046
bca-greedy	**−4578.16**	*best generated*						
	0.057	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.005	0.005	0.005	0.005	0.005
		best fused	**−4578.16**	**−4578.16**	**−4578.16**	**−4578.16**	**−4578.16**	**−4578.16**
		$t_{\text{fuse}}(s)$	0.030	0.005	0.005	0.005	0.005	0.005
greedy	**−4578.16**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.036	0.001	0.001	0.007	0.001	0.001
		best fused	**−4578.16**	**−4578.16**	**−4578.16**	**−4578.16**	**−4578.16**	**−4578.16**
		$t_{\text{fuse}}(s)$	0.036	0.001	0.001	0.007	0.001	0.001

hotel104 (*energy_hotel_frame85frame99*), known optimum: -4528.32

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4528.32**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.001	0.001	0.001	0.001	0.001
		best fused	**−4528.32**	**−4528.32**	**−4528.32**	**−4528.32**	**−4528.32**	**−4528.32**
		$t_{\text{fuse}}(s)$	0.031	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4528.32**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.002	0.002	0.002	0.002	0.003
		best fused	**−4528.32**	**−4528.32**	**−4528.32**	**−4528.32**	**−4528.32**	**−4528.32**
		$t_{\text{fuse}}(s)$	0.028	0.002	0.002	0.002	0.002	0.003
dd-ls4	**−4528.32**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
		best fused	**−4528.32**	**−4528.32**	**−4528.32**	**−4528.32**	**−4528.32**	**−4528.32**
		$t_{\text{fuse}}(s)$	0.031	0.005	0.005	0.005	0.005	0.005
bca-lap	**−4528.32**	*best generated*						
	2.846	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.096	0.050	0.050	0.050	0.050	0.050
		best fused	**−4528.32**	**−4528.32**	**−4528.32**	**−4528.32**	**−4528.32**	**−4528.32**
		$t_{\text{fuse}}(s)$	0.096	0.050	0.050	0.050	0.050	0.050
bca-greedy	**−4528.32**	*best generated*						
	0.845	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.069	0.007	0.007	0.007	0.007	0.007
		best fused	**−4528.32**	**−4528.32**	**−4528.32**	**−4528.32**	**−4528.32**	**−4528.32**
		$t_{\text{fuse}}(s)$	0.069	0.007	0.007	0.007	0.007	0.007
greedy	**−4528.32**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001
		best fused	**−4528.32**	**−4528.32**	**−4528.32**	**−4528.32**	**−4528.32**	**−4528.32**
		$t_{\text{fuse}}(s)$	0.027	0.001	0.001	0.001	0.001	0.001

hotel105 (*energy_hotel_frame92frame99*), known optimum: -4593.17

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−4593.17**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.033	0.001	0.001	0.001	0.001	0.001
		best fused	**−4593.17**	**−4593.17**	**−4593.17**	**−4593.17**	**−4593.17**	**−4593.17**
		$t_{\text{fuse}}(s)$	0.033	0.001	0.001	0.001	0.001	0.001
dd-ls3	**−4593.17**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.028	0.002	0.002	0.002	0.002	0.003
		best fused	**−4593.17**	**−4593.17**	**−4593.17**	**−4593.17**	**−4593.17**	**−4593.17**
		$t_{\text{fuse}}(s)$	0.028	0.002	0.002	0.002	0.002	0.003
dd-ls4	**−4593.17**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.003	0.003	0.003	0.003	0.003
		best fused	**−4593.17**	**−4593.17**	**−4593.17**	**−4593.17**	**−4593.17**	**−4593.17**
		$t_{\text{fuse}}(s)$	0.030	0.003	0.003	0.003	0.003	0.003
bca-lap	**−4593.17**	*best generated*						
	0.653	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.077	0.051	0.051	0.051	0.052	0.052
		best fused	**−4593.17**	**−4593.17**	**−4593.17**	**−4593.17**	**−4593.17**	**−4593.17**
		$t_{\text{fuse}}(s)$	0.077	0.051	0.051	0.051	0.052	0.052
bca-greedy	**−4593.17**	*best generated*						
	0.187	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.030	0.005	0.005	0.005	0.005	0.005
		best fused	**−4593.17**	**−4593.17**	**−4593.17**	**−4593.17**	**−4593.17**	**−4593.17**
		$t_{\text{fuse}}(s)$	0.030	0.005	0.005	0.005	0.005	0.005
greedy	**−4593.17**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.026	0.001	0.001	0.001	0.001	0.001
		best fused	**−4593.17**	**−4593.17**	**−4593.17**	**−4593.17**	**−4593.17**	**−4593.17**
		$t_{\text{fuse}}(s)$	0.026	0.001	0.001	0.001	0.001	0.001

A6.2. house

number of instances: 105

maximum number of iterations during generation: 500

house1 (*energy_house_frame1frame86*), known optimum: -3833.13

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3833.13**	*best generated*						
	0.014	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.061	0.009	0.010	0.025	0.025	0.014
		best fused	**−3833.13**	**−3833.13**	**−3833.13**	**−3833.13**	**−3833.13**	**−3833.13**
		$t_{\text{fuse}}(s)$	0.061	0.009	0.010	0.025	0.025	0.014
dd-ls3	**−3833.13**	*best generated*						
	0.047	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.083	0.024	0.024	0.056	0.056	0.026
		best fused	**−3833.13**	**−3833.13**	**−3833.13**	**−3833.13**	**−3833.13**	**−3833.13**
		$t_{\text{fuse}}(s)$	0.083	0.024	0.024	0.056	0.056	0.026
dd-ls4	**−3833.13**	*best generated*						
	0.231	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.128	0.094	0.094	0.253	0.252	0.095
		best fused	**−3833.13**	**−3833.13**	**−3833.13**	**−3833.13**	**−3833.13**	**−3833.13**
		$t_{\text{fuse}}(s)$	0.128	0.094	0.094	0.253	0.252	0.095
bca-lap	**−3833.13**	*best generated*						
	4.630	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.750	0.702	0.704	0.703	0.704	0.713
		best fused	**−3833.13**	**−3833.13**	**−3833.13**	**−3833.13**	**−3833.13**	**−3833.13**
		$t_{\text{fuse}}(s)$	0.750	0.702	0.704	0.703	0.704	0.713
bca-greedy	**−3833.13**	*best generated*						
	1.153	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.117	0.030	0.029	0.029	0.030	0.037
		best fused	**−3833.13**	**−3833.13**	**−3833.13**	**−3833.13**	**−3833.13**	**−3833.13**
		$t_{\text{fuse}}(s)$	0.117	0.030	0.029	0.029	0.030	0.037
greedy	−3522.54	*best generated*						
	0.057	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.052	0.004	0.004	0.182	0.178	0.063
		best fused	**−3833.13**	**−3833.13**	**−3833.13**	−3522.54	−3522.54	**−3833.13**
		$t_{\text{fuse}}(s)$	0.144	0.014	0.016	0.182	0.178	0.253

house2 (*energy_house_frame1frame87*), known optimum: -3808.48

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3808.48**	*best generated*						
	0.010	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.056	0.009	0.009	0.019	0.020	0.013
		best fused	**−3808.48**	**−3808.48**	**−3808.48**	**−3808.48**	**−3808.48**	**−3808.48**
		$t_{\text{fuse}}(s)$	0.056	0.009	0.009	0.019	0.020	0.013
dd-ls3	**−3808.48**	*best generated*						
	0.037	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.069	0.036	0.036	0.045	0.045	0.037
		best fused	**−3808.48**	**−3808.48**	**−3808.48**	**−3808.48**	**−3808.48**	**−3808.48**
		$t_{\text{fuse}}(s)$	0.069	0.036	0.036	0.045	0.045	0.037
dd-ls4	**−3808.48**	*best generated*						
	0.094	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.151	0.114	0.115	0.114	0.114	0.116
		best fused	**−3808.48**	**−3808.48**	**−3808.48**	**−3808.48**	**−3808.48**	**−3808.48**
		$t_{\text{fuse}}(s)$	0.151	0.114	0.115	0.114	0.114	0.116
bca-lap	**−3808.48**	*best generated*						
	1.414	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.760	0.711	0.712	0.712	0.713	0.722
		best fused	**−3808.48**	**−3808.48**	**−3808.48**	**−3808.48**	**−3808.48**	**−3808.48**
		$t_{\text{fuse}}(s)$	0.760	0.711	0.712	0.712	0.713	0.722
bca-greedy	**−3808.48**	*best generated*						
	0.106	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.095	0.018	0.018	0.068	0.069	0.076
		best fused	**−3808.48**	**−3808.48**	**−3808.48**	**−3808.48**	**−3808.48**	**−3808.48**
		$t_{\text{fuse}}(s)$	0.095	0.018	0.018	0.068	0.069	0.076
greedy	−3448.54	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.065	0.005	0.005	0.005	0.004	0.009
		best fused	**−3808.48**	**−3808.48**	**−3808.48**	−3448.54	−3448.54	**−3808.48**
		$t_{\text{fuse}}(s)$	0.114	0.010	0.011	0.005	0.004	0.371

house3 (*energy_house_frame1frame88*), known optimum: -3758.22

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3758.22**	*best generated*						
	0.026	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.085	0.016	0.017	0.046	0.046	0.022
		best fused	**−3758.22**	**−3758.22**	**−3758.22**	**−3758.22**	**−3758.22**	**−3758.22**
		$t_{\text{fuse}}(s)$	0.085	0.016	0.017	0.046	0.046	0.022
dd-ls3	**−3758.22**	*best generated*						
	0.118	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.115	0.077	0.077	0.132	0.131	0.081
		best fused	**−3758.22**	**−3758.22**	**−3758.22**	**−3758.22**	**−3758.22**	**−3758.22**
		$t_{\text{fuse}}(s)$	0.115	0.077	0.077	0.132	0.131	0.081
dd-ls4	**−3758.22**	*best generated*						
	0.158	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.222	0.181	0.181	0.181	0.181	0.183
		best fused	**−3758.22**	**−3758.22**	**−3758.22**	**−3758.22**	**−3758.22**	**−3758.22**
		$t_{\text{fuse}}(s)$	0.222	0.181	0.181	0.181	0.181	0.183
bca-lap	**−3758.22**	*best generated*						
	7.371	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.424	2.327	2.333	2.331	2.334	2.362
		best fused	**−3758.22**	**−3758.22**	**−3758.22**	**−3758.22**	**−3758.22**	**−3758.22**
		$t_{\text{fuse}}(s)$	2.424	2.327	2.333	2.331	2.334	2.362
bca-greedy	**−3758.22**	*best generated*						
	1.647	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.084	0.028	0.028	0.027	0.027	0.039
		best fused	**−3758.22**	**−3758.22**	**−3758.22**	**−3758.22**	**−3758.22**	**−3758.22**
		$t_{\text{fuse}}(s)$	0.084	0.028	0.028	0.027	0.027	0.039
greedy	−3350.57	*best generated*						
	0.020	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.101	0.004	0.004	0.070	0.068	0.168
		best fused	**−3758.22**	**−3758.22**	**−3758.22**	−3350.57	−3350.57	−3592.68
		$t_{\text{fuse}}(s)$	1.261	0.097	0.112	0.070	0.068	0.680

house4 (*energy_house_frame1frame89*), known optimum: -3776.74

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3776.74**	*best generated*						
	0.018	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.119	0.027	0.028	0.034	0.035	0.036
		best fused	**−3776.74**	**−3776.74**	**−3776.74**	**−3776.74**	**−3776.74**	**−3776.74**
		$t_{\text{fuse}}(s)$	0.119	0.027	0.028	0.034	0.035	0.036
dd-ls3	**−3776.74**	*best generated*						
	0.059	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.075	0.037	0.037	0.069	0.069	0.058
		best fused	**−3776.74**	**−3776.74**	**−3776.74**	**−3776.74**	**−3776.74**	**−3776.74**
		$t_{\text{fuse}}(s)$	0.075	0.037	0.037	0.069	0.069	0.058
dd-ls4	**−3776.74**	*best generated*						
	0.323	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.184	0.141	0.141	0.350	0.350	0.142
		best fused	**−3776.74**	**−3776.74**	**−3776.74**	**−3776.74**	**−3776.74**	**−3776.74**
		$t_{\text{fuse}}(s)$	0.184	0.141	0.141	0.350	0.350	0.142
bca-lap	**−3776.74**	*best generated*						
	5.116	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.358	2.261	2.267	2.265	2.269	2.297
		best fused	**−3776.74**	**−3776.74**	**−3776.74**	**−3776.74**	**−3776.74**	**−3776.74**
		$t_{\text{fuse}}(s)$	2.358	2.261	2.267	2.265	2.269	2.297
bca-greedy	**−3776.74**	*best generated*						
	0.170	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.215	0.131	0.133	0.133	0.133	0.145
		best fused	**−3776.74**	**−3776.74**	**−3776.74**	**−3776.74**	**−3776.74**	**−3776.74**
		$t_{\text{fuse}}(s)$	0.215	0.131	0.133	0.133	0.133	0.145
greedy	−3638.09	*best generated*						
	0.033	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.061	0.004	0.005	0.111	0.111	0.453
		best fused	**−3776.74**	**−3776.74**	**−3776.74**	−3638.09	−3638.09	**−3776.74**
		$t_{\text{fuse}}(s)$	0.085	0.007	0.007	0.111	0.111	0.566

house5 (*energy_house_frame1frame90*), known optimum: -3710.78

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3710.78**	*best generated*						
	0.018	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.052	0.007	0.008	0.035	0.034	0.009
		best fused	**−3710.78**	**−3710.78**	**−3710.78**	**−3710.78**	**−3710.78**	**−3710.78**
		$t_{\text{fuse}}(s)$	0.052	0.007	0.008	0.035	0.034	0.009
dd-ls3	**−3710.78**	*best generated*						
	0.167	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.156	0.097	0.097	0.184	0.182	0.102
		best fused	**−3710.78**	**−3710.78**	**−3710.78**	**−3710.78**	**−3710.78**	**−3710.78**
		$t_{\text{fuse}}(s)$	0.156	0.097	0.097	0.184	0.182	0.102
dd-ls4	**−3710.78**	*best generated*						
	0.996	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.254	0.211	0.212	1.029	1.029	0.214
		best fused	**−3710.78**	**−3710.78**	**−3710.78**	**−3710.78**	**−3710.78**	**−3710.78**
		$t_{\text{fuse}}(s)$	0.254	0.211	0.212	1.029	1.029	0.214
bca-lap	**−3710.78**	*best generated*						
	7.169	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.186	3.998	4.006	5.749	5.758	4.052
		best fused	**−3710.78**	**−3710.78**	**−3710.78**	**−3710.78**	**−3710.78**	**−3710.78**
		$t_{\text{fuse}}(s)$	4.186	3.998	4.006	5.749	5.758	4.052
bca-greedy	**−3710.78**	*best generated*						
	1.343	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.112	0.058	0.059	0.718	0.720	0.804
		best fused	**−3710.78**	**−3710.78**	**−3710.78**	**−3710.78**	**−3710.78**	**−3710.78**
		$t_{\text{fuse}}(s)$	0.112	0.058	0.059	0.718	0.720	0.804
greedy	−3388.31	*best generated*						
	0.024	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.045	0.003	0.003	0.080	0.083	0.112
		best fused	**−3710.78**	**−3710.78**	**−3710.78**	−3388.31	−3388.31	**−3710.78**
		$t_{\text{fuse}}(s)$	0.053	0.004	0.004	0.080	0.083	0.174

house6 (*energy_house_frame1frame91*), known optimum: -3761.74

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3761.74**	*best generated*						
	0.022	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.297	0.012	0.013	0.040	0.041	0.015
		best fused	**−3761.74**	**−3761.74**	**−3761.74**	**−3761.74**	**−3761.74**	**−3761.74**
		$t_{\text{fuse}}(s)$	0.297	0.012	0.013	0.040	0.041	0.015
dd-ls3	**−3761.74**	*best generated*						
	0.044	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.109	0.053	0.052	0.053	0.053	0.054
		best fused	**−3761.74**	**−3761.74**	**−3761.74**	**−3761.74**	**−3761.74**	**−3761.74**
		$t_{\text{fuse}}(s)$	0.109	0.053	0.052	0.053	0.053	0.054
dd-ls4	**−3761.74**	*best generated*						
	0.405	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.242	0.193	0.193	0.431	0.430	0.348
		best fused	**−3761.74**	**−3761.74**	**−3761.74**	**−3761.74**	**−3761.74**	**−3761.74**
		$t_{\text{fuse}}(s)$	0.242	0.193	0.193	0.431	0.430	0.348
bca-lap	**−3761.74**	*best generated*						
	7.302	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.994	2.879	2.885	2.884	2.885	2.923
		best fused	**−3761.74**	**−3761.74**	**−3761.74**	**−3761.74**	**−3761.74**	**−3761.74**
		$t_{\text{fuse}}(s)$	2.994	2.879	2.885	2.884	2.885	2.923
bca-greedy	**−3761.74**	*best generated*						
	1.599	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.212	0.132	0.134	0.134	0.134	0.142
		best fused	**−3761.74**	**−3761.74**	**−3761.74**	**−3761.74**	**−3761.74**	**−3761.74**
		$t_{\text{fuse}}(s)$	0.212	0.132	0.134	0.134	0.134	0.142
greedy	−3539.90	*best generated*						
	0.039	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.102	0.006	0.008	0.127	0.123	0.095
		best fused	**−3761.74**	**−3761.74**	**−3761.74**	−3539.90	−3539.90	**−3761.74**
		$t_{\text{fuse}}(s)$	0.132	0.010	0.011	0.127	0.123	0.152

house7 (*energy_house_frame2frame87*), known optimum: -3837.08

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3837.08**	*best generated*						
	0.015	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.068	0.012	0.012	0.027	0.027	0.016
		best fused	**−3837.08**	**−3837.08**	**−3837.08**	**−3837.08**	**−3837.08**	**−3837.08**
		$t_{\text{fuse}}(s)$	0.068	0.012	0.012	0.027	0.027	0.016
dd-ls3	**−3837.08**	*best generated*						
	0.017	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.060	0.023	0.024	0.024	0.024	0.025
		best fused	**−3837.08**	**−3837.08**	**−3837.08**	**−3837.08**	**−3837.08**	**−3837.08**
		$t_{\text{fuse}}(s)$	0.060	0.023	0.024	0.024	0.024	0.025
dd-ls4	**−3837.08**	*best generated*						
	0.263	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.178	0.140	0.141	0.284	0.285	0.142
		best fused	**−3837.08**	**−3837.08**	**−3837.08**	**−3837.08**	**−3837.08**	**−3837.08**
		$t_{\text{fuse}}(s)$	0.178	0.140	0.141	0.284	0.285	0.142
bca-lap	**−3837.08**	*best generated*						
	2.434	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.307	0.268	0.269	0.269	0.269	0.273
		best fused	**−3837.08**	**−3837.08**	**−3837.08**	**−3837.08**	**−3837.08**	**−3837.08**
		$t_{\text{fuse}}(s)$	0.307	0.268	0.269	0.269	0.269	0.273
bca-greedy	**−3837.08**	*best generated*						
	0.652	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.061	0.020	0.020	0.034	0.035	0.043
		best fused	**−3837.08**	**−3837.08**	**−3837.08**	**−3837.08**	**−3837.08**	**−3837.08**
		$t_{\text{fuse}}(s)$	0.061	0.020	0.020	0.034	0.035	0.043
greedy	−3606.62	*best generated*						
	0.057	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.107	0.009	0.010	0.185	0.184	0.443
		best fused	**−3837.08**	**−3837.08**	**−3837.08**	−3606.62	−3606.62	−3712.04
		$t_{\text{fuse}}(s)$	0.124	0.011	0.012	0.185	0.184	0.443

house8 (*energy_house_frame2frame88*), known optimum: -3807.53

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3807.53**	*best generated*						
	0.021	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.066	0.011	0.011	0.038	0.038	0.015
		best fused	**−3807.53**	**−3807.53**	**−3807.53**	**−3807.53**	**−3807.53**	**−3807.53**
		$t_{\text{fuse}}(s)$	0.066	0.011	0.011	0.038	0.038	0.015
dd-ls3	**−3807.53**	*best generated*						
	0.174	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.098	0.054	0.054	0.191	0.190	0.056
		best fused	**−3807.53**	**−3807.53**	**−3807.53**	**−3807.53**	**−3807.53**	**−3807.53**
		$t_{\text{fuse}}(s)$	0.098	0.054	0.054	0.191	0.190	0.056
dd-ls4	**−3807.53**	*best generated*						
	0.234	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.151	0.107	0.107	0.256	0.255	0.108
		best fused	**−3807.53**	**−3807.53**	**−3807.53**	**−3807.53**	**−3807.53**	**−3807.53**
		$t_{\text{fuse}}(s)$	0.151	0.107	0.107	0.256	0.255	0.108
bca-lap	**−3807.53**	*best generated*						
	5.342	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.782	1.657	1.661	1.659	1.660	1.682
		best fused	**−3807.53**	**−3807.53**	**−3807.53**	**−3807.53**	**−3807.53**	**−3807.53**
		$t_{\text{fuse}}(s)$	1.782	1.657	1.661	1.659	1.660	1.682
bca-greedy	**−3807.53**	*best generated*						
	1.180	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.214	0.134	0.135	0.135	0.135	0.143
		best fused	**−3807.53**	**−3807.53**	**−3807.53**	**−3807.53**	**−3807.53**	**−3807.53**
		$t_{\text{fuse}}(s)$	0.214	0.134	0.135	0.135	0.135	0.143
greedy	−3509.97	*best generated*						
	0.042	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.089	0.007	0.007	0.135	0.133	0.078
		best fused	**−3807.53**	**−3807.53**	**−3807.53**	−3509.97	−3509.97	**−3807.53**
		$t_{\text{fuse}}(s)$	0.299	0.024	0.027	0.135	0.133	0.303

house9 (*energy_house_frame2frame89*), known optimum: -3807.82

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3807.82**	*best generated*						
	0.026	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.141	0.027	0.028	0.047	0.047	0.037
		best fused	**−3807.82**	**−3807.82**	**−3807.82**	**−3807.82**	**−3807.82**	**−3807.82**
		$t_{\text{fuse}}(s)$	0.141	0.027	0.028	0.047	0.047	0.037
dd-ls3	**−3807.82**	*best generated*						
	0.194	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.101	0.042	0.042	0.211	0.211	0.044
		best fused	**−3807.82**	**−3807.82**	**−3807.82**	**−3807.82**	**−3807.82**	**−3807.82**
		$t_{\text{fuse}}(s)$	0.101	0.042	0.042	0.211	0.211	0.044
dd-ls4	**−3807.82**	*best generated*						
	0.423	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.182	0.140	0.141	0.449	0.448	0.143
		best fused	**−3807.82**	**−3807.82**	**−3807.82**	**−3807.82**	**−3807.82**	**−3807.82**
		$t_{\text{fuse}}(s)$	0.182	0.140	0.141	0.449	0.448	0.143
bca-lap	**−3807.82**	*best generated*						
	7.410	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.537	2.425	2.432	2.433	2.431	2.462
		best fused	**−3807.82**	**−3807.82**	**−3807.82**	**−3807.82**	**−3807.82**	**−3807.82**
		$t_{\text{fuse}}(s)$	2.537	2.425	2.432	2.433	2.431	2.462
bca-greedy	**−3807.82**	*best generated*						
	0.196	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.070	0.027	0.027	0.106	0.106	0.125
		best fused	**−3807.82**	**−3807.82**	**−3807.82**	**−3807.82**	**−3807.82**	**−3807.82**
		$t_{\text{fuse}}(s)$	0.070	0.027	0.027	0.106	0.106	0.125
greedy	−3600.06	*best generated*						
	0.039	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.137	0.011	0.010	0.141	0.135	0.361
		best fused	**−3807.82**	**−3807.82**	**−3807.82**	−3600.06	−3600.06	**−3807.82**
		$t_{\text{fuse}}(s)$	0.180	0.013	0.014	0.141	0.135	0.598

house10 (*energy_house_frame2frame90*), known optimum: -3766.17

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3766.17**	*best generated*						
	0.025	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.064	0.010	0.010	0.045	0.045	0.014
		best fused	**−3766.17**	**−3766.17**	**−3766.17**	**−3766.17**	**−3766.17**	**−3766.17**
		$t_{\text{fuse}}(s)$	0.064	0.010	0.010	0.045	0.045	0.014
dd-ls3	**−3766.17**	*best generated*						
	0.155	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.083	0.038	0.039	0.170	0.170	0.041
		best fused	**−3766.17**	**−3766.17**	**−3766.17**	**−3766.17**	**−3766.17**	**−3766.17**
		$t_{\text{fuse}}(s)$	0.083	0.038	0.039	0.170	0.170	0.041
dd-ls4	**−3766.17**	*best generated*						
	0.485	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.357	0.237	0.237	0.507	0.508	0.307
		best fused	**−3766.17**	**−3766.17**	**−3766.17**	**−3766.17**	**−3766.17**	**−3766.17**
		$t_{\text{fuse}}(s)$	0.357	0.237	0.237	0.507	0.508	0.307
bca-lap	**−3766.17**	*best generated*						
	7.363	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.532	2.361	2.367	2.372	2.365	2.395
		best fused	**−3766.17**	**−3766.17**	**−3766.17**	**−3766.17**	**−3766.17**	**−3766.17**
		$t_{\text{fuse}}(s)$	2.532	2.361	2.367	2.372	2.365	2.395
bca-greedy	**−3766.17**	*best generated*						
	1.552	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.107	0.053	0.053	0.392	0.392	0.343
		best fused	**−3766.17**	**−3766.17**	**−3766.17**	**−3766.17**	**−3766.17**	**−3766.17**
		$t_{\text{fuse}}(s)$	0.107	0.053	0.053	0.392	0.392	0.343
greedy	−3618.95	*best generated*						
	0.051	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.194	0.009	0.010	0.167	0.165	0.588
		best fused	**−3766.17**	**−3766.17**	**−3766.17**	−3618.95	−3618.95	**−3766.17**
		$t_{\text{fuse}}(s)$	0.202	0.009	0.010	0.167	0.165	0.590

house11 (*energy_house_frame2frame91*), known optimum: -3791.43

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3791.43**	*best generated*						
	0.020	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.118	0.018	0.020	0.036	0.037	0.025
		best fused	**−3791.43**	**−3791.43**	**−3791.43**	**−3791.43**	**−3791.43**	**−3791.43**
		$t_{\text{fuse}}(s)$	0.118	0.018	0.020	0.036	0.037	0.025
dd-ls3	**−3791.43**	*best generated*						
	0.095	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.083	0.040	0.040	0.107	0.107	0.041
		best fused	**−3791.43**	**−3791.43**	**−3791.43**	**−3791.43**	**−3791.43**	**−3791.43**
		$t_{\text{fuse}}(s)$	0.083	0.040	0.040	0.107	0.107	0.041
dd-ls4	**−3791.43**	*best generated*						
	0.348	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.290	0.236	0.237	0.369	0.370	0.241
		best fused	**−3791.43**	**−3791.43**	**−3791.43**	**−3791.43**	**−3791.43**	**−3791.43**
		$t_{\text{fuse}}(s)$	0.290	0.236	0.237	0.369	0.370	0.241
bca-lap	**−3791.43**	*best generated*						
	7.816	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.554	2.456	2.462	2.461	2.462	2.493
		best fused	**−3791.43**	**−3791.43**	**−3791.43**	**−3791.43**	**−3791.43**	**−3791.43**
		$t_{\text{fuse}}(s)$	2.554	2.456	2.462	2.461	2.462	2.493
bca-greedy	**−3791.43**	*best generated*						
	0.088	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.066	0.021	0.023	0.179	0.179	0.059
		best fused	**−3791.43**	**−3791.43**	**−3791.43**	**−3791.43**	**−3791.43**	**−3791.43**
		$t_{\text{fuse}}(s)$	0.066	0.021	0.023	0.179	0.179	0.059
greedy	−3457.02	*best generated*						
	0.038	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.080	0.003	0.003	0.128	0.123	0.329
		best fused	**−3791.43**	**−3791.43**	**−3791.43**	−3457.02	−3457.02	**−3791.43**
		$t_{\text{fuse}}(s)$	0.137	0.008	0.009	0.128	0.123	0.617

house12 (*energy_house_frame2frame92*), known optimum: -3753.22

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3753.22**	*best generated*						
	0.027	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.079	0.008	0.008	0.048	0.050	0.016
		best fused	**−3753.22**	**−3753.22**	**−3753.22**	**−3753.22**	**−3753.22**	**−3753.22**
		$t_{\text{fuse}}(s)$	0.079	0.008	0.008	0.048	0.050	0.016
dd-ls3	**−3753.22**	*best generated*						
	0.159	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.114	0.057	0.058	0.174	0.174	0.060
		best fused	**−3753.22**	**−3753.22**	**−3753.22**	**−3753.22**	**−3753.22**	**−3753.22**
		$t_{\text{fuse}}(s)$	0.114	0.057	0.058	0.174	0.174	0.060
dd-ls4	**−3753.22**	*best generated*						
	0.636	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.252	0.198	0.199	0.666	0.666	0.202
		best fused	**−3753.22**	**−3753.22**	**−3753.22**	**−3753.22**	**−3753.22**	**−3753.22**
		$t_{\text{fuse}}(s)$	0.252	0.198	0.199	0.666	0.666	0.202
bca-lap	**−3753.22**	*best generated*						
	4.707	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.087	2.971	2.978	2.981	2.980	3.014
		best fused	**−3753.22**	**−3753.22**	**−3753.22**	**−3753.22**	**−3753.22**	**−3753.22**
		$t_{\text{fuse}}(s)$	3.087	2.971	2.978	2.981	2.980	3.014
bca-greedy	**−3753.22**	*best generated*						
	1.036	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.534	0.336	0.340	0.512	0.511	0.381
		best fused	**−3753.22**	**−3753.22**	**−3753.22**	**−3753.22**	**−3753.22**	**−3753.22**
		$t_{\text{fuse}}(s)$	0.534	0.336	0.340	0.512	0.511	0.381
greedy	−3556.07	*best generated*						
	0.018	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.205	0.007	0.008	0.061	0.058	0.268
		best fused	**−3753.22**	**−3753.22**	**−3753.22**	−3556.07	−3556.07	**−3753.22**
		$t_{\text{fuse}}(s)$	0.253	0.011	0.012	0.061	0.058	0.287

house13 (*energy_house_frame3frame88*), known optimum: -3808.14

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3808.14**	*best generated*						
	0.021	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.061	0.009	0.010	0.038	0.038	0.012
		best fused	**−3808.14**	**−3808.14**	**−3808.14**	**−3808.14**	**−3808.14**	**−3808.14**
		$t_{\text{fuse}}(s)$	0.061	0.009	0.010	0.038	0.038	0.012
dd-ls3	**−3808.14**	*best generated*						
	0.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.097	0.043	0.043	0.043	0.044	0.046
		best fused	**−3808.14**	**−3808.14**	**−3808.14**	**−3808.14**	**−3808.14**	**−3808.14**
		$t_{\text{fuse}}(s)$	0.097	0.043	0.043	0.043	0.044	0.046
dd-ls4	**−3808.14**	*best generated*						
	0.635	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.168	0.292	0.130	0.664	0.664	0.259
		best fused	**−3808.14**	**−3808.14**	**−3808.14**	**−3808.14**	**−3808.14**	**−3808.14**
		$t_{\text{fuse}}(s)$	0.168	0.292	0.130	0.664	0.664	0.259
bca-lap	**−3808.14**	*best generated*						
	7.593	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.180	2.089	2.094	2.094	2.094	2.122
		best fused	**−3808.14**	**−3808.14**	**−3808.14**	**−3808.14**	**−3808.14**	**−3808.14**
		$t_{\text{fuse}}(s)$	2.180	2.089	2.094	2.094	2.094	2.122
bca-greedy	**−3808.14**	*best generated*						
	1.682	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.077	0.019	0.020	0.030	0.030	0.035
		best fused	**−3808.14**	**−3808.14**	**−3808.14**	**−3808.14**	**−3808.14**	**−3808.14**
		$t_{\text{fuse}}(s)$	0.077	0.019	0.020	0.030	0.030	0.035
greedy	**−3808.14**	*best generated*						
	0.034	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.282	0.015	0.017	0.115	0.118	0.675
		best fused	**−3808.14**	**−3808.14**	**−3808.14**	**−3808.14**	**−3808.14**	**−3808.14**
		$t_{\text{fuse}}(s)$	0.282	0.015	0.017	0.115	0.118	0.675

house14 (*energy_house_frame3frame89*), known optimum: -3815.26

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3815.26**	*best generated*						
	0.020	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.107	0.018	0.020	0.036	0.036	0.025
		best fused	**−3815.26**	**−3815.26**	**−3815.26**	**−3815.26**	**−3815.26**	**−3815.26**
		$t_{\text{fuse}}(s)$	0.107	0.018	0.020	0.036	0.036	0.025
dd-ls3	**−3815.26**	*best generated*						
	0.078	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.121	0.064	0.064	0.088	0.088	0.067
		best fused	**−3815.26**	**−3815.26**	**−3815.26**	**−3815.26**	**−3815.26**	**−3815.26**
		$t_{\text{fuse}}(s)$	0.121	0.064	0.064	0.088	0.088	0.067
dd-ls4	**−3815.26**	*best generated*						
	0.509	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.242	0.199	0.200	0.536	0.537	0.203
		best fused	**−3815.26**	**−3815.26**	**−3815.26**	**−3815.26**	**−3815.26**	**−3815.26**
		$t_{\text{fuse}}(s)$	0.242	0.199	0.200	0.536	0.537	0.203
bca-lap	**−3815.26**	*best generated*						
	2.457	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.625	2.512	2.517	2.517	2.517	2.552
		best fused	**−3815.26**	**−3815.26**	**−3815.26**	**−3815.26**	**−3815.26**	**−3815.26**
		$t_{\text{fuse}}(s)$	2.625	2.512	2.517	2.517	2.517	2.552
bca-greedy	**−3815.26**	*best generated*						
	0.279	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.277	0.183	0.184	0.285	0.286	0.310
		best fused	**−3815.26**	**−3815.26**	**−3815.26**	**−3815.26**	**−3815.26**	**−3815.26**
		$t_{\text{fuse}}(s)$	0.277	0.183	0.184	0.285	0.286	0.310
greedy	−3460.92	*best generated*						
	0.033	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.055	0.004	0.005	0.118	0.120	0.386
		best fused	**−3815.26**	**−3815.26**	**−3815.26**	−3460.92	−3460.92	−3712.38
		$t_{\text{fuse}}(s)$	0.076	0.006	0.007	0.118	0.120	0.403

house15 (*energy_house_frame3frame90*), known optimum: -3761.33

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3761.33**	*best generated*						
	0.012	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.284	0.015	0.015	0.024	0.025	0.017
		best fused	**−3761.33**	**−3761.33**	**−3761.33**	**−3761.33**	**−3761.33**	**−3761.33**
		$t_{\text{fuse}}(s)$	0.284	0.015	0.015	0.024	0.025	0.017
dd-ls3	**−3761.33**	*best generated*						
	0.135	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.135	0.059	0.060	0.149	0.149	0.098
		best fused	**−3761.33**	**−3761.33**	**−3761.33**	**−3761.33**	**−3761.33**	**−3761.33**
		$t_{\text{fuse}}(s)$	0.135	0.059	0.060	0.149	0.149	0.098
dd-ls4	**−3761.33**	*best generated*						
	0.483	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.194	0.154	0.155	0.509	0.510	0.157
		best fused	**−3761.33**	**−3761.33**	**−3761.33**	**−3761.33**	**−3761.33**	**−3761.33**
		$t_{\text{fuse}}(s)$	0.194	0.154	0.155	0.509	0.510	0.157
bca-lap	**−3761.33**	*best generated*						
	2.329	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.240	2.137	2.141	2.141	2.142	2.168
		best fused	**−3761.33**	**−3761.33**	**−3761.33**	**−3761.33**	**−3761.33**	**−3761.33**
		$t_{\text{fuse}}(s)$	2.240	2.137	2.141	2.141	2.142	2.168
bca-greedy	**−3761.33**	*best generated*						
	0.381	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.097	0.034	0.034	0.034	0.034	0.036
		best fused	**−3761.33**	**−3761.33**	**−3761.33**	**−3761.33**	**−3761.33**	**−3761.33**
		$t_{\text{fuse}}(s)$	0.097	0.034	0.034	0.034	0.034	0.036
greedy	−3572.52	*best generated*						
	0.047	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.090	0.007	0.008	0.161	0.165	0.115
		best fused	**−3761.33**	**−3761.33**	**−3761.33**	−3572.52	−3572.52	**−3761.33**
		$t_{\text{fuse}}(s)$	0.094	0.007	0.008	0.161	0.165	0.166

house16 (*energy_house_frame3frame91*), known optimum: -3808.47

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3808.47**	*best generated*						
	0.008	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.087	0.012	0.012	0.016	0.016	0.011
		best fused	**−3808.47**	**−3808.47**	**−3808.47**	**−3808.47**	**−3808.47**	**−3808.47**
		$t_{\text{fuse}}(s)$	0.087	0.012	0.012	0.016	0.016	0.011
dd-ls3	**−3808.47**	*best generated*						
	0.127	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.103	0.056	0.056	0.140	0.140	0.058
		best fused	**−3808.47**	**−3808.47**	**−3808.47**	**−3808.47**	**−3808.47**	**−3808.47**
		$t_{\text{fuse}}(s)$	0.103	0.056	0.056	0.140	0.140	0.058
dd-ls4	**−3808.47**	*best generated*						
	0.478	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.317	0.211	0.262	0.504	0.504	0.215
		best fused	**−3808.47**	**−3808.47**	**−3808.47**	**−3808.47**	**−3808.47**	**−3808.47**
		$t_{\text{fuse}}(s)$	0.317	0.211	0.262	0.504	0.504	0.215
bca-lap	**−3808.47**	*best generated*						
	3.317	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.897	2.788	2.793	2.794	2.797	2.832
		best fused	**−3808.47**	**−3808.47**	**−3808.47**	**−3808.47**	**−3808.47**	**−3808.47**
		$t_{\text{fuse}}(s)$	2.897	2.788	2.793	2.794	2.797	2.832
bca-greedy	**−3808.47**	*best generated*						
	0.764	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.070	0.025	0.024	0.090	0.091	0.096
		best fused	**−3808.47**	**−3808.47**	**−3808.47**	**−3808.47**	**−3808.47**	**−3808.47**
		$t_{\text{fuse}}(s)$	0.070	0.025	0.024	0.090	0.091	0.096
greedy	−3601.44	*best generated*						
	0.026	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.059	0.004	0.005	0.095	0.087	0.382
		best fused	**−3808.47**	**−3808.47**	**−3808.47**	−3601.44	−3601.44	**−3808.47**
		$t_{\text{fuse}}(s)$	0.472	0.041	0.047	0.095	0.087	0.384

house17 (*energy_house_frame3frame92*), known optimum: -3769.27

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3769.27**	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.084	0.016	0.016	0.025	0.026	0.021
		best fused	**−3769.27**	**−3769.27**	**−3769.27**	**−3769.27**	**−3769.27**	**−3769.27**
		$t_{\text{fuse}}(s)$	0.084	0.016	0.016	0.025	0.026	0.021
dd-ls3	**−3769.27**	*best generated*						
	0.057	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.097	0.051	0.051	0.066	0.066	0.053
		best fused	**−3769.27**	**−3769.27**	**−3769.27**	**−3769.27**	**−3769.27**	**−3769.27**
		$t_{\text{fuse}}(s)$	0.097	0.051	0.051	0.066	0.066	0.053
dd-ls4	**−3769.27**	*best generated*						
	0.295	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.242	0.201	0.202	0.320	0.320	0.205
		best fused	**−3769.27**	**−3769.27**	**−3769.27**	**−3769.27**	**−3769.27**	**−3769.27**
		$t_{\text{fuse}}(s)$	0.242	0.201	0.202	0.320	0.320	0.205
bca-lap	**−3769.27**	*best generated*						
	7.269	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.953	2.840	2.846	2.852	2.845	2.885
		best fused	**−3769.27**	**−3769.27**	**−3769.27**	**−3769.27**	**−3769.27**	**−3769.27**
		$t_{\text{fuse}}(s)$	2.953	2.840	2.846	2.852	2.845	2.885
bca-greedy	**−3769.27**	*best generated*						
	1.600	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.155	0.088	0.087	0.200	0.200	0.103
		best fused	**−3769.27**	**−3769.27**	**−3769.27**	**−3769.27**	**−3769.27**	**−3769.27**
		$t_{\text{fuse}}(s)$	0.155	0.088	0.087	0.200	0.200	0.103
greedy	−3625.92	*best generated*						
	0.050	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.134	0.012	0.014	0.176	0.175	0.233
		best fused	**−3769.27**	**−3769.27**	**−3769.27**	−3625.92	−3625.92	**−3769.27**
		$t_{\text{fuse}}(s)$	0.158	0.014	0.016	0.176	0.175	0.268

house18 (*energy_house_frame3frame93*), known optimum: -3763.96

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3763.96**	*best generated*						
	0.021	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.093	0.018	0.020	0.039	0.039	0.025
		best fused	**−3763.96**	**−3763.96**	**−3763.96**	**−3763.96**	**−3763.96**	**−3763.96**
		$t_{\text{fuse}}(s)$	0.093	0.018	0.020	0.039	0.039	0.025
dd-ls3	**−3763.96**	*best generated*						
	0.081	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.120	0.071	0.072	0.093	0.093	0.053
		best fused	**−3763.96**	**−3763.96**	**−3763.96**	**−3763.96**	**−3763.96**	**−3763.96**
		$t_{\text{fuse}}(s)$	0.120	0.071	0.072	0.093	0.093	0.053
dd-ls4	**−3763.96**	*best generated*						
	0.402	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.378	0.424	0.425	0.425	0.425	0.314
		best fused	**−3763.96**	**−3763.96**	**−3763.96**	**−3763.96**	**−3763.96**	**−3763.96**
		$t_{\text{fuse}}(s)$	0.378	0.424	0.425	0.425	0.425	0.314
bca-lap	**−3763.96**	*best generated*						
	6.624	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.768	4.608	4.618	4.618	4.619	4.677
		best fused	**−3763.96**	**−3763.96**	**−3763.96**	**−3763.96**	**−3763.96**	**−3763.96**
		$t_{\text{fuse}}(s)$	4.768	4.608	4.618	4.618	4.619	4.677
bca-greedy	**−3763.96**	*best generated*						
	1.419	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.067	0.024	0.024	0.245	0.246	0.044
		best fused	**−3763.96**	**−3763.96**	**−3763.96**	**−3763.96**	**−3763.96**	**−3763.96**
		$t_{\text{fuse}}(s)$	0.067	0.024	0.024	0.245	0.246	0.044
greedy	−3503.81	*best generated*						
	0.048	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.056	0.007	0.007	0.159	0.156	0.141
		best fused	**−3763.96**	**−3763.96**	**−3763.96**	−3503.81	−3503.81	**−3763.96**
		$t_{\text{fuse}}(s)$	0.658	0.061	0.070	0.159	0.156	0.640

house19 (*energy_house_frame4frame89*), known optimum: -3826.43

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3826.43**	*best generated*						
	0.008	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.086	0.014	0.016	0.017	0.017	0.021
		best fused	**−3826.43**	**−3826.43**	**−3826.43**	**−3826.43**	**−3826.43**	**−3826.43**
		$t_{\text{fuse}}(s)$	0.086	0.014	0.016	0.017	0.017	0.021
dd-ls3	**−3826.43**	*best generated*						
	0.119	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.084	0.043	0.043	0.133	0.132	0.045
		best fused	**−3826.43**	**−3826.43**	**−3826.43**	**−3826.43**	**−3826.43**	**−3826.43**
		$t_{\text{fuse}}(s)$	0.084	0.043	0.043	0.133	0.132	0.045
dd-ls4	**−3826.43**	*best generated*						
	0.605	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.469	0.411	0.411	0.632	0.632	0.416
		best fused	**−3826.43**	**−3826.43**	**−3826.43**	**−3826.43**	**−3826.43**	**−3826.43**
		$t_{\text{fuse}}(s)$	0.469	0.411	0.411	0.632	0.632	0.416
bca-lap	**−3826.43**	*best generated*						
	4.607	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.067	2.944	2.950	2.952	2.951	2.991
		best fused	**−3826.43**	**−3826.43**	**−3826.43**	**−3826.43**	**−3826.43**	**−3826.43**
		$t_{\text{fuse}}(s)$	3.067	2.944	2.950	2.952	2.951	2.991
bca-greedy	**−3826.43**	*best generated*						
	0.191	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.073	0.024	0.024	0.064	0.063	0.067
		best fused	**−3826.43**	**−3826.43**	**−3826.43**	**−3826.43**	**−3826.43**	**−3826.43**
		$t_{\text{fuse}}(s)$	0.073	0.024	0.024	0.064	0.063	0.067
greedy	−3518.33	*best generated*						
	0.032	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.080	0.006	0.007	0.107	0.107	0.034
		best fused	**−3826.43**	**−3826.43**	**−3826.43**	−3518.33	−3518.33	**−3826.43**
		$t_{\text{fuse}}(s)$	0.240	0.020	0.022	0.107	0.107	0.608

house20 (*energy_house_frame4frame90*), known optimum: -3772.11

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3772.11**	*best generated*						
	0.043	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.099	0.019	0.020	0.075	0.078	0.026
		best fused	**−3772.11**	**−3772.11**	**−3772.11**	**−3772.11**	**−3772.11**	**−3772.11**
		$t_{\text{fuse}}(s)$	0.099	0.019	0.020	0.075	0.078	0.026
dd-ls3	**−3772.11**	*best generated*						
	0.071	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.105	0.056	0.057	0.081	0.081	0.060
		best fused	**−3772.11**	**−3772.11**	**−3772.11**	**−3772.11**	**−3772.11**	**−3772.11**
		$t_{\text{fuse}}(s)$	0.105	0.056	0.057	0.081	0.081	0.060
dd-ls4	**−3772.11**	*best generated*						
	0.587	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.205	0.164	0.164	0.614	0.614	0.165
		best fused	**−3772.11**	**−3772.11**	**−3772.11**	**−3772.11**	**−3772.11**	**−3772.11**
		$t_{\text{fuse}}(s)$	0.205	0.164	0.164	0.614	0.614	0.165
bca-lap	**−3772.11**	*best generated*						
	3.148	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.780	2.653	2.656	2.656	2.656	2.686
		best fused	**−3772.11**	**−3772.11**	**−3772.11**	**−3772.11**	**−3772.11**	**−3772.11**
		$t_{\text{fuse}}(s)$	2.780	2.653	2.656	2.656	2.656	2.686
bca-greedy	**−3772.11**	*best generated*						
	0.031	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.088	0.036	0.035	0.035	0.036	0.048
		best fused	**−3772.11**	**−3772.11**	**−3772.11**	**−3772.11**	**−3772.11**	**−3772.11**
		$t_{\text{fuse}}(s)$	0.088	0.036	0.035	0.035	0.036	0.048
greedy	**−3772.11**	*best generated*						
	0.038	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.228	0.019	0.022	0.133	0.131	0.375
		best fused	**−3772.11**	**−3772.11**	**−3772.11**	**−3772.11**	**−3772.11**	**−3772.11**
		$t_{\text{fuse}}(s)$	0.228	0.019	0.022	0.133	0.131	0.375

house21 (*energy_house_frame4frame91*), known optimum: -3813.78

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3813.78**	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.116	0.015	0.015	0.024	0.025	0.032
		best fused	**−3813.78**	**−3813.78**	**−3813.78**	**−3813.78**	**−3813.78**	**−3813.78**
		$t_{\text{fuse}}(s)$	0.116	0.015	0.015	0.024	0.025	0.032
dd-ls3	**−3813.78**	*best generated*						
	0.168	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.100	0.052	0.052	0.183	0.184	0.055
		best fused	**−3813.78**	**−3813.78**	**−3813.78**	**−3813.78**	**−3813.78**	**−3813.78**
		$t_{\text{fuse}}(s)$	0.100	0.052	0.052	0.183	0.184	0.055
dd-ls4	**−3813.78**	*best generated*						
	0.498	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.168	0.129	0.129	0.525	0.525	0.131
		best fused	**−3813.78**	**−3813.78**	**−3813.78**	**−3813.78**	**−3813.78**	**−3813.78**
		$t_{\text{fuse}}(s)$	0.168	0.129	0.129	0.525	0.525	0.131
bca-lap	**−3813.78**	*best generated*						
	5.501	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.600	3.464	3.470	3.472	3.469	3.512
		best fused	**−3813.78**	**−3813.78**	**−3813.78**	**−3813.78**	**−3813.78**	**−3813.78**
		$t_{\text{fuse}}(s)$	3.600	3.464	3.470	3.472	3.469	3.512
bca-greedy	**−3813.78**	*best generated*						
	1.167	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.076	0.032	0.032	0.032	0.032	0.033
		best fused	**−3813.78**	**−3813.78**	**−3813.78**	**−3813.78**	**−3813.78**	**−3813.78**
		$t_{\text{fuse}}(s)$	0.076	0.032	0.032	0.032	0.032	0.033
greedy	−3663.59	*best generated*						
	0.003	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.055	0.004	0.004	0.013	0.013	0.107
		best fused	**−3813.78**	**−3813.78**	**−3813.78**	−3663.59	−3663.59	**−3813.78**
		$t_{\text{fuse}}(s)$	0.130	0.011	0.012	0.013	0.013	0.132

house22 (*energy_house_frame4frame92*), known optimum: -3769.21

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3769.21**	*best generated*						
	0.024	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.080	0.013	0.014	0.046	0.044	0.018
		best fused	**−3769.21**	**−3769.21**	**−3769.21**	**−3769.21**	**−3769.21**	**−3769.21**
		$t_{\text{fuse}}(s)$	0.080	0.013	0.014	0.046	0.044	0.018
dd-ls3	**−3769.21**	*best generated*						
	0.164	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.160	0.098	0.099	0.180	0.180	0.103
		best fused	**−3769.21**	**−3769.21**	**−3769.21**	**−3769.21**	**−3769.21**	**−3769.21**
		$t_{\text{fuse}}(s)$	0.160	0.098	0.099	0.180	0.180	0.103
dd-ls4	**−3769.21**	*best generated*						
	0.683	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.320	0.265	0.265	0.710	0.710	0.269
		best fused	**−3769.21**	**−3769.21**	**−3769.21**	**−3769.21**	**−3769.21**	**−3769.21**
		$t_{\text{fuse}}(s)$	0.320	0.265	0.265	0.710	0.710	0.269
bca-lap	**−3769.21**	*best generated*						
	7.511	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	5.313	5.148	5.158	5.163	5.162	5.214
		best fused	**−3769.21**	**−3769.21**	**−3769.21**	**−3769.21**	**−3769.21**	**−3769.21**
		$t_{\text{fuse}}(s)$	5.313	5.148	5.158	5.163	5.162	5.214
bca-greedy	**−3769.21**	*best generated*						
	1.282	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.428	0.265	0.268	0.354	0.355	0.402
		best fused	**−3769.21**	**−3769.21**	**−3769.21**	**−3769.21**	**−3769.21**	**−3769.21**
		$t_{\text{fuse}}(s)$	0.428	0.265	0.268	0.354	0.355	0.402
greedy	−3519.37	*best generated*						
	0.018	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.051	0.004	0.004	0.063	0.059	0.255
		best fused	**−3769.21**	**−3769.21**	**−3769.21**	−3519.37	−3519.37	**−3769.21**
		$t_{\text{fuse}}(s)$	0.398	0.006	0.006	0.063	0.059	0.342

house23 (*energy_house_frame4frame93*), known optimum: -3770.02

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3770.02**	*best generated*						
	0.031	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.084	0.014	0.015	0.053	0.055	0.020
		best fused	**−3770.02**	**−3770.02**	**−3770.02**	**−3770.02**	**−3770.02**	**−3770.02**
		$t_{\text{fuse}}(s)$	0.084	0.014	0.015	0.053	0.055	0.020
dd-ls3	**−3770.02**	*best generated*						
	0.270	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.101	0.056	0.057	0.291	0.291	0.059
		best fused	**−3770.02**	**−3770.02**	**−3770.02**	**−3770.02**	**−3770.02**	**−3770.02**
		$t_{\text{fuse}}(s)$	0.101	0.056	0.057	0.291	0.291	0.059
dd-ls4	**−3770.02**	*best generated*						
	0.153	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.222	0.173	0.173	0.173	0.173	0.176
		best fused	**−3770.02**	**−3770.02**	**−3770.02**	**−3770.02**	**−3770.02**	**−3770.02**
		$t_{\text{fuse}}(s)$	0.222	0.173	0.173	0.173	0.173	0.176
bca-lap	**−3770.02**	*best generated*						
	9.865	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	6.996	6.789	6.800	6.801	6.802	6.875
		best fused	**−3770.02**	**−3770.02**	**−3770.02**	**−3770.02**	**−3770.02**	**−3770.02**
		$t_{\text{fuse}}(s)$	6.996	6.789	6.800	6.801	6.802	6.875
bca-greedy	**−3770.02**	*best generated*						
	0.933	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.284	0.168	0.169	0.524	0.523	0.184
		best fused	**−3770.02**	**−3770.02**	**−3770.02**	**−3770.02**	**−3770.02**	**−3770.02**
		$t_{\text{fuse}}(s)$	0.284	0.168	0.169	0.524	0.523	0.184
greedy	−3572.25	*best generated*						
	0.027	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.159	0.009	0.011	0.087	0.087	0.286
		best fused	**−3770.02**	**−3770.02**	**−3770.02**	−3572.25	−3572.25	**−3770.02**
		$t_{\text{fuse}}(s)$	0.192	0.013	0.015	0.087	0.087	0.289

house24 (*energy_house_frame4frame94*), known optimum: -3781.42

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3781.42**	*best generated*						
	0.028	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.136	0.016	0.025	0.051	0.050	0.032
		best fused	**−3781.42**	**−3781.42**	**−3781.42**	**−3781.42**	**−3781.42**	**−3781.42**
		$t_{\text{fuse}}(s)$	0.136	0.016	0.025	0.051	0.050	0.032
dd-ls3	**−3781.42**	*best generated*						
	0.271	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.115	0.046	0.047	0.293	0.293	0.049
		best fused	**−3781.42**	**−3781.42**	**−3781.42**	**−3781.42**	**−3781.42**	**−3781.42**
		$t_{\text{fuse}}(s)$	0.115	0.046	0.047	0.293	0.293	0.049
dd-ls4	**−3781.42**	*best generated*						
	0.417	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.305	0.256	0.257	0.445	0.445	0.259
		best fused	**−3781.42**	**−3781.42**	**−3781.42**	**−3781.42**	**−3781.42**	**−3781.42**
		$t_{\text{fuse}}(s)$	0.305	0.256	0.257	0.445	0.445	0.259
bca-lap	**−3781.42**	*best generated*						
	8.236	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.504	4.361	4.371	4.371	4.371	4.419
		best fused	**−3781.42**	**−3781.42**	**−3781.42**	**−3781.42**	**−3781.42**	**−3781.42**
		$t_{\text{fuse}}(s)$	4.504	4.361	4.371	4.371	4.371	4.419
bca-greedy	**−3781.42**	*best generated*						
	1.629	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.392	0.249	0.251	0.251	0.252	0.266
		best fused	**−3781.42**	**−3781.42**	**−3781.42**	**−3781.42**	**−3781.42**	**−3781.42**
		$t_{\text{fuse}}(s)$	0.392	0.249	0.251	0.251	0.252	0.266
greedy	−3691.84	*best generated*						
	0.029	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.056	0.005	0.005	0.094	0.096	0.155
		best fused	**−3781.42**	**−3781.42**	**−3781.42**	−3691.84	−3691.84	**−3781.42**
		$t_{\text{fuse}}(s)$	0.128	0.012	0.013	0.094	0.096	0.248

house25 (*energy_house_frame5frame90*), known optimum: -3757.48

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3757.48**	*best generated*						
	0.017	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.099	0.012	0.013	0.032	0.032	0.016
		best fused	**−3757.48**	**−3757.48**	**−3757.48**	**−3757.48**	**−3757.48**	**−3757.48**
		$t_{\text{fuse}}(s)$	0.099	0.012	0.013	0.032	0.032	0.016
dd-ls3	**−3757.48**	*best generated*						
	0.306	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.175	0.091	0.092	0.331	0.331	0.096
		best fused	**−3757.48**	**−3757.48**	**−3757.48**	**−3757.48**	**−3757.48**	**−3757.48**
		$t_{\text{fuse}}(s)$	0.175	0.091	0.092	0.331	0.331	0.096
dd-ls4	**−3757.48**	*best generated*						
	0.447	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.182	0.143	0.143	0.474	0.474	0.145
		best fused	**−3757.48**	**−3757.48**	**−3757.48**	**−3757.48**	**−3757.48**	**−3757.48**
		$t_{\text{fuse}}(s)$	0.182	0.143	0.143	0.474	0.474	0.145
bca-lap	**−3757.48**	*best generated*						
	7.394	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.828	1.706	1.710	3.923	3.920	1.728
		best fused	**−3757.48**	**−3757.48**	**−3757.48**	**−3757.48**	**−3757.48**	**−3757.48**
		$t_{\text{fuse}}(s)$	1.828	1.706	1.710	3.923	3.920	1.728
bca-greedy	**−3757.48**	*best generated*						
	1.176	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.095	0.050	0.052	0.051	0.051	0.054
		best fused	**−3757.48**	**−3757.48**	**−3757.48**	**−3757.48**	**−3757.48**	**−3757.48**
		$t_{\text{fuse}}(s)$	0.095	0.050	0.052	0.051	0.051	0.054
greedy	−3521.31	*best generated*						
	0.005	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.100	0.006	0.007	0.020	0.020	0.064
		best fused	**−3757.48**	**−3757.48**	**−3757.48**	−3521.31	−3521.31	**−3757.48**
		$t_{\text{fuse}}(s)$	0.168	0.012	0.014	0.020	0.020	0.509

house26 (*energy_house_frame5frame91*), known optimum: -3801.56

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3801.56**	*best generated*						
	0.017	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.066	0.010	0.011	0.031	0.033	0.013
		best fused	**−3801.56**	**−3801.56**	**−3801.56**	**−3801.56**	**−3801.56**	**−3801.56**
		$t_{\text{fuse}}(s)$	0.066	0.010	0.011	0.031	0.033	0.013
dd-ls3	**−3801.56**	*best generated*						
	0.083	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.150	0.083	0.085	0.095	0.094	0.088
		best fused	**−3801.56**	**−3801.56**	**−3801.56**	**−3801.56**	**−3801.56**	**−3801.56**
		$t_{\text{fuse}}(s)$	0.150	0.083	0.085	0.095	0.094	0.088
dd-ls4	**−3801.56**	*best generated*						
	0.262	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.336	0.285	0.286	0.285	0.286	0.289
		best fused	**−3801.56**	**−3801.56**	**−3801.56**	**−3801.56**	**−3801.56**	**−3801.56**
		$t_{\text{fuse}}(s)$	0.336	0.285	0.286	0.285	0.286	0.289
bca-lap	**−3801.56**	*best generated*						
	4.757	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.885	2.719	2.725	2.724	2.724	2.757
		best fused	**−3801.56**	**−3801.56**	**−3801.56**	**−3801.56**	**−3801.56**	**−3801.56**
		$t_{\text{fuse}}(s)$	2.885	2.719	2.725	2.724	2.724	2.757
bca-greedy	**−3801.56**	*best generated*						
	0.930	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.228	0.088	0.089	0.201	0.201	0.218
		best fused	**−3801.56**	**−3801.56**	**−3801.56**	**−3801.56**	**−3801.56**	**−3801.56**
		$t_{\text{fuse}}(s)$	0.228	0.088	0.089	0.201	0.201	0.218
greedy	−3577.39	*best generated*						
	0.045	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.068	0.006	0.007	0.148	0.149	0.367
		best fused	**−3801.56**	**−3801.56**	**−3801.56**	−3577.39	−3577.39	**−3801.56**
		$t_{\text{fuse}}(s)$	0.420	0.039	0.043	0.148	0.149	0.369

house27 (*energy_house_frame5frame92*), known optimum: -3759.36

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3759.36**	*best generated*						
	0.014	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.144	0.024	0.026	0.026	0.027	0.016
		best fused	**−3759.36**	**−3759.36**	**−3759.36**	**−3759.36**	**−3759.36**	**−3759.36**
		$t_{\text{fuse}}(s)$	0.144	0.024	0.026	0.026	0.027	0.016
dd-ls3	**−3759.36**	*best generated*						
	0.177	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.190	0.113	0.115	0.193	0.193	0.119
		best fused	**−3759.36**	**−3759.36**	**−3759.36**	**−3759.36**	**−3759.36**	**−3759.36**
		$t_{\text{fuse}}(s)$	0.190	0.113	0.115	0.193	0.193	0.119
dd-ls4	**−3759.36**	*best generated*						
	0.464	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.291	0.242	0.243	0.487	0.487	0.245
		best fused	**−3759.36**	**−3759.36**	**−3759.36**	**−3759.36**	**−3759.36**	**−3759.36**
		$t_{\text{fuse}}(s)$	0.291	0.242	0.243	0.487	0.487	0.245
bca-lap	**−3759.36**	*best generated*						
	3.489	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.757	2.602	2.607	2.607	2.608	2.639
		best fused	**−3759.36**	**−3759.36**	**−3759.36**	**−3759.36**	**−3759.36**	**−3759.36**
		$t_{\text{fuse}}(s)$	2.757	2.602	2.607	2.607	2.608	2.639
bca-greedy	**−3759.36**	*best generated*						
	0.018	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.053	0.017	0.017	0.330	0.331	0.375
		best fused	**−3759.36**	**−3759.36**	**−3759.36**	**−3759.36**	**−3759.36**	**−3759.36**
		$t_{\text{fuse}}(s)$	0.053	0.017	0.017	0.330	0.331	0.375
greedy	−3605.39	*best generated*						
	0.042	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.151	0.013	0.015	0.146	0.147	0.211
		best fused	**−3759.36**	**−3759.36**	**−3759.36**	−3605.39	−3605.39	**−3759.36**
		$t_{\text{fuse}}(s)$	0.151	0.013	0.015	0.146	0.147	0.211

house28 (*energy_house_frame5frame93*), known optimum: -3764.02

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3764.02**	*best generated*						
	0.026	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.086	0.014	0.015	0.046	0.046	0.044
		best fused	**−3764.02**	**−3764.02**	**−3764.02**	**−3764.02**	**−3764.02**	**−3764.02**
		$t_{\text{fuse}}(s)$	0.086	0.014	0.015	0.046	0.046	0.044
dd-ls3	**−3764.02**	*best generated*						
	0.053	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.080	0.038	0.039	0.062	0.062	0.065
		best fused	**−3764.02**	**−3764.02**	**−3764.02**	**−3764.02**	**−3764.02**	**−3764.02**
		$t_{\text{fuse}}(s)$	0.080	0.038	0.039	0.062	0.062	0.065
dd-ls4	**−3764.02**	*best generated*						
	0.289	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.184	0.141	0.142	0.313	0.313	0.144
		best fused	**−3764.02**	**−3764.02**	**−3764.02**	**−3764.02**	**−3764.02**	**−3764.02**
		$t_{\text{fuse}}(s)$	0.184	0.141	0.142	0.313	0.313	0.144
bca-lap	**−3764.02**	*best generated*						
	8.270	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.993	2.869	2.876	2.879	2.875	2.909
		best fused	**−3764.02**	**−3764.02**	**−3764.02**	**−3764.02**	**−3764.02**	**−3764.02**
		$t_{\text{fuse}}(s)$	2.993	2.869	2.876	2.879	2.875	2.909
bca-greedy	**−3764.02**	*best generated*						
	0.112	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.572	0.391	0.393	0.393	0.394	0.428
		best fused	**−3764.02**	**−3764.02**	**−3764.02**	**−3764.02**	**−3764.02**	**−3764.02**
		$t_{\text{fuse}}(s)$	0.572	0.391	0.393	0.393	0.394	0.428
greedy	−3524.17	*best generated*						
	0.033	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.111	0.007	0.007	0.114	0.116	0.095
		best fused	**−3764.02**	**−3764.02**	**−3764.02**	−3524.17	−3524.17	**−3764.02**
		$t_{\text{fuse}}(s)$	0.130	0.008	0.009	0.114	0.116	0.107

house29 (*energy_house_frame5frame94*), known optimum: -3765.23

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3765.23**	*best generated*						
	0.029	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.088	0.024	0.013	0.053	0.051	0.032
		best fused	**−3765.23**	**−3765.23**	**−3765.23**	**−3765.23**	**−3765.23**	**−3765.23**
		$t_{\text{fuse}}(s)$	0.088	0.024	0.013	0.053	0.051	0.032
dd-ls3	**−3765.23**	*best generated*						
	0.058	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.102	0.057	0.058	0.067	0.067	0.060
		best fused	**−3765.23**	**−3765.23**	**−3765.23**	**−3765.23**	**−3765.23**	**−3765.23**
		$t_{\text{fuse}}(s)$	0.102	0.057	0.058	0.067	0.067	0.060
dd-ls4	**−3765.23**	*best generated*						
	0.576	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.181	0.141	0.141	0.605	0.605	0.143
		best fused	**−3765.23**	**−3765.23**	**−3765.23**	**−3765.23**	**−3765.23**	**−3765.23**
		$t_{\text{fuse}}(s)$	0.181	0.141	0.141	0.605	0.605	0.143
bca-lap	**−3765.23**	*best generated*						
	8.286	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.998	3.864	3.872	3.873	3.875	3.918
		best fused	**−3765.23**	**−3765.23**	**−3765.23**	**−3765.23**	**−3765.23**	**−3765.23**
		$t_{\text{fuse}}(s)$	3.998	3.864	3.872	3.873	3.875	3.918
bca-greedy	**−3765.23**	*best generated*						
	1.651	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.087	0.035	0.035	0.498	0.499	0.540
		best fused	**−3765.23**	**−3765.23**	**−3765.23**	**−3765.23**	**−3765.23**	**−3765.23**
		$t_{\text{fuse}}(s)$	0.087	0.035	0.035	0.498	0.499	0.540
greedy	−3580.21	*best generated*						
	0.055	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.258	0.022	0.026	0.179	0.171	0.165
		best fused	**−3765.23**	**−3765.23**	**−3765.23**	−3580.21	−3580.21	**−3765.23**
		$t_{\text{fuse}}(s)$	0.349	0.030	0.035	0.179	0.171	0.221

house30 (*energy_house_frame5frame95*), known optimum: -3773.62

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3773.62**	*best generated*						
	0.025	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.049	0.011	0.012	0.046	0.045	0.009
		best fused	**−3773.62**	**−3773.62**	**−3773.62**	**−3773.62**	**−3773.62**	**−3773.62**
		$t_{\text{fuse}}(s)$	0.049	0.011	0.012	0.046	0.045	0.009
dd-ls3	**−3773.62**	*best generated*						
	0.096	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.134	0.078	0.078	0.107	0.107	0.081
		best fused	**−3773.62**	**−3773.62**	**−3773.62**	**−3773.62**	**−3773.62**	**−3773.62**
		$t_{\text{fuse}}(s)$	0.134	0.078	0.078	0.107	0.107	0.081
dd-ls4	**−3773.62**	*best generated*						
	0.136	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.195	0.156	0.157	0.157	0.157	0.158
		best fused	**−3773.62**	**−3773.62**	**−3773.62**	**−3773.62**	**−3773.62**	**−3773.62**
		$t_{\text{fuse}}(s)$	0.195	0.156	0.157	0.157	0.157	0.158
bca-lap	**−3773.62**	*best generated*						
	8.034	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.338	3.173	3.179	3.181	3.179	3.217
		best fused	**−3773.62**	**−3773.62**	**−3773.62**	**−3773.62**	**−3773.62**	**−3773.62**
		$t_{\text{fuse}}(s)$	3.338	3.173	3.179	3.181	3.179	3.217
bca-greedy	**−3773.62**	*best generated*						
	1.556	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.082	0.040	0.040	0.359	0.360	0.387
		best fused	**−3773.62**	**−3773.62**	**−3773.62**	**−3773.62**	**−3773.62**	**−3773.62**
		$t_{\text{fuse}}(s)$	0.082	0.040	0.040	0.359	0.360	0.387
greedy	−3496.08	*best generated*						
	0.032	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.072	0.005	0.006	0.110	0.110	0.471
		best fused	**−3773.62**	**−3773.62**	**−3773.62**	−3496.08	−3496.08	**−3773.62**
		$t_{\text{fuse}}(s)$	0.080	0.060	0.068	0.110	0.110	0.595

house31 (*energy_house_frame6frame91*), known optimum: -3824.94

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3824.94**	*best generated*						
	0.014	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.068	0.008	0.008	0.026	0.027	0.011
		best fused	**−3824.94**	**−3824.94**	**−3824.94**	**−3824.94**	**−3824.94**	**−3824.94**
		$t_{\text{fuse}}(s)$	0.068	0.008	0.008	0.026	0.027	0.011
dd-ls3	**−3824.94**	*best generated*						
	0.091	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.140	0.064	0.065	0.103	0.103	0.067
		best fused	**−3824.94**	**−3824.94**	**−3824.94**	**−3824.94**	**−3824.94**	**−3824.94**
		$t_{\text{fuse}}(s)$	0.140	0.064	0.065	0.103	0.103	0.067
dd-ls4	**−3824.94**	*best generated*						
	0.497	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.185	0.145	0.146	0.522	0.521	0.147
		best fused	**−3824.94**	**−3824.94**	**−3824.94**	**−3824.94**	**−3824.94**	**−3824.94**
		$t_{\text{fuse}}(s)$	0.185	0.145	0.146	0.522	0.521	0.147
bca-lap	**−3824.94**	*best generated*						
	3.086	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.328	3.142	3.148	3.147	3.148	3.185
		best fused	**−3824.94**	**−3824.94**	**−3824.94**	**−3824.94**	**−3824.94**	**−3824.94**
		$t_{\text{fuse}}(s)$	3.328	3.142	3.148	3.147	3.148	3.185
bca-greedy	**−3824.94**	*best generated*						
	0.018	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.312	0.201	0.203	0.202	0.203	0.226
		best fused	**−3824.94**	**−3824.94**	**−3824.94**	**−3824.94**	**−3824.94**	**−3824.94**
		$t_{\text{fuse}}(s)$	0.312	0.201	0.203	0.202	0.203	0.226
greedy	−3610.82	*best generated*						
	0.006	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.068	0.006	0.006	0.022	0.023	0.110
		best fused	**−3824.94**	**−3824.94**	**−3824.94**	−3610.82	−3610.82	**−3824.94**
		$t_{\text{fuse}}(s)$	0.176	0.017	0.018	0.022	0.023	0.130

house32 (*energy_house_frame6frame92*), known optimum: -3779.95

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3779.95**	*best generated*						
	0.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.063	0.010	0.011	0.062	0.062	0.014
		best fused	**−3779.95**	**−3779.95**	**−3779.95**	**−3779.95**	**−3779.95**	**−3779.95**
		$t_{\text{fuse}}(s)$	0.063	0.010	0.011	0.062	0.062	0.014
dd-ls3	**−3779.95**	*best generated*						
	0.143	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.127	0.058	0.059	0.157	0.157	0.061
		best fused	**−3779.95**	**−3779.95**	**−3779.95**	**−3779.95**	**−3779.95**	**−3779.95**
		$t_{\text{fuse}}(s)$	0.127	0.058	0.059	0.157	0.157	0.061
dd-ls4	**−3779.95**	*best generated*						
	0.561	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.273	0.225	0.226	0.588	0.588	0.229
		best fused	**−3779.95**	**−3779.95**	**−3779.95**	**−3779.95**	**−3779.95**	**−3779.95**
		$t_{\text{fuse}}(s)$	0.273	0.225	0.226	0.588	0.588	0.229
bca-lap	**−3779.95**	*best generated*						
	7.885	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.747	3.618	3.626	3.629	3.625	3.671
		best fused	**−3779.95**	**−3779.95**	**−3779.95**	**−3779.95**	**−3779.95**	**−3779.95**
		$t_{\text{fuse}}(s)$	3.747	3.618	3.626	3.629	3.625	3.671
bca-greedy	**−3779.95**	*best generated*						
	1.498	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.576	0.398	0.402	0.428	0.427	0.429
		best fused	**−3779.95**	**−3779.95**	**−3779.95**	**−3779.95**	**−3779.95**	**−3779.95**
		$t_{\text{fuse}}(s)$	0.576	0.398	0.402	0.428	0.427	0.429
greedy	−3548.66	*best generated*						
	0.283	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.177	0.032	0.060	0.318	0.319	0.185
		best fused	**−3779.95**	**−3779.95**	**−3779.95**	−3548.66	−3548.66	**−3779.95**
		$t_{\text{fuse}}(s)$	0.240	0.089	0.091	0.318	0.319	0.185

house33 (*energy_house_frame6frame93*), known optimum: -3780.40

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3780.40**	*best generated*						
	0.028	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.193	0.016	0.015	0.051	0.051	0.020
		best fused	**−3780.40**	**−3780.40**	**−3780.40**	**−3780.40**	**−3780.40**	**−3780.40**
		$t_{\text{fuse}}(s)$	0.193	0.016	0.015	0.051	0.051	0.020
dd-ls3	**−3780.40**	*best generated*						
	0.118	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.215	0.130	0.132	0.132	0.131	0.137
		best fused	**−3780.40**	**−3780.40**	**−3780.40**	**−3780.40**	**−3780.40**	**−3780.40**
		$t_{\text{fuse}}(s)$	0.215	0.130	0.132	0.132	0.131	0.137
dd-ls4	**−3780.40**	*best generated*						
	0.513	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.475	0.409	0.409	0.539	0.539	0.415
		best fused	**−3780.40**	**−3780.40**	**−3780.40**	**−3780.40**	**−3780.40**	**−3780.40**
		$t_{\text{fuse}}(s)$	0.475	0.409	0.409	0.539	0.539	0.415
bca-lap	**−3780.40**	*best generated*						
	8.452	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.587	4.440	4.448	4.451	4.447	4.498
		best fused	**−3780.40**	**−3780.40**	**−3780.40**	**−3780.40**	**−3780.40**	**−3780.40**
		$t_{\text{fuse}}(s)$	4.587	4.440	4.448	4.451	4.447	4.498
bca-greedy	**−3780.40**	*best generated*						
	1.556	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.659	0.463	0.468	0.467	0.468	0.515
		best fused	**−3780.40**	**−3780.40**	**−3780.40**	**−3780.40**	**−3780.40**	**−3780.40**
		$t_{\text{fuse}}(s)$	0.659	0.463	0.468	0.467	0.468	0.515
greedy	−3670.80	*best generated*						
	0.959	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.161	0.022	0.023	1.061	1.062	0.126
		best fused	**−3780.40**	**−3780.40**	**−3780.40**	−3670.80	−3670.80	**−3780.40**
		$t_{\text{fuse}}(s)$	0.206	0.043	0.044	1.061	1.062	0.183

house34 (*energy_house_frame6frame94*), known optimum: -3787.27

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3787.27**	*best generated*						
	0.024	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.059	0.010	0.009	0.043	0.044	0.013
		best fused	**−3787.27**	**−3787.27**	**−3787.27**	**−3787.27**	**−3787.27**	**−3787.27**
		$t_{\text{fuse}}(s)$	0.059	0.010	0.009	0.043	0.044	0.013
dd-ls3	**−3787.27**	*best generated*						
	0.100	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.118	0.067	0.068	0.112	0.112	0.071
		best fused	**−3787.27**	**−3787.27**	**−3787.27**	**−3787.27**	**−3787.27**	**−3787.27**
		$t_{\text{fuse}}(s)$	0.118	0.067	0.068	0.112	0.112	0.071
dd-ls4	**−3787.27**	*best generated*						
	0.522	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.234	0.193	0.193	0.550	0.550	0.196
		best fused	**−3787.27**	**−3787.27**	**−3787.27**	**−3787.27**	**−3787.27**	**−3787.27**
		$t_{\text{fuse}}(s)$	0.234	0.193	0.193	0.550	0.550	0.196
bca-lap	**−3787.27**	*best generated*						
	3.835	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.800	3.669	3.677	3.679	3.675	3.721
		best fused	**−3787.27**	**−3787.27**	**−3787.27**	**−3787.27**	**−3787.27**	**−3787.27**
		$t_{\text{fuse}}(s)$	3.800	3.669	3.677	3.679	3.675	3.721
bca-greedy	**−3787.27**	*best generated*						
	0.020	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.163	0.086	0.087	0.087	0.087	0.114
		best fused	**−3787.27**	**−3787.27**	**−3787.27**	**−3787.27**	**−3787.27**	**−3787.27**
		$t_{\text{fuse}}(s)$	0.163	0.086	0.087	0.087	0.087	0.114
greedy	−3597.51	*best generated*						
	0.671	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.116	0.022	0.022	0.747	0.748	0.316
		best fused	**−3787.27**	**−3787.27**	**−3787.27**	−3597.51	−3597.51	**−3787.27**
		$t_{\text{fuse}}(s)$	0.209	0.071	0.072	0.747	0.748	1.367

house35 (*energy_house_frame6frame95*), known optimum: -3794.15

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3794.15**	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.071	0.012	0.013	0.025	0.025	0.016
		best fused	**−3794.15**	**−3794.15**	**−3794.15**	**−3794.15**	**−3794.15**	**−3794.15**
		$t_{\text{fuse}}(s)$	0.071	0.012	0.013	0.025	0.025	0.016
dd-ls3	**−3794.15**	*best generated*						
	0.191	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.191	0.124	0.125	0.208	0.208	0.130
		best fused	**−3794.15**	**−3794.15**	**−3794.15**	**−3794.15**	**−3794.15**	**−3794.15**
		$t_{\text{fuse}}(s)$	0.191	0.124	0.125	0.208	0.208	0.130
dd-ls4	**−3794.15**	*best generated*						
	0.215	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.283	0.236	0.237	0.236	0.236	0.240
		best fused	**−3794.15**	**−3794.15**	**−3794.15**	**−3794.15**	**−3794.15**	**−3794.15**
		$t_{\text{fuse}}(s)$	0.283	0.236	0.237	0.236	0.236	0.240
bca-lap	**−3794.15**	*best generated*						
	7.569	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.255	3.025	3.032	3.031	3.030	3.072
		best fused	**−3794.15**	**−3794.15**	**−3794.15**	**−3794.15**	**−3794.15**	**−3794.15**
		$t_{\text{fuse}}(s)$	3.255	3.025	3.032	3.031	3.030	3.072
bca-greedy	**−3794.15**	*best generated*						
	0.023	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.065	0.025	0.026	0.029	0.030	0.037
		best fused	**−3794.15**	**−3794.15**	**−3794.15**	**−3794.15**	**−3794.15**	**−3794.15**
		$t_{\text{fuse}}(s)$	0.065	0.025	0.026	0.029	0.030	0.037
greedy	−3517.76	*best generated*						
	0.052	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.111	0.038	0.039	0.062	0.063	0.311
		best fused	**−3794.15**	**−3794.15**	**−3794.15**	−3517.76	−3517.76	**−3794.15**
		$t_{\text{fuse}}(s)$	0.334	0.131	0.135	0.062	0.063	0.712

house36 (*energy_house_frame6frame96*), known optimum: -3770.58

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3770.58**	*best generated*						
	0.026	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.133	0.020	0.020	0.042	0.041	0.025
		best fused	**−3770.58**	**−3770.58**	**−3770.58**	**−3770.58**	**−3770.58**	**−3770.58**
		$t_{\text{fuse}}(s)$	0.133	0.020	0.020	0.042	0.041	0.025
dd-ls3	**−3770.58**	*best generated*						
	0.195	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.079	0.039	0.039	0.212	0.213	0.040
		best fused	**−3770.58**	**−3770.58**	**−3770.58**	**−3770.58**	**−3770.58**	**−3770.58**
		$t_{\text{fuse}}(s)$	0.079	0.039	0.039	0.212	0.213	0.040
dd-ls4	**−3770.58**	*best generated*						
	0.672	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.217	0.176	0.176	0.701	0.702	0.178
		best fused	**−3770.58**	**−3770.58**	**−3770.58**	**−3770.58**	**−3770.58**	**−3770.58**
		$t_{\text{fuse}}(s)$	0.217	0.176	0.176	0.701	0.702	0.178
bca-lap	**−3770.58**	*best generated*						
	4.700	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.714	3.581	3.587	3.588	3.585	3.635
		best fused	**−3770.58**	**−3770.58**	**−3770.58**	**−3770.58**	**−3770.58**	**−3770.58**
		$t_{\text{fuse}}(s)$	3.714	3.581	3.587	3.588	3.585	3.635
bca-greedy	**−3770.58**	*best generated*						
	1.018	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.125	0.031	0.031	0.066	0.066	0.080
		best fused	**−3770.58**	**−3770.58**	**−3770.58**	**−3770.58**	**−3770.58**	**−3770.58**
		$t_{\text{fuse}}(s)$	0.125	0.031	0.031	0.066	0.066	0.080
greedy	−3558.09	*best generated*						
	0.015	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.256	0.004	0.004	0.052	0.053	0.031
		best fused	**−3770.58**	**−3770.58**	**−3770.58**	−3558.09	−3558.09	**−3770.58**
		$t_{\text{fuse}}(s)$	2.338	0.008	0.009	0.052	0.053	0.068

house37 (*energy_house_frame7frame92*), known optimum: -3764.47

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3764.47**	*best generated*						
	0.027	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.156	0.027	0.029	0.046	0.047	0.038
		best fused	**−3764.47**	**−3764.47**	**−3764.47**	**−3764.47**	**−3764.47**	**−3764.47**
		$t_{\text{fuse}}(s)$	0.156	0.027	0.029	0.046	0.047	0.038
dd-ls3	**−3764.47**	*best generated*						
	0.098	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.177	0.072	0.072	0.110	0.111	0.115
		best fused	**−3764.47**	**−3764.47**	**−3764.47**	**−3764.47**	**−3764.47**	**−3764.47**
		$t_{\text{fuse}}(s)$	0.177	0.072	0.072	0.110	0.111	0.115
dd-ls4	**−3764.47**	*best generated*						
	0.426	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.314	0.260	0.260	0.451	0.452	0.264
		best fused	**−3764.47**	**−3764.47**	**−3764.47**	**−3764.47**	**−3764.47**	**−3764.47**
		$t_{\text{fuse}}(s)$	0.314	0.260	0.260	0.451	0.452	0.264
bca-lap	−3610.89	*best generated*						
	7.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.781	1.621	1.624	1.625	1.625	1.645
		best fused	**−3764.47**	**−3764.47**	**−3764.47**	−3610.89	−3610.89	**−3764.47**
		$t_{\text{fuse}}(s)$	1.781	1.621	1.624	1.625	1.625	1.645
bca-greedy	**−3764.47**	*best generated*						
	0.559	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.079	0.027	0.027	0.230	0.231	0.262
		best fused	**−3764.47**	**−3764.47**	**−3764.47**	**−3764.47**	**−3764.47**	**−3764.47**
		$t_{\text{fuse}}(s)$	0.079	0.027	0.027	0.230	0.231	0.262
greedy	−3530.33	*best generated*						
	0.027	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.060	0.004	0.005	0.090	0.092	0.453
		best fused	**−3764.47**	**−3764.47**	**−3764.47**	−3530.33	−3530.33	−3684.99
		$t_{\text{fuse}}(s)$	0.081	0.007	0.007	0.090	0.092	0.557

house38 (*energy_house_frame7frame93*), known optimum: -3768.98

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3768.98**	*best generated*						
	0.029	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.138	0.023	0.024	0.050	0.050	0.032
		best fused	**−3768.98**	**−3768.98**	**−3768.98**	**−3768.98**	**−3768.98**	**−3768.98**
		$t_{\text{fuse}}(s)$	0.138	0.023	0.024	0.050	0.050	0.032
dd-ls3	**−3768.98**	*best generated*						
	0.137	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.078	0.038	0.038	0.151	0.152	0.040
		best fused	**−3768.98**	**−3768.98**	**−3768.98**	**−3768.98**	**−3768.98**	**−3768.98**
		$t_{\text{fuse}}(s)$	0.078	0.038	0.038	0.151	0.152	0.040
dd-ls4	**−3768.98**	*best generated*						
	0.451	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.270	0.221	0.222	0.476	0.476	0.224
		best fused	**−3768.98**	**−3768.98**	**−3768.98**	**−3768.98**	**−3768.98**	**−3768.98**
		$t_{\text{fuse}}(s)$	0.270	0.221	0.222	0.476	0.476	0.224
bca-lap	**−3768.98**	*best generated*						
	7.359	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.038	1.909	1.913	1.912	1.912	1.939
		best fused	**−3768.98**	**−3768.98**	**−3768.98**	**−3768.98**	**−3768.98**	**−3768.98**
		$t_{\text{fuse}}(s)$	2.038	1.909	1.913	1.912	1.912	1.939
bca-greedy	**−3768.98**	*best generated*						
	1.575	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.079	0.030	0.030	0.298	0.299	0.337
		best fused	**−3768.98**	**−3768.98**	**−3768.98**	**−3768.98**	**−3768.98**	**−3768.98**
		$t_{\text{fuse}}(s)$	0.079	0.030	0.030	0.298	0.299	0.337
greedy	−3614.70	*best generated*						
	0.018	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.166	0.014	0.016	0.062	0.064	0.217
		best fused	**−3768.98**	**−3768.98**	**−3768.98**	−3614.70	−3614.70	**−3768.98**
		$t_{\text{fuse}}(s)$	0.206	0.018	0.020	0.062	0.064	0.355

house39 (*energy_house_frame7frame94*), known optimum: -3771.82

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3771.82**	*best generated*						
	0.019	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.119	0.023	0.024	0.035	0.035	0.032
		best fused	**−3771.82**	**−3771.82**	**−3771.82**	**−3771.82**	**−3771.82**	**−3771.82**
		$t_{\text{fuse}}(s)$	0.119	0.023	0.024	0.035	0.035	0.032
dd-ls3	**−3771.82**	*best generated*						
	0.125	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.080	0.042	0.042	0.139	0.139	0.044
		best fused	**−3771.82**	**−3771.82**	**−3771.82**	**−3771.82**	**−3771.82**	**−3771.82**
		$t_{\text{fuse}}(s)$	0.080	0.042	0.042	0.139	0.139	0.044
dd-ls4	**−3771.82**	*best generated*						
	0.780	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.382	0.333	0.334	0.810	0.811	0.198
		best fused	**−3771.82**	**−3771.82**	**−3771.82**	**−3771.82**	**−3771.82**	**−3771.82**
		$t_{\text{fuse}}(s)$	0.382	0.333	0.334	0.810	0.811	0.198
bca-lap	**−3771.82**	*best generated*						
	2.889	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.907	2.740	2.746	2.745	2.744	2.781
		best fused	**−3771.82**	**−3771.82**	**−3771.82**	**−3771.82**	**−3771.82**	**−3771.82**
		$t_{\text{fuse}}(s)$	2.907	2.740	2.746	2.745	2.744	2.781
bca-greedy	**−3771.82**	*best generated*						
	0.266	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.077	0.028	0.028	0.027	0.028	0.037
		best fused	**−3771.82**	**−3771.82**	**−3771.82**	**−3771.82**	**−3771.82**	**−3771.82**
		$t_{\text{fuse}}(s)$	0.077	0.028	0.028	0.027	0.028	0.037
greedy	−3687.63	*best generated*						
	0.036	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.071	0.007	0.007	0.115	0.115	0.078
		best fused	**−3771.82**	**−3771.82**	**−3771.82**	−3687.63	−3687.63	**−3771.82**
		$t_{\text{fuse}}(s)$	0.071	0.007	0.007	0.115	0.115	0.289

house40 (*energy_house_frame7frame95*), known optimum: -3780.66

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3780.66**	*best generated*						
	0.022	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.065	0.009	0.009	0.040	0.040	0.012
		best fused	**−3780.66**	**−3780.66**	**−3780.66**	**−3780.66**	**−3780.66**	**−3780.66**
		$t_{\text{fuse}}(s)$	0.065	0.009	0.009	0.040	0.040	0.012
dd-ls3	**−3780.66**	*best generated*						
	0.094	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.078	0.040	0.041	0.106	0.106	0.043
		best fused	**−3780.66**	**−3780.66**	**−3780.66**	**−3780.66**	**−3780.66**	**−3780.66**
		$t_{\text{fuse}}(s)$	0.078	0.040	0.041	0.106	0.106	0.043
dd-ls4	**−3780.66**	*best generated*						
	0.819	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.196	0.155	0.156	0.851	0.851	0.303
		best fused	**−3780.66**	**−3780.66**	**−3780.66**	**−3780.66**	**−3780.66**	**−3780.66**
		$t_{\text{fuse}}(s)$	0.196	0.155	0.156	0.851	0.851	0.303
bca-lap	**−3780.66**	*best generated*						
	4.285	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.883	1.770	1.775	1.774	1.774	1.797
		best fused	**−3780.66**	**−3780.66**	**−3780.66**	**−3780.66**	**−3780.66**	**−3780.66**
		$t_{\text{fuse}}(s)$	1.883	1.770	1.775	1.774	1.774	1.797
bca-greedy	**−3780.66**	*best generated*						
	0.297	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.112	0.061	0.061	0.061	0.061	0.071
		best fused	**−3780.66**	**−3780.66**	**−3780.66**	**−3780.66**	**−3780.66**	**−3780.66**
		$t_{\text{fuse}}(s)$	0.112	0.061	0.061	0.061	0.061	0.071
greedy	−3553.89	*best generated*						
	0.039	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.094	0.007	0.007	0.132	0.135	0.467
		best fused	**−3780.66**	**−3780.66**	**−3780.66**	−3553.89	−3553.89	**−3780.66**
		$t_{\text{fuse}}(s)$	0.234	0.018	0.019	0.132	0.135	0.467

house41 (*energy_house_frame7frame96*), known optimum: -3755.85

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3755.85**	*best generated*						
	0.030	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.090	0.012	0.012	0.049	0.049	0.016
		best fused	**−3755.85**	**−3755.85**	**−3755.85**	**−3755.85**	**−3755.85**	**−3755.85**
		$t_{\text{fuse}}(s)$	0.090	0.012	0.012	0.049	0.049	0.016
dd-ls3	**−3755.85**	*best generated*						
	0.060	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.078	0.037	0.037	0.070	0.070	0.039
		best fused	**−3755.85**	**−3755.85**	**−3755.85**	**−3755.85**	**−3755.85**	**−3755.85**
		$t_{\text{fuse}}(s)$	0.078	0.037	0.037	0.070	0.070	0.039
dd-ls4	**−3755.85**	*best generated*						
	0.815	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.652	0.579	0.580	0.846	0.846	0.586
		best fused	**−3755.85**	**−3755.85**	**−3755.85**	**−3755.85**	**−3755.85**	**−3755.85**
		$t_{\text{fuse}}(s)$	0.652	0.579	0.580	0.846	0.846	0.586
bca-lap	**−3755.85**	*best generated*						
	2.979	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.170	2.989	2.994	2.996	2.993	3.033
		best fused	**−3755.85**	**−3755.85**	**−3755.85**	**−3755.85**	**−3755.85**	**−3755.85**
		$t_{\text{fuse}}(s)$	3.170	2.989	2.994	2.996	2.993	3.033
bca-greedy	**−3755.85**	*best generated*						
	0.023	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.067	0.030	0.030	0.030	0.030	0.032
		best fused	**−3755.85**	**−3755.85**	**−3755.85**	**−3755.85**	**−3755.85**	**−3755.85**
		$t_{\text{fuse}}(s)$	0.067	0.030	0.030	0.030	0.030	0.032
greedy	−3561.42	*best generated*						
	0.024	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.113	0.008	0.009	0.082	0.082	0.068
		best fused	**−3755.85**	**−3755.85**	**−3755.85**	−3561.42	−3561.42	**−3755.85**
		$t_{\text{fuse}}(s)$	0.260	0.022	0.024	0.082	0.082	0.150

house42 (*energy_house_frame7frame97*), known optimum: -3712.31

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3712.31**	*best generated*						
	0.033	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.097	0.012	0.012	0.057	0.058	0.016
		best fused	**−3712.31**	**−3712.31**	**−3712.31**	**−3712.31**	**−3712.31**	**−3712.31**
		$t_{\text{fuse}}(s)$	0.097	0.012	0.012	0.057	0.058	0.016
dd-ls3	**−3712.31**	*best generated*						
	0.099	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.087	0.043	0.043	0.111	0.111	0.046
		best fused	**−3712.31**	**−3712.31**	**−3712.31**	**−3712.31**	**−3712.31**	**−3712.31**
		$t_{\text{fuse}}(s)$	0.087	0.043	0.043	0.111	0.111	0.046
dd-ls4	**−3712.31**	*best generated*						
	1.036	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.600	0.524	0.525	1.072	1.072	0.531
		best fused	**−3712.31**	**−3712.31**	**−3712.31**	**−3712.31**	**−3712.31**	**−3712.31**
		$t_{\text{fuse}}(s)$	0.600	0.524	0.525	1.072	1.072	0.531
bca-lap	**−3712.31**	*best generated*						
	9.673	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.454	3.234	3.238	3.237	3.237	3.281
		best fused	**−3712.31**	**−3712.31**	**−3712.31**	**−3712.31**	**−3712.31**	**−3712.31**
		$t_{\text{fuse}}(s)$	3.454	3.234	3.238	3.237	3.237	3.281
bca-greedy	**−3712.31**	*best generated*						
	1.636	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.822	0.575	0.579	0.578	0.579	0.649
		best fused	**−3712.31**	**−3712.31**	**−3712.31**	**−3712.31**	**−3712.31**	**−3712.31**
		$t_{\text{fuse}}(s)$	0.822	0.575	0.579	0.578	0.579	0.649
greedy	−3298.43	*best generated*						
	0.030	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.160	0.012	0.013	0.102	0.104	0.021
		best fused	**−3712.31**	**−3712.31**	**−3712.31**	−3298.43	−3298.43	−3565.13
		$t_{\text{fuse}}(s)$	0.361	0.030	0.033	0.102	0.104	0.782

house43 (*energy_house_frame8frame93*), known optimum: -3787.12

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3787.12**	*best generated*						
	0.023	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.112	0.014	0.015	0.040	0.041	0.020
		best fused	**−3787.12**	**−3787.12**	**−3787.12**	**−3787.12**	**−3787.12**	**−3787.12**
		$t_{\text{fuse}}(s)$	0.112	0.014	0.015	0.040	0.041	0.020
dd-ls3	**−3787.12**	*best generated*						
	0.197	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.174	0.115	0.116	0.214	0.215	0.121
		best fused	**−3787.12**	**−3787.12**	**−3787.12**	**−3787.12**	**−3787.12**	**−3787.12**
		$t_{\text{fuse}}(s)$	0.174	0.115	0.116	0.214	0.215	0.121
dd-ls4	**−3787.12**	*best generated*						
	0.440	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.169	0.131	0.131	0.466	0.467	0.132
		best fused	**−3787.12**	**−3787.12**	**−3787.12**	**−3787.12**	**−3787.12**	**−3787.12**
		$t_{\text{fuse}}(s)$	0.169	0.131	0.131	0.466	0.467	0.132
bca-lap	**−3787.12**	*best generated*						
	3.084	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.083	1.005	1.007	1.006	1.006	1.019
		best fused	**−3787.12**	**−3787.12**	**−3787.12**	**−3787.12**	**−3787.12**	**−3787.12**
		$t_{\text{fuse}}(s)$	1.083	1.005	1.007	1.006	1.006	1.019
bca-greedy	**−3787.12**	*best generated*						
	0.718	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.103	0.045	0.047	0.232	0.232	0.278
		best fused	**−3787.12**	**−3787.12**	**−3787.12**	**−3787.12**	**−3787.12**	**−3787.12**
		$t_{\text{fuse}}(s)$	0.103	0.045	0.047	0.232	0.232	0.278
greedy	−3673.75	*best generated*						
	0.002	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.068	0.006	0.006	0.007	0.007	0.034
		best fused	**−3787.12**	**−3787.12**	**−3787.12**	−3673.75	−3673.75	**−3787.12**
		$t_{\text{fuse}}(s)$	0.213	0.019	0.021	0.007	0.007	0.213

house44 (*energy_house_frame8frame94*), known optimum: -3794.54

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3794.54**	*best generated*						
	0.024	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.094	0.023	0.015	0.042	0.042	0.020
		best fused	**−3794.54**	**−3794.54**	**−3794.54**	**−3794.54**	**−3794.54**	**−3794.54**
		$t_{\text{fuse}}(s)$	0.094	0.023	0.015	0.042	0.042	0.020
dd-ls3	**−3794.54**	*best generated*						
	0.177	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.168	0.106	0.107	0.194	0.194	0.112
		best fused	**−3794.54**	**−3794.54**	**−3794.54**	**−3794.54**	**−3794.54**	**−3794.54**
		$t_{\text{fuse}}(s)$	0.168	0.106	0.107	0.194	0.194	0.112
dd-ls4	**−3794.54**	*best generated*						
	0.624	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.399	0.344	0.344	0.653	0.652	0.348
		best fused	**−3794.54**	**−3794.54**	**−3794.54**	**−3794.54**	**−3794.54**	**−3794.54**
		$t_{\text{fuse}}(s)$	0.399	0.344	0.344	0.653	0.652	0.348
bca-lap	**−3794.54**	*best generated*						
	7.196	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.443	2.332	2.338	2.337	2.337	2.371
		best fused	**−3794.54**	**−3794.54**	**−3794.54**	**−3794.54**	**−3794.54**	**−3794.54**
		$t_{\text{fuse}}(s)$	2.443	2.332	2.338	2.337	2.337	2.371
bca-greedy	**−3794.54**	*best generated*						
	0.038	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.062	0.024	0.024	0.046	0.046	0.030
		best fused	**−3794.54**	**−3794.54**	**−3794.54**	**−3794.54**	**−3794.54**	**−3794.54**
		$t_{\text{fuse}}(s)$	0.062	0.024	0.024	0.046	0.046	0.030
greedy	−3520.59	*best generated*						
	0.054	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.050	0.003	0.004	0.170	0.169	0.046
		best fused	**−3794.54**	**−3794.54**	**−3794.54**	−3520.59	−3520.59	**−3794.54**
		$t_{\text{fuse}}(s)$	0.383	0.035	0.039	0.170	0.169	0.063

house45 (*energy_house_frame8frame95*), known optimum: -3800.01

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3800.01**	*best generated*						
	0.030	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.092	0.013	0.014	0.052	0.052	0.018
		best fused	**−3800.01**	**−3800.01**	**−3800.01**	**−3800.01**	**−3800.01**	**−3800.01**
		$t_{\text{fuse}}(s)$	0.092	0.013	0.014	0.052	0.052	0.018
dd-ls3	**−3800.01**	*best generated*						
	0.182	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.088	0.082	0.082	0.199	0.199	0.048
		best fused	**−3800.01**	**−3800.01**	**−3800.01**	**−3800.01**	**−3800.01**	**−3800.01**
		$t_{\text{fuse}}(s)$	0.088	0.082	0.082	0.199	0.199	0.048
dd-ls4	**−3800.01**	*best generated*						
	0.241	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.308	0.262	0.263	0.263	0.263	0.266
		best fused	**−3800.01**	**−3800.01**	**−3800.01**	**−3800.01**	**−3800.01**	**−3800.01**
		$t_{\text{fuse}}(s)$	0.308	0.262	0.263	0.263	0.263	0.266
bca-lap	**−3800.01**	*best generated*						
	4.380	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.631	0.581	0.582	0.742	0.741	0.591
		best fused	**−3800.01**	**−3800.01**	**−3800.01**	**−3800.01**	**−3800.01**	**−3800.01**
		$t_{\text{fuse}}(s)$	0.631	0.581	0.582	0.742	0.741	0.591
bca-greedy	**−3800.01**	*best generated*						
	0.959	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.093	0.041	0.042	0.074	0.074	0.075
		best fused	**−3800.01**	**−3800.01**	**−3800.01**	**−3800.01**	**−3800.01**	**−3800.01**
		$t_{\text{fuse}}(s)$	0.093	0.041	0.042	0.074	0.074	0.075
greedy	−3542.93	*best generated*						
	0.044	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.133	0.011	0.012	0.152	0.154	0.566
		best fused	**−3800.01**	**−3800.01**	**−3800.01**	−3542.93	−3542.93	−3707.27
		$t_{\text{fuse}}(s)$	0.172	0.015	0.016	0.152	0.154	0.639

house46 (*energy_house_frame8frame96*), known optimum: -3781.83

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3781.83**	*best generated*						
	0.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.101	0.012	0.013	0.060	0.061	0.015
		best fused	**−3781.83**	**−3781.83**	**−3781.83**	**−3781.83**	**−3781.83**	**−3781.83**
		$t_{\text{fuse}}(s)$	0.101	0.012	0.013	0.060	0.061	0.015
dd-ls3	**−3781.83**	*best generated*						
	0.070	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.133	0.079	0.080	0.080	0.080	0.084
		best fused	**−3781.83**	**−3781.83**	**−3781.83**	**−3781.83**	**−3781.83**	**−3781.83**
		$t_{\text{fuse}}(s)$	0.133	0.079	0.080	0.080	0.080	0.084
dd-ls4	**−3781.83**	*best generated*						
	0.304	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.378	0.327	0.328	0.327	0.328	0.331
		best fused	**−3781.83**	**−3781.83**	**−3781.83**	**−3781.83**	**−3781.83**	**−3781.83**
		$t_{\text{fuse}}(s)$	0.378	0.327	0.328	0.327	0.328	0.331
bca-lap	**−3781.83**	*best generated*						
	5.512	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.488	2.384	2.389	2.388	2.389	2.418
		best fused	**−3781.83**	**−3781.83**	**−3781.83**	**−3781.83**	**−3781.83**	**−3781.83**
		$t_{\text{fuse}}(s)$	2.488	2.384	2.389	2.388	2.389	2.418
bca-greedy	**−3781.83**	*best generated*						
	1.184	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.103	0.046	0.047	0.195	0.196	0.214
		best fused	**−3781.83**	**−3781.83**	**−3781.83**	**−3781.83**	**−3781.83**	**−3781.83**
		$t_{\text{fuse}}(s)$	0.103	0.046	0.047	0.195	0.196	0.214
greedy	−3529.68	*best generated*						
	0.053	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.065	0.004	0.005	0.168	0.169	0.009
		best fused	**−3781.83**	**−3781.83**	**−3781.83**	−3529.68	−3529.68	**−3781.83**
		$t_{\text{fuse}}(s)$	0.248	0.022	0.025	0.168	0.169	0.091

house47 (*energy_house_frame8frame97*), known optimum: -3738.27

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3738.27**	*best generated*						
	0.036	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.094	0.011	0.011	0.062	0.062	0.019
		best fused	**−3738.27**	**−3738.27**	**−3738.27**	**−3738.27**	**−3738.27**	**−3738.27**
		$t_{\text{fuse}}(s)$	0.094	0.011	0.011	0.062	0.062	0.019
dd-ls3	**−3738.27**	*best generated*						
	0.116	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.191	0.128	0.129	0.129	0.129	0.134
		best fused	**−3738.27**	**−3738.27**	**−3738.27**	**−3738.27**	**−3738.27**	**−3738.27**
		$t_{\text{fuse}}(s)$	0.191	0.128	0.129	0.129	0.129	0.134
dd-ls4	**−3738.27**	*best generated*						
	0.693	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.796	0.724	0.725	0.725	0.725	0.292
		best fused	**−3738.27**	**−3738.27**	**−3738.27**	**−3738.27**	**−3738.27**	**−3738.27**
		$t_{\text{fuse}}(s)$	0.796	0.724	0.725	0.725	0.725	0.292
bca-lap	**−3738.27**	*best generated*						
	4.650	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.366	3.250	3.256	3.255	3.255	3.300
		best fused	**−3738.27**	**−3738.27**	**−3738.27**	**−3738.27**	**−3738.27**	**−3738.27**
		$t_{\text{fuse}}(s)$	3.366	3.250	3.256	3.255	3.255	3.300
bca-greedy	**−3738.27**	*best generated*						
	1.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.168	0.087	0.089	0.088	0.088	0.097
		best fused	**−3738.27**	**−3738.27**	**−3738.27**	**−3738.27**	**−3738.27**	**−3738.27**
		$t_{\text{fuse}}(s)$	0.168	0.087	0.089	0.088	0.088	0.097
greedy	−3429.94	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.130	0.011	0.012	0.048	0.050	0.205
		best fused	**−3738.27**	**−3738.27**	**−3738.27**	−3429.94	−3429.94	−3552.87
		$t_{\text{fuse}}(s)$	0.357	0.029	0.033	0.048	0.050	0.421

house48 (*energy_house_frame8frame98*), known optimum: -3759.21

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3759.21**	*best generated*						
	0.020	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.175	0.033	0.035	0.035	0.036	0.046
		best fused	**−3759.21**	**−3759.21**	**−3759.21**	**−3759.21**	**−3759.21**	**−3759.21**
		$t_{\text{fuse}}(s)$	0.175	0.033	0.035	0.035	0.036	0.046
dd-ls3	**−3759.21**	*best generated*						
	0.200	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.131	0.081	0.081	0.217	0.218	0.085
		best fused	**−3759.21**	**−3759.21**	**−3759.21**	**−3759.21**	**−3759.21**	**−3759.21**
		$t_{\text{fuse}}(s)$	0.131	0.081	0.081	0.217	0.218	0.085
dd-ls4	**−3759.21**	*best generated*						
	1.006	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.200	0.163	0.163	1.043	1.044	0.165
		best fused	**−3759.21**	**−3759.21**	**−3759.21**	**−3759.21**	**−3759.21**	**−3759.21**
		$t_{\text{fuse}}(s)$	0.200	0.163	0.163	1.043	1.044	0.165
bca-lap	**−3759.21**	*best generated*						
	7.701	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.683	0.628	0.629	1.053	1.053	0.638
		best fused	**−3759.21**	**−3759.21**	**−3759.21**	**−3759.21**	**−3759.21**	**−3759.21**
		$t_{\text{fuse}}(s)$	0.683	0.628	0.629	1.053	1.053	0.638
bca-greedy	**−3759.21**	*best generated*						
	1.645	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.092	0.044	0.044	0.165	0.166	0.179
		best fused	**−3759.21**	**−3759.21**	**−3759.21**	**−3759.21**	**−3759.21**	**−3759.21**
		$t_{\text{fuse}}(s)$	0.092	0.044	0.044	0.165	0.166	0.179
greedy	−3447.61	*best generated*						
	0.043	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.056	0.004	0.004	0.147	0.153	0.036
		best fused	**−3759.21**	**−3759.21**	**−3759.21**	−3447.61	−3447.61	−3540.58
		$t_{\text{fuse}}(s)$	0.320	0.029	0.032	0.147	0.153	0.440

house49 (*energy_house_frame9frame94*), known optimum: -3806.80

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3806.80**	*best generated*						
	0.023	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.150	0.027	0.028	0.041	0.041	0.037
		best fused	**−3806.80**	**−3806.80**	**−3806.80**	**−3806.80**	**−3806.80**	**−3806.80**
		$t_{\text{fuse}}(s)$	0.150	0.027	0.028	0.041	0.041	0.037
dd-ls3	**−3806.80**	*best generated*						
	0.107	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.083	0.043	0.043	0.119	0.119	0.089
		best fused	**−3806.80**	**−3806.80**	**−3806.80**	**−3806.80**	**−3806.80**	**−3806.80**
		$t_{\text{fuse}}(s)$	0.083	0.043	0.043	0.119	0.119	0.089
dd-ls4	**−3806.80**	*best generated*						
	0.839	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.368	0.319	0.319	0.869	0.869	0.323
		best fused	**−3806.80**	**−3806.80**	**−3806.80**	**−3806.80**	**−3806.80**	**−3806.80**
		$t_{\text{fuse}}(s)$	0.368	0.319	0.319	0.869	0.869	0.323
bca-lap	**−3806.80**	*best generated*						
	7.669	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.097	2.010	2.013	2.016	2.012	2.038
		best fused	**−3806.80**	**−3806.80**	**−3806.80**	**−3806.80**	**−3806.80**	**−3806.80**
		$t_{\text{fuse}}(s)$	2.097	2.010	2.013	2.016	2.012	2.038
bca-greedy	**−3806.80**	*best generated*						
	1.651	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.462	0.316	0.320	0.320	0.320	0.351
		best fused	**−3806.80**	**−3806.80**	**−3806.80**	**−3806.80**	**−3806.80**	**−3806.80**
		$t_{\text{fuse}}(s)$	0.462	0.316	0.320	0.320	0.320	0.351
greedy	−3498.63	*best generated*						
	0.039	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.059	0.004	0.005	0.132	0.133	0.195
		best fused	**−3806.80**	**−3806.80**	**−3806.80**	−3498.63	−3498.63	**−3806.80**
		$t_{\text{fuse}}(s)$	0.672	0.013	0.014	0.132	0.133	0.309

house50 (*energy_house_frame9frame95*), known optimum: -3811.22

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3811.22**	*best generated*						
	0.023	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.085	0.009	0.014	0.042	0.041	0.021
		best fused	**−3811.22**	**−3811.22**	**−3811.22**	**−3811.22**	**−3811.22**	**−3811.22**
		$t_{\text{fuse}}(s)$	0.085	0.009	0.014	0.042	0.041	0.021
dd-ls3	**−3811.22**	*best generated*						
	0.106	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.104	0.061	0.062	0.118	0.117	0.064
		best fused	**−3811.22**	**−3811.22**	**−3811.22**	**−3811.22**	**−3811.22**	**−3811.22**
		$t_{\text{fuse}}(s)$	0.104	0.061	0.062	0.118	0.117	0.064
dd-ls4	**−3811.22**	*best generated*						
	0.511	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.356	0.310	0.310	0.540	0.540	0.314
		best fused	**−3811.22**	**−3811.22**	**−3811.22**	**−3811.22**	**−3811.22**	**−3811.22**
		$t_{\text{fuse}}(s)$	0.356	0.310	0.310	0.540	0.540	0.314
bca-lap	**−3811.22**	*best generated*						
	1.325	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.394	1.297	1.301	1.301	1.302	1.319
		best fused	**−3811.22**	**−3811.22**	**−3811.22**	**−3811.22**	**−3811.22**	**−3811.22**
		$t_{\text{fuse}}(s)$	1.394	1.297	1.301	1.301	1.302	1.319
bca-greedy	**−3811.22**	*best generated*						
	0.278	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.081	0.031	0.031	0.210	0.210	0.223
		best fused	**−3811.22**	**−3811.22**	**−3811.22**	**−3811.22**	**−3811.22**	**−3811.22**
		$t_{\text{fuse}}(s)$	0.081	0.031	0.031	0.210	0.210	0.223
greedy	−3642.12	*best generated*						
	0.039	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.066	0.005	0.005	0.132	0.135	0.173
		best fused	**−3811.22**	**−3811.22**	**−3811.22**	−3642.12	−3642.12	**−3811.22**
		$t_{\text{fuse}}(s)$	0.081	0.007	0.007	0.132	0.135	0.192

house51 (*energy_house_frame9frame96*), known optimum: -3797.97

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3797.97**	*best generated*						
	0.030	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.114	0.016	0.016	0.051	0.052	0.018
		best fused	**−3797.97**	**−3797.97**	**−3797.97**	**−3797.97**	**−3797.97**	**−3797.97**
		$t_{\text{fuse}}(s)$	0.114	0.016	0.016	0.051	0.052	0.018
dd-ls3	**−3797.97**	*best generated*						
	0.080	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.067	0.029	0.029	0.091	0.091	0.031
		best fused	**−3797.97**	**−3797.97**	**−3797.97**	**−3797.97**	**−3797.97**	**−3797.97**
		$t_{\text{fuse}}(s)$	0.067	0.029	0.029	0.091	0.091	0.031
dd-ls4	**−3797.97**	*best generated*						
	0.189	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.253	0.211	0.212	0.212	0.212	0.214
		best fused	**−3797.97**	**−3797.97**	**−3797.97**	**−3797.97**	**−3797.97**	**−3797.97**
		$t_{\text{fuse}}(s)$	0.253	0.211	0.212	0.212	0.212	0.214
bca-lap	**−3797.97**	*best generated*						
	7.340	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.683	1.567	1.570	1.571	1.569	1.591
		best fused	**−3797.97**	**−3797.97**	**−3797.97**	**−3797.97**	**−3797.97**	**−3797.97**
		$t_{\text{fuse}}(s)$	1.683	1.567	1.570	1.571	1.569	1.591
bca-greedy	**−3797.97**	*best generated*						
	1.615	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.351	0.223	0.226	0.225	0.225	0.244
		best fused	**−3797.97**	**−3797.97**	**−3797.97**	**−3797.97**	**−3797.97**	**−3797.97**
		$t_{\text{fuse}}(s)$	0.351	0.223	0.226	0.225	0.225	0.244
greedy	−3565.75	*best generated*						
	0.007	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.072	0.006	0.007	0.025	0.024	0.112
		best fused	**−3797.97**	**−3797.97**	**−3797.97**	−3565.75	−3565.75	−3694.65
		$t_{\text{fuse}}(s)$	0.196	0.018	0.020	0.025	0.024	0.112

house52 (*energy_house_frame9frame97*), known optimum: -3748.62

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3748.62**	*best generated*						
	0.014	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.103	0.012	0.013	0.027	0.027	0.017
		best fused	**−3748.62**	**−3748.62**	**−3748.62**	**−3748.62**	**−3748.62**	**−3748.62**
		$t_{\text{fuse}}(s)$	0.103	0.012	0.013	0.027	0.027	0.017
dd-ls3	**−3748.62**	*best generated*						
	0.173	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.110	0.062	0.063	0.188	0.190	0.065
		best fused	**−3748.62**	**−3748.62**	**−3748.62**	**−3748.62**	**−3748.62**	**−3748.62**
		$t_{\text{fuse}}(s)$	0.110	0.062	0.063	0.188	0.190	0.065
dd-ls4	**−3748.62**	*best generated*						
	0.409	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.159	0.122	0.122	0.437	0.436	0.124
		best fused	**−3748.62**	**−3748.62**	**−3748.62**	**−3748.62**	**−3748.62**	**−3748.62**
		$t_{\text{fuse}}(s)$	0.159	0.122	0.122	0.437	0.436	0.124
bca-lap	**−3748.62**	*best generated*						
	2.499	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.607	2.503	2.507	2.507	2.507	2.539
		best fused	**−3748.62**	**−3748.62**	**−3748.62**	**−3748.62**	**−3748.62**	**−3748.62**
		$t_{\text{fuse}}(s)$	2.607	2.503	2.507	2.507	2.507	2.539
bca-greedy	**−3748.62**	*best generated*						
	0.484	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.216	0.124	0.124	0.381	0.381	0.420
		best fused	**−3748.62**	**−3748.62**	**−3748.62**	**−3748.62**	**−3748.62**	**−3748.62**
		$t_{\text{fuse}}(s)$	0.216	0.124	0.124	0.381	0.381	0.420
greedy	−3365.00	*best generated*						
	0.041	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.156	0.015	0.017	0.140	0.139	0.182
		best fused	**−3748.62**	**−3748.62**	**−3748.62**	−3365.00	−3365.00	−3644.62
		$t_{\text{fuse}}(s)$	0.828	0.149	0.169	0.140	0.139	0.744

house53 (*energy_house_frame9frame98*), known optimum: -3770.40

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3770.40**	*best generated*						
	0.012	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.073	0.010	0.011	0.023	0.024	0.013
		best fused	**−3770.40**	**−3770.40**	**−3770.40**	**−3770.40**	**−3770.40**	**−3770.40**
		$t_{\text{fuse}}(s)$	0.073	0.010	0.011	0.023	0.024	0.013
dd-ls3	**−3770.40**	*best generated*						
	0.128	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.107	0.062	0.063	0.141	0.142	0.065
		best fused	**−3770.40**	**−3770.40**	**−3770.40**	**−3770.40**	**−3770.40**	**−3770.40**
		$t_{\text{fuse}}(s)$	0.107	0.062	0.063	0.141	0.142	0.065
dd-ls4	**−3770.40**	*best generated*						
	0.714	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.231	0.193	0.193	0.745	0.745	0.348
		best fused	**−3770.40**	**−3770.40**	**−3770.40**	**−3770.40**	**−3770.40**	**−3770.40**
		$t_{\text{fuse}}(s)$	0.231	0.193	0.193	0.745	0.745	0.348
bca-lap	**−3770.40**	*best generated*						
	3.734	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.865	1.758	1.755	1.755	1.755	1.780
		best fused	**−3770.40**	**−3770.40**	**−3770.40**	**−3770.40**	**−3770.40**	**−3770.40**
		$t_{\text{fuse}}(s)$	1.865	1.758	1.755	1.755	1.755	1.780
bca-greedy	**−3770.40**	*best generated*						
	0.808	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.218	0.063	0.063	0.134	0.135	0.163
		best fused	**−3770.40**	**−3770.40**	**−3770.40**	**−3770.40**	**−3770.40**	**−3770.40**
		$t_{\text{fuse}}(s)$	0.218	0.063	0.063	0.134	0.135	0.163
greedy	−3544.31	*best generated*						
	0.051	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.055	0.004	0.004	0.162	0.174	0.419
		best fused	**−3770.40**	**−3770.40**	**−3770.40**	−3544.31	−3544.31	**−3770.40**
		$t_{\text{fuse}}(s)$	0.347	0.030	0.034	0.162	0.174	0.660

house54 (*energy_house_frame9frame99*), known optimum: -3726.83

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3726.83**	*best generated*						
	0.021	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.067	0.005	0.005	0.038	0.039	0.007
		best fused	**−3726.83**	**−3726.83**	**−3726.83**	**−3726.83**	**−3726.83**	**−3726.83**
		$t_{\text{fuse}}(s)$	0.067	0.005	0.005	0.038	0.039	0.007
dd-ls3	**−3726.83**	*best generated*						
	0.077	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.136	0.054	0.054	0.087	0.090	0.057
		best fused	**−3726.83**	**−3726.83**	**−3726.83**	**−3726.83**	**−3726.83**	**−3726.83**
		$t_{\text{fuse}}(s)$	0.136	0.054	0.054	0.087	0.090	0.057
dd-ls4	**−3726.83**	*best generated*						
	0.541	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.379	0.324	0.324	0.569	0.569	0.329
		best fused	**−3726.83**	**−3726.83**	**−3726.83**	**−3726.83**	**−3726.83**	**−3726.83**
		$t_{\text{fuse}}(s)$	0.379	0.324	0.324	0.569	0.569	0.329
bca-lap	**−3726.83**	*best generated*						
	6.891	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.075	1.974	1.978	1.977	1.978	2.003
		best fused	**−3726.83**	**−3726.83**	**−3726.83**	**−3726.83**	**−3726.83**	**−3726.83**
		$t_{\text{fuse}}(s)$	2.075	1.974	1.978	1.977	1.978	2.003
bca-greedy	**−3726.83**	*best generated*						
	1.240	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.409	0.265	0.267	0.463	0.465	0.309
		best fused	**−3726.83**	**−3726.83**	**−3726.83**	**−3726.83**	**−3726.83**	**−3726.83**
		$t_{\text{fuse}}(s)$	0.409	0.265	0.267	0.463	0.465	0.309
greedy	−3391.48	*best generated*						
	0.052	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.057	0.004	0.005	0.181	0.179	0.260
		best fused	**−3726.83**	**−3726.83**	**−3726.83**	−3391.48	−3391.48	−3569.46
		$t_{\text{fuse}}(s)$	0.317	0.026	0.029	0.181	0.179	0.515

house55 (*energy_house_frame10frame95*), known optimum: -3809.38

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3809.38**	*best generated*						
	0.017	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.101	0.017	0.018	0.032	0.032	0.019
		best fused	**−3809.38**	**−3809.38**	**−3809.38**	**−3809.38**	**−3809.38**	**−3809.38**
		$t_{\text{fuse}}(s)$	0.101	0.017	0.018	0.032	0.032	0.019
dd-ls3	**−3809.38**	*best generated*						
	0.143	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.102	0.057	0.057	0.157	0.157	0.060
		best fused	**−3809.38**	**−3809.38**	**−3809.38**	**−3809.38**	**−3809.38**	**−3809.38**
		$t_{\text{fuse}}(s)$	0.102	0.057	0.057	0.157	0.157	0.060
dd-ls4	**−3809.38**	*best generated*						
	0.536	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.274	0.222	0.222	0.562	0.562	0.225
		best fused	**−3809.38**	**−3809.38**	**−3809.38**	**−3809.38**	**−3809.38**	**−3809.38**
		$t_{\text{fuse}}(s)$	0.274	0.222	0.222	0.562	0.562	0.225
bca-lap	**−3809.38**	*best generated*						
	6.232	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.055	1.929	1.931	1.930	1.931	1.956
		best fused	**−3809.38**	**−3809.38**	**−3809.38**	**−3809.38**	**−3809.38**	**−3809.38**
		$t_{\text{fuse}}(s)$	2.055	1.929	1.931	1.930	1.931	1.956
bca-greedy	**−3809.38**	*best generated*						
	0.290	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.223	0.133	0.134	0.134	0.135	0.147
		best fused	**−3809.38**	**−3809.38**	**−3809.38**	**−3809.38**	**−3809.38**	**−3809.38**
		$t_{\text{fuse}}(s)$	0.223	0.133	0.134	0.134	0.135	0.147
greedy	−3585.36	*best generated*						
	0.002	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.095	0.007	0.008	0.010	0.010	0.175
		best fused	**−3809.38**	**−3809.38**	**−3809.38**	−3585.36	−3585.36	**−3809.38**
		$t_{\text{fuse}}(s)$	0.095	0.007	0.008	0.010	0.010	0.185

house56 (*energy_house_frame10frame96*), known optimum: -3786.86

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3786.86**	*best generated*						
	0.021	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.071	0.010	0.010	0.038	0.039	0.013
		best fused	**−3786.86**	**−3786.86**	**−3786.86**	**−3786.86**	**−3786.86**	**−3786.86**
		$t_{\text{fuse}}(s)$	0.071	0.010	0.010	0.038	0.039	0.013
dd-ls3	**−3786.86**	*best generated*						
	0.085	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.126	0.072	0.072	0.096	0.096	0.075
		best fused	**−3786.86**	**−3786.86**	**−3786.86**	**−3786.86**	**−3786.86**	**−3786.86**
		$t_{\text{fuse}}(s)$	0.126	0.072	0.072	0.096	0.096	0.075
dd-ls4	**−3786.86**	*best generated*						
	0.357	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.152	0.113	0.113	0.381	0.381	0.115
		best fused	**−3786.86**	**−3786.86**	**−3786.86**	**−3786.86**	**−3786.86**	**−3786.86**
		$t_{\text{fuse}}(s)$	0.152	0.113	0.113	0.381	0.381	0.115
bca-lap	**−3786.86**	*best generated*						
	3.957	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.864	1.787	1.791	1.790	1.791	1.814
		best fused	**−3786.86**	**−3786.86**	**−3786.86**	**−3786.86**	**−3786.86**	**−3786.86**
		$t_{\text{fuse}}(s)$	1.864	1.787	1.791	1.790	1.791	1.814
bca-greedy	**−3786.86**	*best generated*						
	0.861	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.383	0.256	0.258	0.260	0.259	0.286
		best fused	**−3786.86**	**−3786.86**	**−3786.86**	**−3786.86**	**−3786.86**	**−3786.86**
		$t_{\text{fuse}}(s)$	0.383	0.256	0.258	0.260	0.259	0.286
greedy	−3709.26	*best generated*						
	0.045	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.129	0.010	0.011	0.153	0.157	0.219
		best fused	**−3786.86**	**−3786.86**	**−3786.86**	−3709.26	−3709.26	**−3786.86**
		$t_{\text{fuse}}(s)$	0.129	0.010	0.011	0.153	0.157	0.447

house57 (*energy_house_frame10frame97*), known optimum: -3748.34

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3748.34**	*best generated*						
	0.016	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.086	0.010	0.011	0.029	0.029	0.014
		best fused	**−3748.34**	**−3748.34**	**−3748.34**	**−3748.34**	**−3748.34**	**−3748.34**
		$t_{\text{fuse}}(s)$	0.086	0.010	0.011	0.029	0.029	0.014
dd-ls3	**−3748.34**	*best generated*						
	0.161	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.110	0.058	0.059	0.176	0.177	0.060
		best fused	**−3748.34**	**−3748.34**	**−3748.34**	**−3748.34**	**−3748.34**	**−3748.34**
		$t_{\text{fuse}}(s)$	0.110	0.058	0.059	0.176	0.177	0.060
dd-ls4	**−3748.34**	*best generated*						
	0.525	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.392	0.333	0.333	0.550	0.550	0.337
		best fused	**−3748.34**	**−3748.34**	**−3748.34**	**−3748.34**	**−3748.34**	**−3748.34**
		$t_{\text{fuse}}(s)$	0.392	0.333	0.333	0.550	0.550	0.337
bca-lap	**−3748.34**	*best generated*						
	5.572	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.558	2.452	2.455	2.454	2.453	2.485
		best fused	**−3748.34**	**−3748.34**	**−3748.34**	**−3748.34**	**−3748.34**	**−3748.34**
		$t_{\text{fuse}}(s)$	2.558	2.452	2.455	2.454	2.453	2.485
bca-greedy	**−3748.34**	*best generated*						
	1.200	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.161	0.084	0.084	0.245	0.245	0.102
		best fused	**−3748.34**	**−3748.34**	**−3748.34**	**−3748.34**	**−3748.34**	**−3748.34**
		$t_{\text{fuse}}(s)$	0.161	0.084	0.084	0.245	0.245	0.102
greedy	−3508.82	*best generated*						
	0.040	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.161	0.008	0.015	0.138	0.144	0.338
		best fused	**−3748.34**	**−3748.34**	**−3748.34**	−3508.82	−3508.82	−3610.28
		$t_{\text{fuse}}(s)$	0.640	0.051	0.058	0.138	0.144	0.640

house58 (*energy_house_frame10frame98*), known optimum: -3766.04

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3766.04**	*best generated*						
	0.026	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.112	0.015	0.017	0.046	0.045	0.022
		best fused	**−3766.04**	**−3766.04**	**−3766.04**	**−3766.04**	**−3766.04**	**−3766.04**
		$t_{\text{fuse}}(s)$	0.112	0.015	0.017	0.046	0.045	0.022
dd-ls3	**−3766.04**	*best generated*						
	0.153	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.112	0.062	0.063	0.168	0.168	0.066
		best fused	**−3766.04**	**−3766.04**	**−3766.04**	**−3766.04**	**−3766.04**	**−3766.04**
		$t_{\text{fuse}}(s)$	0.112	0.062	0.063	0.168	0.168	0.066
dd-ls4	**−3766.04**	*best generated*						
	0.101	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.158	0.121	0.121	0.121	0.121	0.123
		best fused	**−3766.04**	**−3766.04**	**−3766.04**	**−3766.04**	**−3766.04**	**−3766.04**
		$t_{\text{fuse}}(s)$	0.158	0.121	0.121	0.121	0.121	0.123
bca-lap	**−3766.04**	*best generated*						
	4.885	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.635	1.557	1.561	1.560	1.560	1.582
		best fused	**−3766.04**	**−3766.04**	**−3766.04**	**−3766.04**	**−3766.04**	**−3766.04**
		$t_{\text{fuse}}(s)$	1.635	1.557	1.561	1.560	1.560	1.582
bca-greedy	**−3766.04**	*best generated*						
	1.067	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.073	0.032	0.032	0.114	0.114	0.127
		best fused	**−3766.04**	**−3766.04**	**−3766.04**	**−3766.04**	**−3766.04**	**−3766.04**
		$t_{\text{fuse}}(s)$	0.073	0.032	0.032	0.114	0.114	0.127
greedy	−3435.15	*best generated*						
	0.012	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.050	0.002	0.003	0.043	0.044	0.203
		best fused	**−3766.04**	**−3766.04**	**−3766.04**	−3435.15	−3435.15	**−3766.04**
		$t_{\text{fuse}}(s)$	0.087	0.006	0.007	0.043	0.044	0.344

house59 (*energy_house_frame10frame99*), known optimum: -3728.46

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3728.46**	*best generated*						
	0.022	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.079	0.011	0.011	0.039	0.041	0.015
		best fused	**−3728.46**	**−3728.46**	**−3728.46**	**−3728.46**	**−3728.46**	**−3728.46**
		$t_{\text{fuse}}(s)$	0.079	0.011	0.011	0.039	0.041	0.015
dd-ls3	**−3728.46**	*best generated*						
	0.106	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.191	0.118	0.119	0.119	0.119	0.123
		best fused	**−3728.46**	**−3728.46**	**−3728.46**	**−3728.46**	**−3728.46**	**−3728.46**
		$t_{\text{fuse}}(s)$	0.191	0.118	0.119	0.119	0.119	0.123
dd-ls4	**−3728.46**	*best generated*						
	0.501	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.195	0.149	0.149	0.527	0.527	0.151
		best fused	**−3728.46**	**−3728.46**	**−3728.46**	**−3728.46**	**−3728.46**	**−3728.46**
		$t_{\text{fuse}}(s)$	0.195	0.149	0.149	0.527	0.527	0.151
bca-lap	**−3728.46**	*best generated*						
	9.205	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.997	1.917	1.921	1.920	1.921	1.944
		best fused	**−3728.46**	**−3728.46**	**−3728.46**	**−3728.46**	**−3728.46**	**−3728.46**
		$t_{\text{fuse}}(s)$	1.997	1.917	1.921	1.920	1.921	1.944
bca-greedy	**−3728.46**	*best generated*						
	1.660	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.357	0.213	0.215	0.216	0.215	0.250
		best fused	**−3728.46**	**−3728.46**	**−3728.46**	**−3728.46**	**−3728.46**	**−3728.46**
		$t_{\text{fuse}}(s)$	0.357	0.213	0.215	0.216	0.215	0.250
greedy	−3340.54	*best generated*						
	0.036	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.073	0.004	0.004	0.129	0.129	0.276
		best fused	**−3728.46**	**−3728.46**	**−3728.46**	−3340.54	−3340.54	−3580.65
		$t_{\text{fuse}}(s)$	0.686	0.049	0.054	0.129	0.129	0.349

house60 (*energy_house_frame10frame100*), known optimum: -3720.20

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3720.20**	*best generated*						
	0.006	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.085	0.013	0.013	0.013	0.015	0.017
		best fused	**−3720.20**	**−3720.20**	**−3720.20**	**−3720.20**	**−3720.20**	**−3720.20**
		$t_{\text{fuse}}(s)$	0.085	0.013	0.013	0.013	0.015	0.017
dd-ls3	**−3720.20**	*best generated*						
	0.177	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.111	0.061	0.061	0.193	0.194	0.064
		best fused	**−3720.20**	**−3720.20**	**−3720.20**	**−3720.20**	**−3720.20**	**−3720.20**
		$t_{\text{fuse}}(s)$	0.111	0.061	0.061	0.193	0.194	0.064
dd-ls4	**−3720.20**	*best generated*						
	0.549	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.244	0.169	0.170	0.575	0.576	0.172
		best fused	**−3720.20**	**−3720.20**	**−3720.20**	**−3720.20**	**−3720.20**	**−3720.20**
		$t_{\text{fuse}}(s)$	0.244	0.169	0.170	0.575	0.576	0.172
bca-lap	**−3720.20**	*best generated*						
	2.137	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.528	1.460	1.463	1.462	1.463	1.484
		best fused	**−3720.20**	**−3720.20**	**−3720.20**	**−3720.20**	**−3720.20**	**−3720.20**
		$t_{\text{fuse}}(s)$	1.528	1.460	1.463	1.462	1.463	1.484
bca-greedy	**−3720.20**	*best generated*						
	0.472	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.132	0.067	0.067	0.070	0.068	0.077
		best fused	**−3720.20**	**−3720.20**	**−3720.20**	**−3720.20**	**−3720.20**	**−3720.20**
		$t_{\text{fuse}}(s)$	0.132	0.067	0.067	0.070	0.068	0.077
greedy	−3342.12	*best generated*						
	0.030	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.119	0.010	0.011	0.105	0.108	0.418
		best fused	**−3720.20**	**−3720.20**	**−3720.20**	−3342.12	−3342.12	−3465.23
		$t_{\text{fuse}}(s)$	0.583	0.050	0.055	0.105	0.108	0.607

house61 (*energy_house_frame11frame96*), known optimum: -3809.96

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3809.96**	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.071	0.011	0.012	0.024	0.025	0.015
		best fused	**−3809.96**	**−3809.96**	**−3809.96**	**−3809.96**	**−3809.96**	**−3809.96**
		$t_{\text{fuse}}(s)$	0.071	0.011	0.012	0.024	0.025	0.015
dd-ls3	**−3809.96**	*best generated*						
	0.134	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.093	0.043	0.043	0.148	0.148	0.045
		best fused	**−3809.96**	**−3809.96**	**−3809.96**	**−3809.96**	**−3809.96**	**−3809.96**
		$t_{\text{fuse}}(s)$	0.093	0.043	0.043	0.148	0.148	0.045
dd-ls4	**−3809.96**	*best generated*						
	0.286	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.226	0.184	0.184	0.309	0.309	0.186
		best fused	**−3809.96**	**−3809.96**	**−3809.96**	**−3809.96**	**−3809.96**	**−3809.96**
		$t_{\text{fuse}}(s)$	0.226	0.184	0.184	0.309	0.309	0.186
bca-lap	**−3809.96**	*best generated*						
	2.204	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.628	1.506	1.509	1.508	1.510	1.532
		best fused	**−3809.96**	**−3809.96**	**−3809.96**	**−3809.96**	**−3809.96**	**−3809.96**
		$t_{\text{fuse}}(s)$	1.628	1.506	1.509	1.508	1.510	1.532
bca-greedy	**−3809.96**	*best generated*						
	0.249	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.076	0.071	0.072	0.072	0.071	0.079
		best fused	**−3809.96**	**−3809.96**	**−3809.96**	**−3809.96**	**−3809.96**	**−3809.96**
		$t_{\text{fuse}}(s)$	0.076	0.071	0.072	0.072	0.071	0.079
greedy	−3568.26	*best generated*						
	0.034	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.078	0.006	0.007	0.114	0.119	0.112
		best fused	**−3809.96**	**−3809.96**	**−3809.96**	−3568.26	−3568.26	**−3809.96**
		$t_{\text{fuse}}(s)$	0.265	0.026	0.028	0.114	0.119	0.227

house62 (*energy_house_frame11frame97*), known optimum: -3748.31

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3748.31**	*best generated*						
	0.024	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.072	0.009	0.009	0.043	0.043	0.013
		best fused	**−3748.31**	**−3748.31**	**−3748.31**	**−3748.31**	**−3748.31**	**−3748.31**
		$t_{\text{fuse}}(s)$	0.072	0.009	0.009	0.043	0.043	0.013
dd-ls3	**−3748.31**	*best generated*						
	0.105	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.082	0.040	0.040	0.117	0.118	0.043
		best fused	**−3748.31**	**−3748.31**	**−3748.31**	**−3748.31**	**−3748.31**	**−3748.31**
		$t_{\text{fuse}}(s)$	0.082	0.040	0.040	0.117	0.118	0.043
dd-ls4	**−3748.31**	*best generated*						
	0.609	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.188	0.395	0.396	0.639	0.639	0.146
		best fused	**−3748.31**	**−3748.31**	**−3748.31**	**−3748.31**	**−3748.31**	**−3748.31**
		$t_{\text{fuse}}(s)$	0.188	0.395	0.396	0.639	0.639	0.146
bca-lap	**−3748.31**	*best generated*						
	6.318	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.281	2.194	2.192	2.191	2.192	2.221
		best fused	**−3748.31**	**−3748.31**	**−3748.31**	**−3748.31**	**−3748.31**	**−3748.31**
		$t_{\text{fuse}}(s)$	2.281	2.194	2.192	2.191	2.192	2.221
bca-greedy	**−3748.31**	*best generated*						
	1.396	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.341	0.218	0.220	0.220	0.220	0.237
		best fused	**−3748.31**	**−3748.31**	**−3748.31**	**−3748.31**	**−3748.31**	**−3748.31**
		$t_{\text{fuse}}(s)$	0.341	0.218	0.220	0.220	0.220	0.237
greedy	−3354.48	*best generated*						
	0.016	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.050	0.003	0.004	0.057	0.059	0.229
		best fused	**−3748.31**	**−3748.31**	**−3748.31**	−3354.48	−3354.48	**−3748.31**
		$t_{\text{fuse}}(s)$	1.022	0.084	0.094	0.057	0.059	0.430

house63 (*energy_house_frame11frame98*), known optimum: -3781.51

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3781.51**	*best generated*						
	0.021	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.085	0.014	0.015	0.038	0.038	0.019
		best fused	**−3781.51**	**−3781.51**	**−3781.51**	**−3781.51**	**−3781.51**	**−3781.51**
		$t_{\text{fuse}}(s)$	0.085	0.014	0.015	0.038	0.038	0.019
dd-ls3	**−3781.51**	*best generated*						
	0.087	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.070	0.030	0.031	0.099	0.098	0.032
		best fused	**−3781.51**	**−3781.51**	**−3781.51**	**−3781.51**	**−3781.51**	**−3781.51**
		$t_{\text{fuse}}(s)$	0.070	0.030	0.031	0.099	0.098	0.032
dd-ls4	**−3781.51**	*best generated*						
	0.250	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.225	0.183	0.184	0.273	0.273	0.186
		best fused	**−3781.51**	**−3781.51**	**−3781.51**	**−3781.51**	**−3781.51**	**−3781.51**
		$t_{\text{fuse}}(s)$	0.225	0.183	0.184	0.273	0.273	0.186
bca-lap	**−3781.51**	*best generated*						
	7.031	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.258	1.193	1.196	1.196	1.196	1.215
		best fused	**−3781.51**	**−3781.51**	**−3781.51**	**−3781.51**	**−3781.51**	**−3781.51**
		$t_{\text{fuse}}(s)$	1.258	1.193	1.196	1.196	1.196	1.215
bca-greedy	**−3781.51**	*best generated*						
	1.592	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.130	0.070	0.070	0.078	0.078	0.082
		best fused	**−3781.51**	**−3781.51**	**−3781.51**	**−3781.51**	**−3781.51**	**−3781.51**
		$t_{\text{fuse}}(s)$	0.130	0.070	0.070	0.078	0.078	0.082
greedy	−3657.16	*best generated*						
	0.009	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.091	0.009	0.010	0.032	0.032	0.432
		best fused	**−3781.51**	**−3781.51**	**−3781.51**	−3657.16	−3657.16	−3681.55
		$t_{\text{fuse}}(s)$	0.094	0.009	0.011	0.032	0.032	0.432

house64 (*energy_house_frame11frame99*), known optimum: -3736.47

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3736.47**	*best generated*						
	0.033	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.045	0.004	0.005	0.058	0.058	0.006
		best fused	**−3736.47**	**−3736.47**	**−3736.47**	**−3736.47**	**−3736.47**	**−3736.47**
		$t_{\text{fuse}}(s)$	0.045	0.004	0.005	0.058	0.058	0.006
dd-ls3	**−3736.47**	*best generated*						
	0.120	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.102	0.054	0.055	0.134	0.133	0.057
		best fused	**−3736.47**	**−3736.47**	**−3736.47**	**−3736.47**	**−3736.47**	**−3736.47**
		$t_{\text{fuse}}(s)$	0.102	0.054	0.055	0.134	0.133	0.057
dd-ls4	**−3736.47**	*best generated*						
	0.585	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.331	0.278	0.279	0.612	0.612	0.283
		best fused	**−3736.47**	**−3736.47**	**−3736.47**	**−3736.47**	**−3736.47**	**−3736.47**
		$t_{\text{fuse}}(s)$	0.331	0.278	0.279	0.612	0.612	0.283
bca-lap	**−3736.47**	*best generated*						
	7.304	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.448	1.381	1.383	1.382	1.384	1.403
		best fused	**−3736.47**	**−3736.47**	**−3736.47**	**−3736.47**	**−3736.47**	**−3736.47**
		$t_{\text{fuse}}(s)$	1.448	1.381	1.383	1.382	1.384	1.403
bca-greedy	**−3736.47**	*best generated*						
	1.612	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.077	0.030	0.029	0.181	0.181	0.195
		best fused	**−3736.47**	**−3736.47**	**−3736.47**	**−3736.47**	**−3736.47**	**−3736.47**
		$t_{\text{fuse}}(s)$	0.077	0.030	0.029	0.181	0.181	0.195
greedy	−3407.64	*best generated*						
	0.044	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.096	0.007	0.009	0.143	0.144	0.231
		best fused	**−3736.47**	**−3736.47**	**−3736.47**	−3407.64	−3407.64	−3635.28
		$t_{\text{fuse}}(s)$	0.288	0.022	0.027	0.143	0.144	0.668

house65 (*energy_house_frame11frame100*), known optimum: -3739.39

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3739.39**	*best generated*						
	0.020	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.063	0.009	0.009	0.036	0.036	0.013
		best fused	**−3739.39**	**−3739.39**	**−3739.39**	**−3739.39**	**−3739.39**	**−3739.39**
		$t_{\text{fuse}}(s)$	0.063	0.009	0.009	0.036	0.036	0.013
dd-ls3	**−3739.39**	*best generated*						
	0.095	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.170	0.106	0.107	0.108	0.107	0.111
		best fused	**−3739.39**	**−3739.39**	**−3739.39**	**−3739.39**	**−3739.39**	**−3739.39**
		$t_{\text{fuse}}(s)$	0.170	0.106	0.107	0.108	0.107	0.111
dd-ls4	**−3739.39**	*best generated*						
	0.483	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.255	0.207	0.208	0.508	0.508	0.211
		best fused	**−3739.39**	**−3739.39**	**−3739.39**	**−3739.39**	**−3739.39**	**−3739.39**
		$t_{\text{fuse}}(s)$	0.255	0.207	0.208	0.508	0.508	0.211
bca-lap	**−3739.39**	*best generated*						
	7.093	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.065	1.003	1.006	1.005	1.006	1.020
		best fused	**−3739.39**	**−3739.39**	**−3739.39**	**−3739.39**	**−3739.39**	**−3739.39**
		$t_{\text{fuse}}(s)$	1.065	1.003	1.006	1.005	1.006	1.020
bca-greedy	**−3739.39**	*best generated*						
	1.560	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.276	0.156	0.158	0.180	0.179	0.193
		best fused	**−3739.39**	**−3739.39**	**−3739.39**	**−3739.39**	**−3739.39**	**−3739.39**
		$t_{\text{fuse}}(s)$	0.276	0.156	0.158	0.180	0.179	0.193
greedy	−3496.48	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.123	0.010	0.011	0.048	0.050	0.238
		best fused	**−3739.39**	**−3739.39**	**−3739.39**	−3496.48	−3496.48	**−3739.39**
		$t_{\text{fuse}}(s)$	0.625	0.052	0.060	0.048	0.050	0.662

house66 (*energy_house_frame11frame101*), known optimum: -3748.61

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3748.61**	*best generated*						
	0.029	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.053	0.007	0.007	0.050	0.051	0.019
		best fused	**−3748.61**	**−3748.61**	**−3748.61**	**−3748.61**	**−3748.61**	**−3748.61**
		$t_{\text{fuse}}(s)$	0.053	0.007	0.007	0.050	0.051	0.019
dd-ls3	**−3748.61**	*best generated*						
	0.176	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.169	0.029	0.029	0.192	0.192	0.031
		best fused	**−3748.61**	**−3748.61**	**−3748.61**	**−3748.61**	**−3748.61**	**−3748.61**
		$t_{\text{fuse}}(s)$	0.169	0.029	0.029	0.192	0.192	0.031
dd-ls4	**−3748.61**	*best generated*						
	0.438	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.277	0.230	0.230	0.466	0.467	0.233
		best fused	**−3748.61**	**−3748.61**	**−3748.61**	**−3748.61**	**−3748.61**	**−3748.61**
		$t_{\text{fuse}}(s)$	0.277	0.230	0.230	0.466	0.467	0.233
bca-lap	**−3748.61**	*best generated*						
	5.019	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.418	1.338	1.341	1.341	1.341	1.360
		best fused	**−3748.61**	**−3748.61**	**−3748.61**	**−3748.61**	**−3748.61**	**−3748.61**
		$t_{\text{fuse}}(s)$	1.418	1.338	1.341	1.341	1.341	1.360
bca-greedy	**−3748.61**	*best generated*						
	1.133	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.326	0.217	0.220	0.227	0.226	0.243
		best fused	**−3748.61**	**−3748.61**	**−3748.61**	**−3748.61**	**−3748.61**	**−3748.61**
		$t_{\text{fuse}}(s)$	0.326	0.217	0.220	0.227	0.226	0.243
greedy	−3419.16	*best generated*						
	0.057	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.066	0.004	0.005	0.185	0.188	0.076
		best fused	**−3748.61**	**−3748.61**	**−3748.61**	−3419.16	−3419.16	**−3748.61**
		$t_{\text{fuse}}(s)$	0.141	0.011	0.013	0.185	0.188	0.199

house67 (*energy_house_frame12frame97*), known optimum: -3780.35

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3780.35**	*best generated*						
	0.040	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.107	0.022	0.023	0.068	0.068	0.030
		best fused	**−3780.35**	**−3780.35**	**−3780.35**	**−3780.35**	**−3780.35**	**−3780.35**
		$t_{\text{fuse}}(s)$	0.107	0.022	0.023	0.068	0.068	0.030
dd-ls3	**−3780.35**	*best generated*						
	0.254	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.150	0.039	0.039	0.275	0.275	0.041
		best fused	**−3780.35**	**−3780.35**	**−3780.35**	**−3780.35**	**−3780.35**	**−3780.35**
		$t_{\text{fuse}}(s)$	0.150	0.039	0.039	0.275	0.275	0.041
dd-ls4	**−3780.35**	*best generated*						
	0.622	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.251	0.204	0.204	0.653	0.654	0.259
		best fused	**−3780.35**	**−3780.35**	**−3780.35**	**−3780.35**	**−3780.35**	**−3780.35**
		$t_{\text{fuse}}(s)$	0.251	0.204	0.204	0.653	0.654	0.259
bca-lap	**−3780.35**	*best generated*						
	7.058	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.007	2.881	2.887	2.885	2.885	2.932
		best fused	**−3780.35**	**−3780.35**	**−3780.35**	**−3780.35**	**−3780.35**	**−3780.35**
		$t_{\text{fuse}}(s)$	3.007	2.881	2.887	2.885	2.885	2.932
bca-greedy	**−3780.35**	*best generated*						
	1.585	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.135	0.071	0.073	0.072	0.072	0.084
		best fused	**−3780.35**	**−3780.35**	**−3780.35**	**−3780.35**	**−3780.35**	**−3780.35**
		$t_{\text{fuse}}(s)$	0.135	0.071	0.073	0.072	0.072	0.084
greedy	−3547.46	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.129	0.010	0.011	0.048	0.048	0.187
		best fused	**−3780.35**	**−3780.35**	**−3780.35**	−3547.46	−3547.46	−3684.70
		$t_{\text{fuse}}(s)$	0.877	0.070	0.079	0.048	0.048	0.265

house68 (*energy_house_frame12frame98*), known optimum: -3807.50

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3807.50**	*best generated*						
	0.014	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.061	0.010	0.011	0.027	0.027	0.014
		best fused	**−3807.50**	**−3807.50**	**−3807.50**	**−3807.50**	**−3807.50**	**−3807.50**
		$t_{\text{fuse}}(s)$	0.061	0.010	0.011	0.027	0.027	0.014
dd-ls3	**−3807.50**	*best generated*						
	0.274	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.119	0.067	0.068	0.297	0.297	0.072
		best fused	**−3807.50**	**−3807.50**	**−3807.50**	**−3807.50**	**−3807.50**	**−3807.50**
		$t_{\text{fuse}}(s)$	0.119	0.067	0.068	0.297	0.297	0.072
dd-ls4	**−3807.50**	*best generated*						
	0.436	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.302	0.252	0.253	0.464	0.464	0.255
		best fused	**−3807.50**	**−3807.50**	**−3807.50**	**−3807.50**	**−3807.50**	**−3807.50**
		$t_{\text{fuse}}(s)$	0.302	0.252	0.253	0.464	0.464	0.255
bca-lap	**−3807.50**	*best generated*						
	3.043	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.199	1.133	1.135	1.134	1.135	1.151
		best fused	**−3807.50**	**−3807.50**	**−3807.50**	**−3807.50**	**−3807.50**	**−3807.50**
		$t_{\text{fuse}}(s)$	1.199	1.133	1.135	1.134	1.135	1.151
bca-greedy	**−3807.50**	*best generated*						
	0.042	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.109	0.054	0.054	0.054	0.054	0.057
		best fused	**−3807.50**	**−3807.50**	**−3807.50**	**−3807.50**	**−3807.50**	**−3807.50**
		$t_{\text{fuse}}(s)$	0.109	0.054	0.054	0.054	0.054	0.057
greedy	−3496.01	*best generated*						
	0.010	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.075	0.005	0.006	0.035	0.036	0.217
		best fused	**−3807.50**	**−3807.50**	**−3807.50**	−3496.01	−3496.01	−3704.67
		$t_{\text{fuse}}(s)$	0.202	0.018	0.020	0.035	0.036	0.275

house69 (*energy_house_frame12frame99*), known optimum: -3766.79

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3766.79**	*best generated*						
	0.024	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.118	0.022	0.023	0.044	0.043	0.031
		best fused	**−3766.79**	**−3766.79**	**−3766.79**	**−3766.79**	**−3766.79**	**−3766.79**
		$t_{\text{fuse}}(s)$	0.118	0.022	0.023	0.044	0.043	0.031
dd-ls3	**−3766.79**	*best generated*						
	0.082	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.094	0.050	0.050	0.094	0.094	0.052
		best fused	**−3766.79**	**−3766.79**	**−3766.79**	**−3766.79**	**−3766.79**	**−3766.79**
		$t_{\text{fuse}}(s)$	0.094	0.050	0.050	0.094	0.094	0.052
dd-ls4	**−3766.79**	*best generated*						
	0.199	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.230	0.170	0.171	0.220	0.220	0.172
		best fused	**−3766.79**	**−3766.79**	**−3766.79**	**−3766.79**	**−3766.79**	**−3766.79**
		$t_{\text{fuse}}(s)$	0.230	0.170	0.171	0.220	0.220	0.172
bca-lap	**−3766.79**	*best generated*						
	5.735	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.823	0.763	0.763	1.531	1.532	0.774
		best fused	**−3766.79**	**−3766.79**	**−3766.79**	**−3766.79**	**−3766.79**	**−3766.79**
		$t_{\text{fuse}}(s)$	0.823	0.763	0.763	1.531	1.532	0.774
bca-greedy	**−3766.79**	*best generated*						
	1.292	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.076	0.027	0.028	0.158	0.157	0.166
		best fused	**−3766.79**	**−3766.79**	**−3766.79**	**−3766.79**	**−3766.79**	**−3766.79**
		$t_{\text{fuse}}(s)$	0.076	0.027	0.028	0.158	0.157	0.166
greedy	−3532.13	*best generated*						
	0.051	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.222	0.008	0.009	0.163	0.164	0.229
		best fused	**−3766.79**	**−3766.79**	**−3766.79**	−3532.13	−3532.13	−3661.96
		$t_{\text{fuse}}(s)$	0.266	0.012	0.013	0.163	0.164	0.229

house70 (*energy_house_frame12frame100*), known optimum: -3768.48

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3768.48**	*best generated*						
	0.031	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.100	0.018	0.019	0.055	0.054	0.025
		best fused	**−3768.48**	**−3768.48**	**−3768.48**	**−3768.48**	**−3768.48**	**−3768.48**
		$t_{\text{fuse}}(s)$	0.100	0.018	0.019	0.055	0.054	0.025
dd-ls3	**−3768.48**	*best generated*						
	0.084	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.127	0.076	0.076	0.096	0.096	0.079
		best fused	**−3768.48**	**−3768.48**	**−3768.48**	**−3768.48**	**−3768.48**	**−3768.48**
		$t_{\text{fuse}}(s)$	0.127	0.076	0.076	0.096	0.096	0.079
dd-ls4	**−3768.48**	*best generated*						
	0.214	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.201	0.159	0.159	0.235	0.235	0.176
		best fused	**−3768.48**	**−3768.48**	**−3768.48**	**−3768.48**	**−3768.48**	**−3768.48**
		$t_{\text{fuse}}(s)$	0.201	0.159	0.159	0.235	0.235	0.176
bca-lap	**−3768.48**	*best generated*						
	8.282	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.230	1.156	1.159	1.158	1.158	1.175
		best fused	**−3768.48**	**−3768.48**	**−3768.48**	**−3768.48**	**−3768.48**	**−3768.48**
		$t_{\text{fuse}}(s)$	1.230	1.156	1.159	1.158	1.158	1.175
bca-greedy	**−3768.48**	*best generated*						
	1.657	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.122	0.029	0.029	0.165	0.164	0.192
		best fused	**−3768.48**	**−3768.48**	**−3768.48**	**−3768.48**	**−3768.48**	**−3768.48**
		$t_{\text{fuse}}(s)$	0.122	0.029	0.029	0.165	0.164	0.192
greedy	−3495.00	*best generated*						
	0.016	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.113	0.009	0.010	0.052	0.057	0.147
		best fused	**−3768.48**	**−3768.48**	**−3768.48**	−3495.00	−3495.00	**−3768.48**
		$t_{\text{fuse}}(s)$	0.582	0.088	0.099	0.052	0.057	0.542

house71 (*energy_house_frame12frame101*), known optimum: -3775.50

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3775.50**	*best generated*						
	0.050	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.047	0.031	0.032	0.085	0.085	0.007
		best fused	**−3775.50**	**−3775.50**	**−3775.50**	**−3775.50**	**−3775.50**	**−3775.50**
		$t_{\text{fuse}}(s)$	0.047	0.031	0.032	0.085	0.085	0.007
dd-ls3	**−3775.50**	*best generated*						
	0.112	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.103	0.048	0.048	0.124	0.124	0.041
		best fused	**−3775.50**	**−3775.50**	**−3775.50**	**−3775.50**	**−3775.50**	**−3775.50**
		$t_{\text{fuse}}(s)$	0.103	0.048	0.048	0.124	0.124	0.041
dd-ls4	**−3775.50**	*best generated*						
	0.932	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.260	0.211	0.212	0.964	0.964	0.214
		best fused	**−3775.50**	**−3775.50**	**−3775.50**	**−3775.50**	**−3775.50**	**−3775.50**
		$t_{\text{fuse}}(s)$	0.260	0.211	0.212	0.964	0.964	0.214
bca-lap	**−3775.50**	*best generated*						
	4.741	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.340	1.270	1.274	1.272	1.273	1.290
		best fused	**−3775.50**	**−3775.50**	**−3775.50**	**−3775.50**	**−3775.50**	**−3775.50**
		$t_{\text{fuse}}(s)$	1.340	1.270	1.274	1.272	1.273	1.290
bca-greedy	**−3775.50**	*best generated*						
	1.122	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.087	0.035	0.035	0.036	0.035	0.048
		best fused	**−3775.50**	**−3775.50**	**−3775.50**	**−3775.50**	**−3775.50**	**−3775.50**
		$t_{\text{fuse}}(s)$	0.087	0.035	0.035	0.036	0.035	0.048
greedy	−3682.86	*best generated*						
	0.027	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.126	0.010	0.011	0.092	0.093	0.356
		best fused	**−3775.50**	**−3775.50**	**−3775.50**	−3682.86	−3682.86	**−3775.50**
		$t_{\text{fuse}}(s)$	0.126	0.010	0.011	0.092	0.093	0.391

house72 (*energy_house_frame12frame102*), known optimum: -3783.42

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3783.42**	*best generated*						
	0.026	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.088	0.017	0.018	0.045	0.044	0.023
		best fused	**−3783.42**	**−3783.42**	**−3783.42**	**−3783.42**	**−3783.42**	**−3783.42**
		$t_{\text{fuse}}(s)$	0.088	0.017	0.018	0.045	0.044	0.023
dd-ls3	**−3783.42**	*best generated*						
	0.128	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.202	0.123	0.124	0.142	0.142	0.129
		best fused	**−3783.42**	**−3783.42**	**−3783.42**	**−3783.42**	**−3783.42**	**−3783.42**
		$t_{\text{fuse}}(s)$	0.202	0.123	0.124	0.142	0.142	0.129
dd-ls4	**−3783.42**	*best generated*						
	0.266	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.137	0.103	0.104	0.289	0.289	0.105
		best fused	**−3783.42**	**−3783.42**	**−3783.42**	**−3783.42**	**−3783.42**	**−3783.42**
		$t_{\text{fuse}}(s)$	0.137	0.103	0.104	0.289	0.289	0.105
bca-lap	**−3783.42**	*best generated*						
	6.374	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.974	0.905	0.907	0.907	0.907	0.919
		best fused	**−3783.42**	**−3783.42**	**−3783.42**	**−3783.42**	**−3783.42**	**−3783.42**
		$t_{\text{fuse}}(s)$	0.974	0.905	0.907	0.907	0.907	0.919
bca-greedy	**−3783.42**	*best generated*						
	1.407	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.108	0.052	0.052	0.055	0.055	0.065
		best fused	**−3783.42**	**−3783.42**	**−3783.42**	**−3783.42**	**−3783.42**	**−3783.42**
		$t_{\text{fuse}}(s)$	0.108	0.052	0.052	0.055	0.055	0.065
greedy	−3538.12	*best generated*						
	0.052	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.100	0.007	0.008	0.175	0.175	0.089
		best fused	**−3783.42**	**−3783.42**	**−3783.42**	−3538.12	−3538.12	**−3783.42**
		$t_{\text{fuse}}(s)$	0.100	0.007	0.008	0.175	0.175	0.229

house73 (*energy_house_frame13frame98*), known optimum: -3798.88

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3798.88**	*best generated*						
	0.020	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.086	0.015	0.017	0.036	0.036	0.022
		best fused	**−3798.88**	**−3798.88**	**−3798.88**	**−3798.88**	**−3798.88**	**−3798.88**
		$t_{\text{fuse}}(s)$	0.086	0.015	0.017	0.036	0.036	0.022
dd-ls3	**−3798.88**	*best generated*						
	0.051	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.095	0.042	0.042	0.060	0.060	0.045
		best fused	**−3798.88**	**−3798.88**	**−3798.88**	**−3798.88**	**−3798.88**	**−3798.88**
		$t_{\text{fuse}}(s)$	0.095	0.042	0.042	0.060	0.060	0.045
dd-ls4	**−3798.88**	*best generated*						
	0.380	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.337	0.290	0.290	0.405	0.406	0.294
		best fused	**−3798.88**	**−3798.88**	**−3798.88**	**−3798.88**	**−3798.88**	**−3798.88**
		$t_{\text{fuse}}(s)$	0.337	0.290	0.290	0.405	0.406	0.294
bca-lap	**−3798.88**	*best generated*						
	6.890	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.606	1.508	1.511	1.510	1.510	1.529
		best fused	**−3798.88**	**−3798.88**	**−3798.88**	**−3798.88**	**−3798.88**	**−3798.88**
		$t_{\text{fuse}}(s)$	1.606	1.508	1.511	1.510	1.510	1.529
bca-greedy	**−3798.88**	*best generated*						
	1.505	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.111	0.038	0.038	0.057	0.057	0.040
		best fused	**−3798.88**	**−3798.88**	**−3798.88**	**−3798.88**	**−3798.88**	**−3798.88**
		$t_{\text{fuse}}(s)$	0.111	0.038	0.038	0.057	0.057	0.040
greedy	−3493.29	*best generated*						
	0.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.073	0.005	0.006	0.114	0.112	0.057
		best fused	**−3798.88**	**−3798.88**	**−3798.88**	−3493.29	−3493.29	−3689.45
		$t_{\text{fuse}}(s)$	0.344	0.032	0.036	0.114	0.112	0.064

house74 (*energy_house_frame13frame99*), known optimum: -3754.97

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3754.97**	*best generated*						
	0.018	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.090	0.015	0.016	0.033	0.033	0.012
		best fused	**−3754.97**	**−3754.97**	**−3754.97**	**−3754.97**	**−3754.97**	**−3754.97**
		$t_{\text{fuse}}(s)$	0.090	0.015	0.016	0.033	0.033	0.012
dd-ls3	**−3754.97**	*best generated*						
	0.097	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.122	0.056	0.057	0.109	0.109	0.059
		best fused	**−3754.97**	**−3754.97**	**−3754.97**	**−3754.97**	**−3754.97**	**−3754.97**
		$t_{\text{fuse}}(s)$	0.122	0.056	0.057	0.109	0.109	0.059
dd-ls4	**−3754.97**	*best generated*						
	0.417	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.248	0.179	0.180	0.442	0.442	0.181
		best fused	**−3754.97**	**−3754.97**	**−3754.97**	**−3754.97**	**−3754.97**	**−3754.97**
		$t_{\text{fuse}}(s)$	0.248	0.179	0.180	0.442	0.442	0.181
bca-lap	**−3754.97**	*best generated*						
	7.621	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.579	1.502	1.502	1.500	1.500	1.520
		best fused	**−3754.97**	**−3754.97**	**−3754.97**	**−3754.97**	**−3754.97**	**−3754.97**
		$t_{\text{fuse}}(s)$	1.579	1.502	1.502	1.500	1.500	1.520
bca-greedy	**−3754.97**	*best generated*						
	1.697	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.239	0.142	0.143	0.158	0.158	0.171
		best fused	**−3754.97**	**−3754.97**	**−3754.97**	**−3754.97**	**−3754.97**	**−3754.97**
		$t_{\text{fuse}}(s)$	0.239	0.142	0.143	0.158	0.158	0.171
greedy	−3517.36	*best generated*						
	0.029	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.124	0.006	0.007	0.100	0.100	0.223
		best fused	**−3754.97**	**−3754.97**	**−3754.97**	−3517.36	−3517.36	**−3754.97**
		$t_{\text{fuse}}(s)$	0.175	0.024	0.027	0.100	0.100	0.367

house75 (*energy_house_frame13frame100*), known optimum: -3749.52

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3749.52**	*best generated*						
	0.030	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.073	0.011	0.011	0.053	0.053	0.015
		best fused	**−3749.52**	**−3749.52**	**−3749.52**	**−3749.52**	**−3749.52**	**−3749.52**
		$t_{\text{fuse}}(s)$	0.073	0.011	0.011	0.053	0.053	0.015
dd-ls3	**−3749.52**	*best generated*						
	0.242	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.092	0.039	0.039	0.262	0.262	0.041
		best fused	**−3749.52**	**−3749.52**	**−3749.52**	**−3749.52**	**−3749.52**	**−3749.52**
		$t_{\text{fuse}}(s)$	0.092	0.039	0.039	0.262	0.262	0.041
dd-ls4	**−3749.52**	*best generated*						
	1.041	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.763	0.676	0.678	1.076	1.076	0.685
		best fused	**−3749.52**	**−3749.52**	**−3749.52**	**−3749.52**	**−3749.52**	**−3749.52**
		$t_{\text{fuse}}(s)$	0.763	0.676	0.678	1.076	1.076	0.685
bca-lap	**−3749.52**	*best generated*						
	7.481	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.413	1.345	1.349	1.348	1.348	1.364
		best fused	**−3749.52**	**−3749.52**	**−3749.52**	**−3749.52**	**−3749.52**	**−3749.52**
		$t_{\text{fuse}}(s)$	1.413	1.345	1.349	1.348	1.348	1.364
bca-greedy	**−3749.52**	*best generated*						
	1.585	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.398	0.239	0.242	0.242	0.242	0.257
		best fused	**−3749.52**	**−3749.52**	**−3749.52**	**−3749.52**	**−3749.52**	**−3749.52**
		$t_{\text{fuse}}(s)$	0.398	0.239	0.242	0.242	0.242	0.257
greedy	−3564.99	*best generated*						
	0.027	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.196	0.006	0.007	0.089	0.089	0.174
		best fused	**−3749.52**	**−3749.52**	**−3749.52**	−3564.99	−3564.99	−3590.86
		$t_{\text{fuse}}(s)$	0.313	0.018	0.019	0.089	0.089	0.174

house76 (*energy_house_frame13frame101*), known optimum: -3773.17

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3773.17**	*best generated*						
	0.020	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.115	0.023	0.024	0.036	0.036	0.032
		best fused	**−3773.17**	**−3773.17**	**−3773.17**	**−3773.17**	**−3773.17**	**−3773.17**
		$t_{\text{fuse}}(s)$	0.115	0.023	0.024	0.036	0.036	0.032
dd-ls3	**−3773.17**	*best generated*						
	0.039	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.104	0.038	0.038	0.049	0.048	0.040
		best fused	**−3773.17**	**−3773.17**	**−3773.17**	**−3773.17**	**−3773.17**	**−3773.17**
		$t_{\text{fuse}}(s)$	0.104	0.038	0.038	0.049	0.048	0.040
dd-ls4	**−3773.17**	*best generated*						
	0.134	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.199	0.157	0.157	0.157	0.157	0.159
		best fused	**−3773.17**	**−3773.17**	**−3773.17**	**−3773.17**	**−3773.17**	**−3773.17**
		$t_{\text{fuse}}(s)$	0.199	0.157	0.157	0.157	0.157	0.159
bca-lap	**−3773.17**	*best generated*						
	4.207	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.745	1.655	1.658	1.657	1.660	1.678
		best fused	**−3773.17**	**−3773.17**	**−3773.17**	**−3773.17**	**−3773.17**	**−3773.17**
		$t_{\text{fuse}}(s)$	1.745	1.655	1.658	1.657	1.660	1.678
bca-greedy	**−3773.17**	*best generated*						
	0.937	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.340	0.200	0.202	0.202	0.202	0.223
		best fused	**−3773.17**	**−3773.17**	**−3773.17**	**−3773.17**	**−3773.17**	**−3773.17**
		$t_{\text{fuse}}(s)$	0.340	0.200	0.202	0.202	0.202	0.223
greedy	−3531.77	*best generated*						
	0.047	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.073	0.004	0.005	0.151	0.150	0.408
		best fused	**−3773.17**	**−3773.17**	**−3773.17**	−3531.77	−3531.77	**−3773.17**
		$t_{\text{fuse}}(s)$	0.084	0.006	0.006	0.151	0.150	0.531

house77 (*energy_house_frame13frame102*), known optimum: -3775.96

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3775.96**	*best generated*						
	0.022	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.076	0.014	0.014	0.039	0.039	0.018
		best fused	**−3775.96**	**−3775.96**	**−3775.96**	**−3775.96**	**−3775.96**	**−3775.96**
		$t_{\text{fuse}}(s)$	0.076	0.014	0.014	0.039	0.039	0.018
dd-ls3	**−3775.96**	*best generated*						
	0.042	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.103	0.051	0.051	0.051	0.051	0.053
		best fused	**−3775.96**	**−3775.96**	**−3775.96**	**−3775.96**	**−3775.96**	**−3775.96**
		$t_{\text{fuse}}(s)$	0.103	0.051	0.051	0.051	0.051	0.053
dd-ls4	**−3775.96**	*best generated*						
	0.072	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.125	0.091	0.091	0.092	0.092	0.092
		best fused	**−3775.96**	**−3775.96**	**−3775.96**	**−3775.96**	**−3775.96**	**−3775.96**
		$t_{\text{fuse}}(s)$	0.125	0.091	0.091	0.092	0.092	0.092
bca-lap	**−3775.96**	*best generated*						
	7.627	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.749	0.703	0.704	0.704	0.704	0.713
		best fused	**−3775.96**	**−3775.96**	**−3775.96**	**−3775.96**	**−3775.96**	**−3775.96**
		$t_{\text{fuse}}(s)$	0.749	0.703	0.704	0.704	0.704	0.713
bca-greedy	**−3775.96**	*best generated*						
	1.662	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.089	0.027	0.028	0.031	0.031	0.045
		best fused	**−3775.96**	**−3775.96**	**−3775.96**	**−3775.96**	**−3775.96**	**−3775.96**
		$t_{\text{fuse}}(s)$	0.089	0.027	0.028	0.031	0.031	0.045
greedy	−3689.06	*best generated*						
	0.057	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.111	0.008	0.009	0.179	0.180	0.199
		best fused	**−3775.96**	**−3775.96**	**−3775.96**	−3689.06	−3689.06	**−3775.96**
		$t_{\text{fuse}}(s)$	0.270	0.023	0.025	0.179	0.180	0.199

house78 (*energy_house_frame13frame103*), known optimum: -3749.50

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3749.50**	*best generated*						
	0.025	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.105	0.018	0.019	0.044	0.044	0.024
		best fused	**−3749.50**	**−3749.50**	**−3749.50**	**−3749.50**	**−3749.50**	**−3749.50**
		$t_{\text{fuse}}(s)$	0.105	0.018	0.019	0.044	0.044	0.024
dd-ls3	**−3749.50**	*best generated*						
	0.083	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.108	0.052	0.052	0.094	0.094	0.055
		best fused	**−3749.50**	**−3749.50**	**−3749.50**	**−3749.50**	**−3749.50**	**−3749.50**
		$t_{\text{fuse}}(s)$	0.108	0.052	0.052	0.094	0.094	0.055
dd-ls4	**−3749.50**	*best generated*						
	0.528	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.187	0.148	0.148	0.551	0.552	0.150
		best fused	**−3749.50**	**−3749.50**	**−3749.50**	**−3749.50**	**−3749.50**	**−3749.50**
		$t_{\text{fuse}}(s)$	0.187	0.148	0.148	0.551	0.552	0.150
bca-lap	**−3749.50**	*best generated*						
	3.236	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.472	1.378	1.381	1.380	1.383	1.397
		best fused	**−3749.50**	**−3749.50**	**−3749.50**	**−3749.50**	**−3749.50**	**−3749.50**
		$t_{\text{fuse}}(s)$	1.472	1.378	1.381	1.380	1.383	1.397
bca-greedy	**−3749.50**	*best generated*						
	0.761	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.077	0.028	0.028	0.197	0.197	0.034
		best fused	**−3749.50**	**−3749.50**	**−3749.50**	**−3749.50**	**−3749.50**	**−3749.50**
		$t_{\text{fuse}}(s)$	0.077	0.028	0.028	0.197	0.197	0.034
greedy	−3413.87	*best generated*						
	0.009	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.080	0.005	0.006	0.034	0.036	0.207
		best fused	**−3749.50**	**−3749.50**	**−3749.50**	−3413.87	−3413.87	**−3749.50**
		$t_{\text{fuse}}(s)$	0.197	0.017	0.015	0.034	0.036	0.673

house79 (*energy_house_frame14frame99*), known optimum: -3788.42

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3788.42**	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.082	0.015	0.016	0.025	0.024	0.021
		best fused	**−3788.42**	**−3788.42**	**−3788.42**	**−3788.42**	**−3788.42**	**−3788.42**
		$t_{\text{fuse}}(s)$	0.082	0.015	0.016	0.025	0.024	0.021
dd-ls3	**−3788.42**	*best generated*						
	0.137	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.142	0.043	0.043	0.151	0.151	0.045
		best fused	**−3788.42**	**−3788.42**	**−3788.42**	**−3788.42**	**−3788.42**	**−3788.42**
		$t_{\text{fuse}}(s)$	0.142	0.043	0.043	0.151	0.151	0.045
dd-ls4	**−3788.42**	*best generated*						
	0.674	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.195	0.139	0.138	0.702	0.703	0.140
		best fused	**−3788.42**	**−3788.42**	**−3788.42**	**−3788.42**	**−3788.42**	**−3788.42**
		$t_{\text{fuse}}(s)$	0.195	0.139	0.138	0.702	0.703	0.140
bca-lap	**−3788.42**	*best generated*						
	5.430	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.388	1.309	1.313	1.312	1.311	1.332
		best fused	**−3788.42**	**−3788.42**	**−3788.42**	**−3788.42**	**−3788.42**	**−3788.42**
		$t_{\text{fuse}}(s)$	1.388	1.309	1.313	1.312	1.311	1.332
bca-greedy	**−3788.42**	*best generated*						
	1.221	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.296	0.196	0.198	0.198	0.198	0.224
		best fused	**−3788.42**	**−3788.42**	**−3788.42**	**−3788.42**	**−3788.42**	**−3788.42**
		$t_{\text{fuse}}(s)$	0.296	0.196	0.198	0.198	0.198	0.224
greedy	−3646.69	*best generated*						
	0.017	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.090	0.006	0.007	0.060	0.060	0.284
		best fused	**−3788.42**	**−3788.42**	**−3788.42**	−3646.69	−3646.69	**−3788.42**
		$t_{\text{fuse}}(s)$	0.097	0.007	0.008	0.060	0.060	0.369

house80 (*energy_house_frame14frame100*), known optimum: -3785.20

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3785.20**	*best generated*						
	0.008	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.081	0.014	0.015	0.016	0.016	0.011
		best fused	**−3785.20**	**−3785.20**	**−3785.20**	**−3785.20**	**−3785.20**	**−3785.20**
		$t_{\text{fuse}}(s)$	0.081	0.014	0.015	0.016	0.016	0.011
dd-ls3	**−3785.20**	*best generated*						
	0.084	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.107	0.041	0.041	0.095	0.095	0.042
		best fused	**−3785.20**	**−3785.20**	**−3785.20**	**−3785.20**	**−3785.20**	**−3785.20**
		$t_{\text{fuse}}(s)$	0.107	0.041	0.041	0.095	0.095	0.042
dd-ls4	**−3785.20**	*best generated*						
	0.198	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.261	0.187	0.187	0.218	0.218	0.189
		best fused	**−3785.20**	**−3785.20**	**−3785.20**	**−3785.20**	**−3785.20**	**−3785.20**
		$t_{\text{fuse}}(s)$	0.261	0.187	0.187	0.218	0.218	0.189
bca-lap	**−3785.20**	*best generated*						
	1.217	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.147	1.073	1.076	1.075	1.076	1.092
		best fused	**−3785.20**	**−3785.20**	**−3785.20**	**−3785.20**	**−3785.20**	**−3785.20**
		$t_{\text{fuse}}(s)$	1.147	1.073	1.076	1.075	1.076	1.092
bca-greedy	**−3785.20**	*best generated*						
	0.221	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.104	0.029	0.030	0.033	0.032	0.035
		best fused	**−3785.20**	**−3785.20**	**−3785.20**	**−3785.20**	**−3785.20**	**−3785.20**
		$t_{\text{fuse}}(s)$	0.104	0.029	0.030	0.033	0.032	0.035
greedy	−3551.73	*best generated*						
	0.036	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.054	0.003	0.003	0.123	0.126	0.261
		best fused	**−3785.20**	**−3785.20**	**−3785.20**	−3551.73	−3551.73	**−3785.20**
		$t_{\text{fuse}}(s)$	0.416	0.033	0.038	0.123	0.126	0.537

house81 (*energy_house_frame14frame101*), known optimum: -3796.54

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3796.54**	*best generated*						
	0.015	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.119	0.024	0.025	0.029	0.029	0.021
		best fused	**−3796.54**	**−3796.54**	**−3796.54**	**−3796.54**	**−3796.54**	**−3796.54**
		$t_{\text{fuse}}(s)$	0.119	0.024	0.025	0.029	0.029	0.021
dd-ls3	**−3796.54**	*best generated*						
	0.113	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.271	0.106	0.107	0.126	0.126	0.111
		best fused	**−3796.54**	**−3796.54**	**−3796.54**	**−3796.54**	**−3796.54**	**−3796.54**
		$t_{\text{fuse}}(s)$	0.271	0.106	0.107	0.126	0.126	0.111
dd-ls4	**−3796.54**	*best generated*						
	0.566	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.530	0.455	0.456	0.595	0.595	0.461
		best fused	**−3796.54**	**−3796.54**	**−3796.54**	**−3796.54**	**−3796.54**	**−3796.54**
		$t_{\text{fuse}}(s)$	0.530	0.455	0.456	0.595	0.595	0.461
bca-lap	**−3796.54**	*best generated*						
	2.843	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.345	1.262	1.265	1.264	1.265	1.284
		best fused	**−3796.54**	**−3796.54**	**−3796.54**	**−3796.54**	**−3796.54**	**−3796.54**
		$t_{\text{fuse}}(s)$	1.345	1.262	1.265	1.264	1.265	1.284
bca-greedy	**−3796.54**	*best generated*						
	0.243	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.205	0.122	0.123	0.123	0.123	0.136
		best fused	**−3796.54**	**−3796.54**	**−3796.54**	**−3796.54**	**−3796.54**	**−3796.54**
		$t_{\text{fuse}}(s)$	0.205	0.122	0.123	0.123	0.123	0.136
greedy	−3567.17	*best generated*						
	0.045	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.074	0.005	0.005	0.143	0.147	0.155
		best fused	**−3796.54**	**−3796.54**	**−3796.54**	−3567.17	−3567.17	−3704.59
		$t_{\text{fuse}}(s)$	0.307	0.024	0.026	0.143	0.147	0.535

house82 (*energy_house_frame14frame102*), known optimum: -3806.95

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3806.95**	*best generated*						
	0.015	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.098	0.020	0.021	0.028	0.028	0.028
		best fused	**−3806.95**	**−3806.95**	**−3806.95**	**−3806.95**	**−3806.95**	**−3806.95**
		$t_{\text{fuse}}(s)$	0.098	0.020	0.021	0.028	0.028	0.028
dd-ls3	**−3806.95**	*best generated*						
	0.119	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.172	0.049	0.049	0.133	0.133	0.052
		best fused	**−3806.95**	**−3806.95**	**−3806.95**	**−3806.95**	**−3806.95**	**−3806.95**
		$t_{\text{fuse}}(s)$	0.172	0.049	0.049	0.133	0.133	0.052
dd-ls4	**−3806.95**	*best generated*						
	0.391	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.322	0.264	0.264	0.417	0.417	0.268
		best fused	**−3806.95**	**−3806.95**	**−3806.95**	**−3806.95**	**−3806.95**	**−3806.95**
		$t_{\text{fuse}}(s)$	0.322	0.264	0.264	0.417	0.417	0.268
bca-lap	**−3806.95**	*best generated*						
	0.612	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.669	0.623	0.625	0.626	0.626	0.634
		best fused	**−3806.95**	**−3806.95**	**−3806.95**	**−3806.95**	**−3806.95**	**−3806.95**
		$t_{\text{fuse}}(s)$	0.669	0.623	0.625	0.626	0.626	0.634
bca-greedy	**−3806.95**	*best generated*						
	0.187	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.065	0.025	0.025	0.132	0.131	0.146
		best fused	**−3806.95**	**−3806.95**	**−3806.95**	**−3806.95**	**−3806.95**	**−3806.95**
		$t_{\text{fuse}}(s)$	0.065	0.025	0.025	0.132	0.131	0.146
greedy	−3598.80	*best generated*						
	0.043	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.108	0.008	0.008	0.147	0.148	0.102
		best fused	**−3806.95**	**−3806.95**	**−3806.95**	−3598.80	−3598.80	**−3806.95**
		$t_{\text{fuse}}(s)$	0.251	0.020	0.022	0.147	0.148	0.448

house83 (*energy_house_frame14frame103*), known optimum: -3769.12

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3769.12**	*best generated*						
	0.028	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.097	0.016	0.017	0.053	0.050	0.023
		best fused	**−3769.12**	**−3769.12**	**−3769.12**	**−3769.12**	**−3769.12**	**−3769.12**
		$t_{\text{fuse}}(s)$	0.097	0.016	0.017	0.053	0.050	0.023
dd-ls3	**−3769.12**	*best generated*						
	0.076	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.121	0.063	0.063	0.087	0.087	0.065
		best fused	**−3769.12**	**−3769.12**	**−3769.12**	**−3769.12**	**−3769.12**	**−3769.12**
		$t_{\text{fuse}}(s)$	0.121	0.063	0.063	0.087	0.087	0.065
dd-ls4	**−3769.12**	*best generated*						
	0.657	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.198	0.150	0.151	0.687	0.687	0.153
		best fused	**−3769.12**	**−3769.12**	**−3769.12**	**−3769.12**	**−3769.12**	**−3769.12**
		$t_{\text{fuse}}(s)$	0.198	0.150	0.151	0.687	0.687	0.153
bca-lap	**−3769.12**	*best generated*						
	3.074	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.039	0.978	0.982	0.980	0.982	0.994
		best fused	**−3769.12**	**−3769.12**	**−3769.12**	**−3769.12**	**−3769.12**	**−3769.12**
		$t_{\text{fuse}}(s)$	1.039	0.978	0.982	0.980	0.982	0.994
bca-greedy	**−3769.12**	*best generated*						
	0.679	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.233	0.139	0.140	0.158	0.158	0.153
		best fused	**−3769.12**	**−3769.12**	**−3769.12**	**−3769.12**	**−3769.12**	**−3769.12**
		$t_{\text{fuse}}(s)$	0.233	0.139	0.140	0.158	0.158	0.153
greedy	−3569.46	*best generated*						
	0.039	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.061	0.005	0.006	0.134	0.137	0.648
		best fused	**−3769.12**	**−3769.12**	**−3769.12**	−3569.46	−3569.46	−3678.88
		$t_{\text{fuse}}(s)$	0.386	0.034	0.038	0.134	0.137	0.722

house84 (*energy_house_frame14frame104*), known optimum: -3761.22

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3761.22**	*best generated*						
	0.041	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.127	0.026	0.027	0.073	0.072	0.036
		best fused	**−3761.22**	**−3761.22**	**−3761.22**	**−3761.22**	**−3761.22**	**−3761.22**
		$t_{\text{fuse}}(s)$	0.127	0.026	0.027	0.073	0.072	0.036
dd-ls3	**−3761.22**	*best generated*						
	0.141	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.140	0.066	0.067	0.155	0.156	0.070
		best fused	**−3761.22**	**−3761.22**	**−3761.22**	**−3761.22**	**−3761.22**	**−3761.22**
		$t_{\text{fuse}}(s)$	0.140	0.066	0.067	0.155	0.156	0.070
dd-ls4	**−3761.22**	*best generated*						
	0.521	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.267	0.198	0.198	0.548	0.549	0.362
		best fused	**−3761.22**	**−3761.22**	**−3761.22**	**−3761.22**	**−3761.22**	**−3761.22**
		$t_{\text{fuse}}(s)$	0.267	0.198	0.198	0.548	0.549	0.362
bca-lap	**−3761.22**	*best generated*						
	7.217	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.838	0.782	0.785	0.784	0.783	0.796
		best fused	**−3761.22**	**−3761.22**	**−3761.22**	**−3761.22**	**−3761.22**	**−3761.22**
		$t_{\text{fuse}}(s)$	0.838	0.782	0.785	0.784	0.783	0.796
bca-greedy	**−3761.22**	*best generated*						
	1.563	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.076	0.024	0.024	0.036	0.035	0.044
		best fused	**−3761.22**	**−3761.22**	**−3761.22**	**−3761.22**	**−3761.22**	**−3761.22**
		$t_{\text{fuse}}(s)$	0.076	0.024	0.024	0.036	0.035	0.044
greedy	−3394.45	*best generated*						
	0.031	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.047	0.004	0.004	0.108	0.109	0.048
		best fused	**−3761.22**	**−3761.22**	**−3761.22**	−3394.45	−3394.45	**−3761.22**
		$t_{\text{fuse}}(s)$	0.096	0.008	0.009	0.108	0.109	0.353

house85 (*energy_house_frame15frame100*), known optimum: -3784.87

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3784.87**	*best generated*						
	0.024	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.068	0.007	0.008	0.047	0.043	0.015
		best fused	**−3784.87**	**−3784.87**	**−3784.87**	**−3784.87**	**−3784.87**	**−3784.87**
		$t_{\text{fuse}}(s)$	0.068	0.007	0.008	0.047	0.043	0.015
dd-ls3	**−3784.87**	*best generated*						
	0.066	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.157	0.066	0.067	0.077	0.076	0.070
		best fused	**−3784.87**	**−3784.87**	**−3784.87**	**−3784.87**	**−3784.87**	**−3784.87**
		$t_{\text{fuse}}(s)$	0.157	0.066	0.067	0.077	0.076	0.070
dd-ls4	**−3784.87**	*best generated*						
	0.198	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.172	0.128	0.128	0.220	0.220	0.130
		best fused	**−3784.87**	**−3784.87**	**−3784.87**	**−3784.87**	**−3784.87**	**−3784.87**
		$t_{\text{fuse}}(s)$	0.172	0.128	0.128	0.220	0.220	0.130
bca-lap	**−3784.87**	*best generated*						
	4.592	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.416	0.375	0.377	0.377	0.376	0.382
		best fused	**−3784.87**	**−3784.87**	**−3784.87**	**−3784.87**	**−3784.87**	**−3784.87**
		$t_{\text{fuse}}(s)$	0.416	0.375	0.377	0.377	0.376	0.382
bca-greedy	**−3784.87**	*best generated*						
	1.063	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.072	0.026	0.026	0.026	0.026	0.039
		best fused	**−3784.87**	**−3784.87**	**−3784.87**	**−3784.87**	**−3784.87**	**−3784.87**
		$t_{\text{fuse}}(s)$	0.072	0.026	0.026	0.026	0.026	0.039
greedy	−3574.99	*best generated*						
	0.020	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.062	0.004	0.004	0.068	0.070	0.027
		best fused	**−3784.87**	**−3784.87**	**−3784.87**	−3574.99	−3574.99	**−3784.87**
		$t_{\text{fuse}}(s)$	0.134	0.012	0.013	0.068	0.070	0.036

house86 (*energy_house_frame15frame101*), known optimum: -3796.63

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3796.63**	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.040	0.005	0.005	0.025	0.023	0.006
		best fused	**−3796.63**	**−3796.63**	**−3796.63**	**−3796.63**	**−3796.63**	**−3796.63**
		$t_{\text{fuse}}(s)$	0.040	0.005	0.005	0.025	0.023	0.006
dd-ls3	**−3796.63**	*best generated*						
	0.057	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.136	0.066	0.066	0.066	0.066	0.070
		best fused	**−3796.63**	**−3796.63**	**−3796.63**	**−3796.63**	**−3796.63**	**−3796.63**
		$t_{\text{fuse}}(s)$	0.136	0.066	0.066	0.066	0.066	0.070
dd-ls4	**−3796.63**	*best generated*						
	0.098	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.161	0.116	0.116	0.116	0.116	0.118
		best fused	**−3796.63**	**−3796.63**	**−3796.63**	**−3796.63**	**−3796.63**	**−3796.63**
		$t_{\text{fuse}}(s)$	0.161	0.116	0.116	0.116	0.116	0.118
bca-lap	**−3796.63**	*best generated*						
	4.586	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.023	0.962	0.965	0.964	0.965	0.980
		best fused	**−3796.63**	**−3796.63**	**−3796.63**	**−3796.63**	**−3796.63**	**−3796.63**
		$t_{\text{fuse}}(s)$	1.023	0.962	0.965	0.964	0.965	0.980
bca-greedy	**−3796.63**	*best generated*						
	1.072	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.085	0.032	0.032	0.032	0.032	0.034
		best fused	**−3796.63**	**−3796.63**	**−3796.63**	**−3796.63**	**−3796.63**	**−3796.63**
		$t_{\text{fuse}}(s)$	0.085	0.032	0.032	0.032	0.032	0.034
greedy	−3586.39	*best generated*						
	0.011	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.159	0.013	0.015	0.039	0.040	0.150
		best fused	**−3796.63**	**−3796.63**	**−3796.63**	−3586.39	−3586.39	**−3796.63**
		$t_{\text{fuse}}(s)$	0.187	0.013	0.015	0.039	0.040	0.500

house87 (*energy_house_frame15frame102*), known optimum: -3798.54

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3798.54**	*best generated*						
	0.017	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.072	0.014	0.014	0.034	0.032	0.020
		best fused	**−3798.54**	**−3798.54**	**−3798.54**	**−3798.54**	**−3798.54**	**−3798.54**
		$t_{\text{fuse}}(s)$	0.072	0.014	0.014	0.034	0.032	0.020
dd-ls3	**−3798.54**	*best generated*						
	0.083	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.167	0.054	0.055	0.094	0.094	0.057
		best fused	**−3798.54**	**−3798.54**	**−3798.54**	**−3798.54**	**−3798.54**	**−3798.54**
		$t_{\text{fuse}}(s)$	0.167	0.054	0.055	0.094	0.094	0.057
dd-ls4	**−3798.54**	*best generated*						
	0.186	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.174	0.130	0.131	0.208	0.207	0.132
		best fused	**−3798.54**	**−3798.54**	**−3798.54**	**−3798.54**	**−3798.54**	**−3798.54**
		$t_{\text{fuse}}(s)$	0.174	0.130	0.131	0.208	0.207	0.132
bca-lap	**−3798.54**	*best generated*						
	1.448	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.381	0.329	0.330	0.332	0.330	0.335
		best fused	**−3798.54**	**−3798.54**	**−3798.54**	**−3798.54**	**−3798.54**	**−3798.54**
		$t_{\text{fuse}}(s)$	0.381	0.329	0.330	0.332	0.330	0.335
bca-greedy	**−3798.54**	*best generated*						
	0.385	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.136	0.048	0.050	0.049	0.049	0.058
		best fused	**−3798.54**	**−3798.54**	**−3798.54**	**−3798.54**	**−3798.54**	**−3798.54**
		$t_{\text{fuse}}(s)$	0.136	0.048	0.050	0.049	0.049	0.058
greedy	−3549.39	*best generated*						
	0.020	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.074	0.006	0.006	0.065	0.068	0.150
		best fused	**−3798.54**	**−3798.54**	**−3798.54**	−3549.39	−3549.39	**−3798.54**
		$t_{\text{fuse}}(s)$	0.158	0.013	0.014	0.065	0.068	0.155

house88 (*energy_house_frame15frame103*), known optimum: -3774.99

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3774.99**	*best generated*						
	0.002	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.043	0.005	0.005	0.006	0.005	0.006
		best fused	**−3774.99**	**−3774.99**	**−3774.99**	**−3774.99**	**−3774.99**	**−3774.99**
		$t_{\text{fuse}}(s)$	0.043	0.005	0.005	0.006	0.005	0.006
dd-ls3	**−3774.99**	*best generated*						
	0.136	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.146	0.084	0.085	0.150	0.151	0.089
		best fused	**−3774.99**	**−3774.99**	**−3774.99**	**−3774.99**	**−3774.99**	**−3774.99**
		$t_{\text{fuse}}(s)$	0.146	0.084	0.085	0.150	0.151	0.089
dd-ls4	**−3774.99**	*best generated*						
	0.444	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.405	0.343	0.345	0.471	0.471	0.348
		best fused	**−3774.99**	**−3774.99**	**−3774.99**	**−3774.99**	**−3774.99**	**−3774.99**
		$t_{\text{fuse}}(s)$	0.405	0.343	0.345	0.471	0.471	0.348
bca-lap	**−3774.99**	*best generated*						
	5.139	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.443	0.392	0.393	0.393	0.393	0.398
		best fused	**−3774.99**	**−3774.99**	**−3774.99**	**−3774.99**	**−3774.99**	**−3774.99**
		$t_{\text{fuse}}(s)$	0.443	0.392	0.393	0.393	0.393	0.398
bca-greedy	**−3774.99**	*best generated*						
	1.123	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.061	0.024	0.025	0.100	0.100	0.109
		best fused	**−3774.99**	**−3774.99**	**−3774.99**	**−3774.99**	**−3774.99**	**−3774.99**
		$t_{\text{fuse}}(s)$	0.061	0.024	0.025	0.100	0.100	0.109
greedy	−3516.83	*best generated*						
	0.021	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.067	0.005	0.005	0.071	0.071	0.176
		best fused	**−3774.99**	**−3774.99**	**−3774.99**	−3516.83	−3516.83	−3677.10
		$t_{\text{fuse}}(s)$	0.320	0.028	0.031	0.071	0.071	0.237

house89 (*energy_house_frame15frame104*), known optimum: -3762.50

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3762.50**	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.083	0.013	0.013	0.025	0.025	0.018
		best fused	**−3762.50**	**−3762.50**	**−3762.50**	**−3762.50**	**−3762.50**	**−3762.50**
		$t_{\text{fuse}}(s)$	0.083	0.013	0.013	0.025	0.025	0.018
dd-ls3	**−3762.50**	*best generated*						
	0.126	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.462	0.119	0.120	0.139	0.140	0.125
		best fused	**−3762.50**	**−3762.50**	**−3762.50**	**−3762.50**	**−3762.50**	**−3762.50**
		$t_{\text{fuse}}(s)$	0.462	0.119	0.120	0.139	0.140	0.125
dd-ls4	**−3762.50**	*best generated*						
	0.247	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.243	0.189	0.190	0.269	0.269	0.191
		best fused	**−3762.50**	**−3762.50**	**−3762.50**	**−3762.50**	**−3762.50**	**−3762.50**
		$t_{\text{fuse}}(s)$	0.243	0.189	0.190	0.269	0.269	0.191
bca-lap	**−3762.50**	*best generated*						
	0.920	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.484	0.436	0.440	0.438	0.437	0.444
		best fused	**−3762.50**	**−3762.50**	**−3762.50**	**−3762.50**	**−3762.50**	**−3762.50**
		$t_{\text{fuse}}(s)$	0.484	0.436	0.440	0.438	0.437	0.444
bca-greedy	**−3762.50**	*best generated*						
	0.216	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.139	0.031	0.032	0.031	0.031	0.033
		best fused	**−3762.50**	**−3762.50**	**−3762.50**	**−3762.50**	**−3762.50**	**−3762.50**
		$t_{\text{fuse}}(s)$	0.139	0.031	0.032	0.031	0.031	0.033
greedy	**−3762.50**	*best generated*						
	0.048	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.181	0.012	0.013	0.169	0.165	0.581
		best fused	**−3762.50**	**−3762.50**	**−3762.50**	**−3762.50**	**−3762.50**	**−3762.50**
		$t_{\text{fuse}}(s)$	0.181	0.012	0.013	0.169	0.165	0.581

house90 (*energy_house_frame15frame105*), known optimum: -3745.16

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3745.16**	*best generated*						
	0.009	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.069	0.009	0.010	0.019	0.017	0.015
		best fused	**−3745.16**	**−3745.16**	**−3745.16**	**−3745.16**	**−3745.16**	**−3745.16**
		$t_{\text{fuse}}(s)$	0.069	0.009	0.010	0.019	0.017	0.015
dd-ls3	**−3745.16**	*best generated*						
	0.192	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.165	0.093	0.094	0.208	0.209	0.068
		best fused	**−3745.16**	**−3745.16**	**−3745.16**	**−3745.16**	**−3745.16**	**−3745.16**
		$t_{\text{fuse}}(s)$	0.165	0.093	0.094	0.208	0.209	0.068
dd-ls4	**−3745.16**	*best generated*						
	0.223	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.244	0.193	0.192	0.246	0.246	0.195
		best fused	**−3745.16**	**−3745.16**	**−3745.16**	**−3745.16**	**−3745.16**	**−3745.16**
		$t_{\text{fuse}}(s)$	0.244	0.193	0.192	0.246	0.246	0.195
bca-lap	**−3745.16**	*best generated*						
	2.671	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.601	0.547	0.548	0.905	0.905	0.555
		best fused	**−3745.16**	**−3745.16**	**−3745.16**	**−3745.16**	**−3745.16**	**−3745.16**
		$t_{\text{fuse}}(s)$	0.601	0.547	0.548	0.905	0.905	0.555
bca-greedy	**−3745.16**	*best generated*						
	0.571	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.077	0.025	0.025	0.032	0.033	0.041
		best fused	**−3745.16**	**−3745.16**	**−3745.16**	**−3745.16**	**−3745.16**	**−3745.16**
		$t_{\text{fuse}}(s)$	0.077	0.025	0.025	0.032	0.033	0.041
greedy	−3479.38	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.078	0.007	0.007	0.007	0.007	0.021
		best fused	**−3745.16**	**−3745.16**	**−3745.16**	−3479.38	−3479.38	**−3745.16**
		$t_{\text{fuse}}(s)$	0.340	0.029	0.033	0.007	0.007	0.502

house91 (*energy_house_frame16frame101*), known optimum: -3804.83

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3804.83**	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.057	0.009	0.010	0.026	0.025	0.011
		best fused	**−3804.83**	**−3804.83**	**−3804.83**	**−3804.83**	**−3804.83**	**−3804.83**
		$t_{\text{fuse}}(s)$	0.057	0.009	0.010	0.026	0.025	0.011
dd-ls3	**−3804.83**	*best generated*						
	0.054	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.096	0.037	0.037	0.064	0.064	0.039
		best fused	**−3804.83**	**−3804.83**	**−3804.83**	**−3804.83**	**−3804.83**	**−3804.83**
		$t_{\text{fuse}}(s)$	0.096	0.037	0.037	0.064	0.064	0.039
dd-ls4	**−3804.83**	*best generated*						
	0.433	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.199	0.148	0.149	0.459	0.459	0.150
		best fused	**−3804.83**	**−3804.83**	**−3804.83**	**−3804.83**	**−3804.83**	**−3804.83**
		$t_{\text{fuse}}(s)$	0.199	0.148	0.149	0.459	0.459	0.150
bca-lap	**−3804.83**	*best generated*						
	5.776	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.560	1.480	1.486	1.484	1.484	1.505
		best fused	**−3804.83**	**−3804.83**	**−3804.83**	**−3804.83**	**−3804.83**	**−3804.83**
		$t_{\text{fuse}}(s)$	1.560	1.480	1.486	1.484	1.484	1.505
bca-greedy	**−3804.83**	*best generated*						
	1.248	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.097	0.024	0.024	0.024	0.024	0.025
		best fused	**−3804.83**	**−3804.83**	**−3804.83**	**−3804.83**	**−3804.83**	**−3804.83**
		$t_{\text{fuse}}(s)$	0.097	0.024	0.024	0.024	0.024	0.025
greedy	−3561.44	*best generated*						
	0.015	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.088	0.007	0.007	0.054	0.054	0.060
		best fused	**−3804.83**	**−3804.83**	**−3804.83**	−3561.44	−3561.44	**−3804.83**
		$t_{\text{fuse}}(s)$	0.113	0.009	0.010	0.054	0.054	0.103

house92 (*energy_house_frame16frame102*), known optimum: -3815.11

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3815.11**	*best generated*						
	0.009	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.075	0.014	0.015	0.019	0.018	0.023
		best fused	**−3815.11**	**−3815.11**	**−3815.11**	**−3815.11**	**−3815.11**	**−3815.11**
		$t_{\text{fuse}}(s)$	0.075	0.014	0.015	0.019	0.018	0.023
dd-ls3	**−3815.11**	*best generated*						
	0.091	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.345	0.042	0.042	0.102	0.102	0.044
		best fused	**−3815.11**	**−3815.11**	**−3815.11**	**−3815.11**	**−3815.11**	**−3815.11**
		$t_{\text{fuse}}(s)$	0.345	0.042	0.042	0.102	0.102	0.044
dd-ls4	**−3815.11**	*best generated*						
	0.192	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.246	0.195	0.196	0.212	0.211	0.199
		best fused	**−3815.11**	**−3815.11**	**−3815.11**	**−3815.11**	**−3815.11**	**−3815.11**
		$t_{\text{fuse}}(s)$	0.246	0.195	0.196	0.212	0.211	0.199
bca-lap	**−3815.11**	*best generated*						
	1.670	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.392	0.352	0.352	0.352	0.352	0.358
		best fused	**−3815.11**	**−3815.11**	**−3815.11**	**−3815.11**	**−3815.11**	**−3815.11**
		$t_{\text{fuse}}(s)$	0.392	0.352	0.352	0.352	0.352	0.358
bca-greedy	**−3815.11**	*best generated*						
	0.434	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.061	0.017	0.017	0.032	0.032	0.026
		best fused	**−3815.11**	**−3815.11**	**−3815.11**	**−3815.11**	**−3815.11**	**−3815.11**
		$t_{\text{fuse}}(s)$	0.061	0.017	0.017	0.032	0.032	0.026
greedy	−3703.38	*best generated*						
	0.039	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.072	0.006	0.006	0.129	0.133	0.509
		best fused	**−3815.11**	**−3815.11**	**−3815.11**	−3703.38	−3703.38	**−3815.11**
		$t_{\text{fuse}}(s)$	0.386	0.032	0.037	0.129	0.133	0.605

house93 (*energy_house_frame16frame103*), known optimum: -3787.76

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3787.76**	*best generated*						
	0.028	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.098	0.029	0.032	0.052	0.050	0.018
		best fused	**−3787.76**	**−3787.76**	**−3787.76**	**−3787.76**	**−3787.76**	**−3787.76**
		$t_{\text{fuse}}(s)$	0.098	0.029	0.032	0.052	0.050	0.018
dd-ls3	**−3787.76**	*best generated*						
	0.212	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.091	0.039	0.039	0.231	0.231	0.035
		best fused	**−3787.76**	**−3787.76**	**−3787.76**	**−3787.76**	**−3787.76**	**−3787.76**
		$t_{\text{fuse}}(s)$	0.091	0.039	0.039	0.231	0.231	0.035
dd-ls4	**−3787.76**	*best generated*						
	0.200	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.152	0.118	0.119	0.221	0.221	0.120
		best fused	**−3787.76**	**−3787.76**	**−3787.76**	**−3787.76**	**−3787.76**	**−3787.76**
		$t_{\text{fuse}}(s)$	0.152	0.118	0.119	0.221	0.221	0.120
bca-lap	**−3787.76**	*best generated*						
	5.145	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.979	0.918	0.924	0.919	0.919	0.933
		best fused	**−3787.76**	**−3787.76**	**−3787.76**	**−3787.76**	**−3787.76**	**−3787.76**
		$t_{\text{fuse}}(s)$	0.979	0.918	0.924	0.919	0.919	0.933
bca-greedy	**−3787.76**	*best generated*						
	1.101	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.102	0.046	0.047	0.047	0.047	0.062
		best fused	**−3787.76**	**−3787.76**	**−3787.76**	**−3787.76**	**−3787.76**	**−3787.76**
		$t_{\text{fuse}}(s)$	0.102	0.046	0.047	0.047	0.047	0.062
greedy	−3492.50	*best generated*						
	0.031	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.060	0.005	0.005	0.100	0.102	0.227
		best fused	**−3787.76**	**−3787.76**	**−3787.76**	−3492.50	−3492.50	−3692.99
		$t_{\text{fuse}}(s)$	0.821	0.073	0.082	0.100	0.102	0.247

house94 (*energy_house_frame16frame104*), known optimum: -3774.51

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3774.51**	*best generated*						
	0.023	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.065	0.009	0.009	0.042	0.042	0.021
		best fused	**−3774.51**	**−3774.51**	**−3774.51**	**−3774.51**	**−3774.51**	**−3774.51**
		$t_{\text{fuse}}(s)$	0.065	0.009	0.009	0.042	0.042	0.021
dd-ls3	**−3774.51**	*best generated*						
	0.176	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.132	0.072	0.072	0.192	0.192	0.075
		best fused	**−3774.51**	**−3774.51**	**−3774.51**	**−3774.51**	**−3774.51**	**−3774.51**
		$t_{\text{fuse}}(s)$	0.132	0.072	0.072	0.192	0.192	0.075
dd-ls4	**−3774.51**	*best generated*						
	0.265	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.235	0.191	0.191	0.287	0.286	0.194
		best fused	**−3774.51**	**−3774.51**	**−3774.51**	**−3774.51**	**−3774.51**	**−3774.51**
		$t_{\text{fuse}}(s)$	0.235	0.191	0.191	0.287	0.286	0.194
bca-lap	**−3774.51**	*best generated*						
	2.193	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.600	0.548	0.549	1.336	1.334	0.556
		best fused	**−3774.51**	**−3774.51**	**−3774.51**	**−3774.51**	**−3774.51**	**−3774.51**
		$t_{\text{fuse}}(s)$	0.600	0.548	0.549	1.336	1.334	0.556
bca-greedy	**−3774.51**	*best generated*						
	0.068	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.067	0.016	0.017	0.045	0.046	0.018
		best fused	**−3774.51**	**−3774.51**	**−3774.51**	**−3774.51**	**−3774.51**	**−3774.51**
		$t_{\text{fuse}}(s)$	0.067	0.016	0.017	0.045	0.046	0.018
greedy	−3403.01	*best generated*						
	0.025	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.060	0.005	0.005	0.086	0.087	0.210
		best fused	**−3774.51**	**−3774.51**	**−3774.51**	−3403.01	−3403.01	**−3774.51**
		$t_{\text{fuse}}(s)$	0.163	0.013	0.015	0.086	0.087	0.637

house95 (*energy_house_frame16frame105*), known optimum: -3752.97

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3752.97**	*best generated*						
	0.021	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.070	0.006	0.010	0.039	0.038	0.012
		best fused	**−3752.97**	**−3752.97**	**−3752.97**	**−3752.97**	**−3752.97**	**−3752.97**
		$t_{\text{fuse}}(s)$	0.070	0.006	0.010	0.039	0.038	0.012
dd-ls3	**−3752.97**	*best generated*						
	0.235	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.118	0.059	0.060	0.255	0.255	0.068
		best fused	**−3752.97**	**−3752.97**	**−3752.97**	**−3752.97**	**−3752.97**	**−3752.97**
		$t_{\text{fuse}}(s)$	0.118	0.059	0.060	0.255	0.255	0.068
dd-ls4	**−3752.97**	*best generated*						
	0.136	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.124	0.088	0.088	0.158	0.157	0.090
		best fused	**−3752.97**	**−3752.97**	**−3752.97**	**−3752.97**	**−3752.97**	**−3752.97**
		$t_{\text{fuse}}(s)$	0.124	0.088	0.088	0.158	0.157	0.090
bca-lap	**−3752.97**	*best generated*						
	1.801	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.712	0.659	0.661	1.242	1.239	0.669
		best fused	**−3752.97**	**−3752.97**	**−3752.97**	**−3752.97**	**−3752.97**	**−3752.97**
		$t_{\text{fuse}}(s)$	0.712	0.659	0.661	1.242	1.239	0.669
bca-greedy	**−3752.97**	*best generated*						
	0.398	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.089	0.038	0.038	0.190	0.190	0.223
		best fused	**−3752.97**	**−3752.97**	**−3752.97**	**−3752.97**	**−3752.97**	**−3752.97**
		$t_{\text{fuse}}(s)$	0.089	0.038	0.038	0.190	0.190	0.223
greedy	−3520.13	*best generated*						
	0.041	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.048	0.004	0.004	0.133	0.141	0.336
		best fused	**−3752.97**	**−3752.97**	**−3752.97**	−3520.13	−3520.13	**−3752.97**
		$t_{\text{fuse}}(s)$	0.161	0.014	0.015	0.133	0.141	0.594

house96 (*energy_house_frame17frame102*), known optimum: -3820.84

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3820.84**	*best generated*						
	0.010	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.064	0.008	0.008	0.020	0.019	0.011
		best fused	**−3820.84**	**−3820.84**	**−3820.84**	**−3820.84**	**−3820.84**	**−3820.84**
		$t_{\text{fuse}}(s)$	0.064	0.008	0.008	0.020	0.019	0.011
dd-ls3	**−3820.84**	*best generated*						
	0.028	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.074	0.027	0.027	0.036	0.036	0.028
		best fused	**−3820.84**	**−3820.84**	**−3820.84**	**−3820.84**	**−3820.84**	**−3820.84**
		$t_{\text{fuse}}(s)$	0.074	0.027	0.027	0.036	0.036	0.028
dd-ls4	**−3820.84**	*best generated*						
	0.592	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.242	0.201	0.201	0.620	0.621	0.204
		best fused	**−3820.84**	**−3820.84**	**−3820.84**	**−3820.84**	**−3820.84**	**−3820.84**
		$t_{\text{fuse}}(s)$	0.242	0.201	0.201	0.620	0.621	0.204
bca-lap	**−3820.84**	*best generated*						
	3.796	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.550	0.505	0.506	0.872	0.872	0.513
		best fused	**−3820.84**	**−3820.84**	**−3820.84**	**−3820.84**	**−3820.84**	**−3820.84**
		$t_{\text{fuse}}(s)$	0.550	0.505	0.506	0.872	0.872	0.513
bca-greedy	**−3820.84**	*best generated*						
	0.823	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.091	0.044	0.045	0.121	0.121	0.127
		best fused	**−3820.84**	**−3820.84**	**−3820.84**	**−3820.84**	**−3820.84**	**−3820.84**
		$t_{\text{fuse}}(s)$	0.091	0.044	0.045	0.121	0.121	0.127
greedy	−3576.25	*best generated*						
	0.031	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.072	0.006	0.005	0.107	0.110	0.481
		best fused	**−3820.84**	**−3820.84**	**−3820.84**	−3576.25	−3576.25	**−3820.84**
		$t_{\text{fuse}}(s)$	0.527	0.043	0.010	0.107	0.110	0.564

house97 (*energy_house_frame17frame103*), known optimum: -3799.56

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3799.56**	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.068	0.010	0.012	0.026	0.024	0.015
		best fused	**−3799.56**	**−3799.56**	**−3799.56**	**−3799.56**	**−3799.56**	**−3799.56**
		$t_{\text{fuse}}(s)$	0.068	0.010	0.012	0.026	0.024	0.015
dd-ls3	**−3799.56**	*best generated*						
	0.055	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.119	0.063	0.064	0.064	0.064	0.067
		best fused	**−3799.56**	**−3799.56**	**−3799.56**	**−3799.56**	**−3799.56**	**−3799.56**
		$t_{\text{fuse}}(s)$	0.119	0.063	0.064	0.064	0.064	0.067
dd-ls4	**−3799.56**	*best generated*						
	0.354	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.154	0.119	0.119	0.380	0.380	0.121
		best fused	**−3799.56**	**−3799.56**	**−3799.56**	**−3799.56**	**−3799.56**	**−3799.56**
		$t_{\text{fuse}}(s)$	0.154	0.119	0.119	0.380	0.380	0.121
bca-lap	**−3799.56**	*best generated*						
	7.743	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.075	0.994	0.996	0.995	0.995	1.010
		best fused	**−3799.56**	**−3799.56**	**−3799.56**	**−3799.56**	**−3799.56**	**−3799.56**
		$t_{\text{fuse}}(s)$	1.075	0.994	0.996	0.995	0.995	1.010
bca-greedy	**−3799.56**	*best generated*						
	1.655	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.121	0.013	0.013	0.014	0.013	0.013
		best fused	**−3799.56**	**−3799.56**	**−3799.56**	**−3799.56**	**−3799.56**	**−3799.56**
		$t_{\text{fuse}}(s)$	0.121	0.013	0.013	0.014	0.013	0.013
greedy	−3607.85	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.111	0.013	0.014	0.045	0.047	0.140
		best fused	**−3799.56**	**−3799.56**	**−3799.56**	−3607.85	−3607.85	−3703.04
		$t_{\text{fuse}}(s)$	0.157	0.018	0.020	0.045	0.047	0.177

house98 (*energy_house_frame17frame104*), known optimum: -3774.96

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3774.96**	*best generated*						
	0.016	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.096	0.014	0.016	0.030	0.029	0.020
		best fused	**−3774.96**	**−3774.96**	**−3774.96**	**−3774.96**	**−3774.96**	**−3774.96**
		$t_{\text{fuse}}(s)$	0.096	0.014	0.016	0.030	0.029	0.020
dd-ls3	**−3774.96**	*best generated*						
	0.054	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.070	0.025	0.025	0.063	0.063	0.026
		best fused	**−3774.96**	**−3774.96**	**−3774.96**	**−3774.96**	**−3774.96**	**−3774.96**
		$t_{\text{fuse}}(s)$	0.070	0.025	0.025	0.063	0.063	0.026
dd-ls4	**−3774.96**	*best generated*						
	0.072	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.137	0.089	0.089	0.089	0.089	0.090
		best fused	**−3774.96**	**−3774.96**	**−3774.96**	**−3774.96**	**−3774.96**	**−3774.96**
		$t_{\text{fuse}}(s)$	0.137	0.089	0.089	0.089	0.089	0.090
bca-lap	**−3774.96**	*best generated*						
	2.279	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.418	1.346	1.348	1.348	1.349	1.366
		best fused	**−3774.96**	**−3774.96**	**−3774.96**	**−3774.96**	**−3774.96**	**−3774.96**
		$t_{\text{fuse}}(s)$	1.418	1.346	1.348	1.348	1.349	1.366
bca-greedy	**−3774.96**	*best generated*						
	0.585	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.128	0.058	0.058	0.169	0.169	0.182
		best fused	**−3774.96**	**−3774.96**	**−3774.96**	**−3774.96**	**−3774.96**	**−3774.96**
		$t_{\text{fuse}}(s)$	0.128	0.058	0.058	0.169	0.169	0.182
greedy	**−3774.96**	*best generated*						
	0.024	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.175	0.015	0.017	0.083	0.085	0.598
		best fused	**−3774.96**	**−3774.96**	**−3774.96**	**−3774.96**	**−3774.96**	**−3774.96**
		$t_{\text{fuse}}(s)$	0.175	0.015	0.017	0.083	0.085	0.598

house99 (*energy_house_frame17frame105*), known optimum: -3756.27

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3756.27**	*best generated*						
	0.020	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.086	0.009	0.010	0.038	0.038	0.012
		best fused	**−3756.27**	**−3756.27**	**−3756.27**	**−3756.27**	**−3756.27**	**−3756.27**
		$t_{\text{fuse}}(s)$	0.086	0.009	0.010	0.038	0.038	0.012
dd-ls3	**−3756.27**	*best generated*						
	0.091	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.097	0.039	0.039	0.102	0.103	0.042
		best fused	**−3756.27**	**−3756.27**	**−3756.27**	**−3756.27**	**−3756.27**	**−3756.27**
		$t_{\text{fuse}}(s)$	0.097	0.039	0.039	0.102	0.103	0.042
dd-ls4	**−3756.27**	*best generated*						
	0.103	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.159	0.123	0.124	0.124	0.124	0.126
		best fused	**−3756.27**	**−3756.27**	**−3756.27**	**−3756.27**	**−3756.27**	**−3756.27**
		$t_{\text{fuse}}(s)$	0.159	0.123	0.124	0.124	0.124	0.126
bca-lap	**−3756.27**	*best generated*						
	7.026	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.726	0.671	0.673	1.148	1.148	0.681
		best fused	**−3756.27**	**−3756.27**	**−3756.27**	**−3756.27**	**−3756.27**	**−3756.27**
		$t_{\text{fuse}}(s)$	0.726	0.671	0.673	1.148	1.148	0.681
bca-greedy	**−3756.27**	*best generated*						
	1.554	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.094	0.028	0.029	0.081	0.081	0.102
		best fused	**−3756.27**	**−3756.27**	**−3756.27**	**−3756.27**	**−3756.27**	**−3756.27**
		$t_{\text{fuse}}(s)$	0.094	0.028	0.029	0.081	0.081	0.102
greedy	−3471.18	*best generated*						
	0.025	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.052	0.004	0.004	0.086	0.088	0.095
		best fused	**−3756.27**	**−3756.27**	**−3756.27**	−3471.18	−3471.18	**−3756.27**
		$t_{\text{fuse}}(s)$	0.398	0.032	0.036	0.086	0.088	0.527

house100 (*energy_house_frame18frame103*), known optimum: -3821.69

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3821.69**	*best generated*						
	0.025	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.123	0.021	0.023	0.044	0.044	0.024
		best fused	**−3821.69**	**−3821.69**	**−3821.69**	**−3821.69**	**−3821.69**	**−3821.69**
		$t_{\text{fuse}}(s)$	0.123	0.021	0.023	0.044	0.044	0.024
dd-ls3	**−3821.69**	*best generated*						
	0.091	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.105	0.042	0.042	0.103	0.103	0.069
		best fused	**−3821.69**	**−3821.69**	**−3821.69**	**−3821.69**	**−3821.69**	**−3821.69**
		$t_{\text{fuse}}(s)$	0.105	0.042	0.042	0.103	0.103	0.069
dd-ls4	**−3821.69**	*best generated*						
	0.415	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.198	0.156	0.156	0.441	0.442	0.158
		best fused	**−3821.69**	**−3821.69**	**−3821.69**	**−3821.69**	**−3821.69**	**−3821.69**
		$t_{\text{fuse}}(s)$	0.198	0.156	0.156	0.441	0.442	0.158
bca-lap	**−3821.69**	*best generated*						
	3.789	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.646	0.594	0.598	0.596	0.596	0.604
		best fused	**−3821.69**	**−3821.69**	**−3821.69**	**−3821.69**	**−3821.69**	**−3821.69**
		$t_{\text{fuse}}(s)$	0.646	0.594	0.598	0.596	0.596	0.604
bca-greedy	**−3821.69**	*best generated*						
	0.844	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.136	0.041	0.042	0.043	0.042	0.055
		best fused	**−3821.69**	**−3821.69**	**−3821.69**	**−3821.69**	**−3821.69**	**−3821.69**
		$t_{\text{fuse}}(s)$	0.136	0.041	0.042	0.043	0.042	0.055
greedy	−3548.58	*best generated*						
	0.041	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.112	0.009	0.010	0.140	0.146	0.390
		best fused	**−3821.69**	**−3821.69**	**−3821.69**	−3548.58	−3548.58	−3723.81
		$t_{\text{fuse}}(s)$	0.354	0.032	0.035	0.140	0.146	0.429

house101 (*energy_house_frame18frame104*), known optimum: -3794.07

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3794.07**	*best generated*						
	0.026	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.135	0.025	0.029	0.046	0.046	0.031
		best fused	**−3794.07**	**−3794.07**	**−3794.07**	**−3794.07**	**−3794.07**	**−3794.07**
		$t_{\text{fuse}}(s)$	0.135	0.025	0.029	0.046	0.046	0.031
dd-ls3	**−3794.07**	*best generated*						
	0.089	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.081	0.035	0.035	0.100	0.100	0.036
		best fused	**−3794.07**	**−3794.07**	**−3794.07**	**−3794.07**	**−3794.07**	**−3794.07**
		$t_{\text{fuse}}(s)$	0.081	0.035	0.035	0.100	0.100	0.036
dd-ls4	**−3794.07**	*best generated*						
	0.550	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.232	0.185	0.186	0.576	0.576	0.188
		best fused	**−3794.07**	**−3794.07**	**−3794.07**	**−3794.07**	**−3794.07**	**−3794.07**
		$t_{\text{fuse}}(s)$	0.232	0.185	0.186	0.576	0.576	0.188
bca-lap	**−3794.07**	*best generated*						
	7.433	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.483	0.432	0.434	0.574	0.573	0.439
		best fused	**−3794.07**	**−3794.07**	**−3794.07**	**−3794.07**	**−3794.07**	**−3794.07**
		$t_{\text{fuse}}(s)$	0.483	0.432	0.434	0.574	0.573	0.439
bca-greedy	**−3794.07**	*best generated*						
	1.658	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.105	0.049	0.049	0.049	0.049	0.052
		best fused	**−3794.07**	**−3794.07**	**−3794.07**	**−3794.07**	**−3794.07**	**−3794.07**
		$t_{\text{fuse}}(s)$	0.105	0.049	0.049	0.049	0.049	0.052
greedy	−3584.02	*best generated*						
	0.048	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.119	0.009	0.010	0.157	0.158	0.330
		best fused	**−3794.07**	**−3794.07**	**−3794.07**	−3584.02	−3584.02	−3703.17
		$t_{\text{fuse}}(s)$	0.433	0.036	0.040	0.157	0.158	0.417

house102 (*energy_house_frame18frame105*), known optimum: -3777.39

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3777.39**	*best generated*						
	0.025	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.115	0.015	0.016	0.045	0.045	0.021
		best fused	**−3777.39**	**−3777.39**	**−3777.39**	**−3777.39**	**−3777.39**	**−3777.39**
		$t_{\text{fuse}}(s)$	0.115	0.015	0.016	0.045	0.045	0.021
dd-ls3	**−3777.39**	*best generated*						
	0.076	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.153	0.087	0.087	0.087	0.087	0.091
		best fused	**−3777.39**	**−3777.39**	**−3777.39**	**−3777.39**	**−3777.39**	**−3777.39**
		$t_{\text{fuse}}(s)$	0.153	0.087	0.087	0.087	0.087	0.091
dd-ls4	**−3777.39**	*best generated*						
	0.205	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.273	0.229	0.230	0.230	0.229	0.232
		best fused	**−3777.39**	**−3777.39**	**−3777.39**	**−3777.39**	**−3777.39**	**−3777.39**
		$t_{\text{fuse}}(s)$	0.273	0.229	0.230	0.230	0.229	0.232
bca-lap	**−3777.39**	*best generated*						
	4.700	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.616	0.568	0.569	0.774	0.774	0.577
		best fused	**−3777.39**	**−3777.39**	**−3777.39**	**−3777.39**	**−3777.39**	**−3777.39**
		$t_{\text{fuse}}(s)$	0.616	0.568	0.569	0.774	0.774	0.577
bca-greedy	**−3777.39**	*best generated*						
	1.029	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.072	0.028	0.028	0.145	0.145	0.161
		best fused	**−3777.39**	**−3777.39**	**−3777.39**	**−3777.39**	**−3777.39**	**−3777.39**
		$t_{\text{fuse}}(s)$	0.072	0.028	0.028	0.145	0.145	0.161
greedy	−3407.38	*best generated*						
	0.052	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.059	0.007	0.008	0.171	0.181	0.049
		best fused	**−3777.39**	**−3777.39**	**−3777.39**	−3407.38	−3407.38	−3695.71
		$t_{\text{fuse}}(s)$	0.281	0.025	0.027	0.171	0.181	0.226

house103 (*energy_house_frame19frame104*), known optimum: -3799.19

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3799.19**	*best generated*						
	0.017	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.075	0.011	0.012	0.032	0.032	0.015
		best fused	**−3799.19**	**−3799.19**	**−3799.19**	**−3799.19**	**−3799.19**	**−3799.19**
		$t_{\text{fuse}}(s)$	0.075	0.011	0.012	0.032	0.032	0.015
dd-ls3	**−3799.19**	*best generated*						
	0.155	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.475	0.030	0.030	0.170	0.170	0.031
		best fused	**−3799.19**	**−3799.19**	**−3799.19**	**−3799.19**	**−3799.19**	**−3799.19**
		$t_{\text{fuse}}(s)$	0.475	0.030	0.030	0.170	0.170	0.031
dd-ls4	**−3799.19**	*best generated*						
	0.303	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.110	0.076	0.076	0.326	0.326	0.077
		best fused	**−3799.19**	**−3799.19**	**−3799.19**	**−3799.19**	**−3799.19**	**−3799.19**
		$t_{\text{fuse}}(s)$	0.110	0.076	0.076	0.326	0.326	0.077
bca-lap	**−3799.19**	*best generated*						
	1.027	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.119	1.058	1.061	1.062	1.061	1.076
		best fused	**−3799.19**	**−3799.19**	**−3799.19**	**−3799.19**	**−3799.19**	**−3799.19**
		$t_{\text{fuse}}(s)$	1.119	1.058	1.061	1.062	1.061	1.076
bca-greedy	**−3799.19**	*best generated*						
	0.021	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.068	0.027	0.028	0.028	0.028	0.029
		best fused	**−3799.19**	**−3799.19**	**−3799.19**	**−3799.19**	**−3799.19**	**−3799.19**
		$t_{\text{fuse}}(s)$	0.068	0.027	0.028	0.028	0.028	0.029
greedy	−3472.29	*best generated*						
	0.032	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.130	0.011	0.012	0.109	0.114	0.100
		best fused	**−3799.19**	**−3799.19**	**−3799.19**	−3472.29	−3472.29	**−3799.19**
		$t_{\text{fuse}}(s)$	0.161	0.013	0.015	0.109	0.114	0.565

house104 (*energy_house_frame19frame105*), known optimum: -3767.45

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3767.45**	*best generated*						
	0.006	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.094	0.008	0.013	0.013	0.012	0.016
		best fused	**−3767.45**	**−3767.45**	**−3767.45**	**−3767.45**	**−3767.45**	**−3767.45**
		$t_{\text{fuse}}(s)$	0.094	0.008	0.013	0.013	0.012	0.016
dd-ls3	**−3767.45**	*best generated*						
	0.148	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.334	0.088	0.088	0.161	0.162	0.092
		best fused	**−3767.45**	**−3767.45**	**−3767.45**	**−3767.45**	**−3767.45**	**−3767.45**
		$t_{\text{fuse}}(s)$	0.334	0.088	0.088	0.161	0.162	0.092
dd-ls4	**−3767.45**	*best generated*						
	0.623	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.204	0.165	0.165	0.654	0.654	0.167
		best fused	**−3767.45**	**−3767.45**	**−3767.45**	**−3767.45**	**−3767.45**	**−3767.45**
		$t_{\text{fuse}}(s)$	0.204	0.165	0.165	0.654	0.654	0.167
bca-lap	**−3767.45**	*best generated*						
	6.398	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.127	1.068	1.071	1.070	1.070	1.085
		best fused	**−3767.45**	**−3767.45**	**−3767.45**	**−3767.45**	**−3767.45**	**−3767.45**
		$t_{\text{fuse}}(s)$	1.127	1.068	1.071	1.070	1.070	1.085
bca-greedy	**−3767.45**	*best generated*						
	1.354	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.067	0.028	0.028	0.183	0.183	0.194
		best fused	**−3767.45**	**−3767.45**	**−3767.45**	**−3767.45**	**−3767.45**	**−3767.45**
		$t_{\text{fuse}}(s)$	0.067	0.028	0.028	0.183	0.183	0.194
greedy	−3599.34	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.130	0.009	0.010	0.042	0.047	0.449
		best fused	**−3767.45**	**−3767.45**	**−3767.45**	−3599.34	−3599.34	**−3767.45**
		$t_{\text{fuse}}(s)$	0.561	0.045	0.051	0.042	0.047	0.627

house105 (*energy_house_frame20frame105*), known optimum: -3772.12

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−3772.12**	*best generated*						
	0.011	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.096	0.008	0.009	0.022	0.021	0.022
		best fused	**−3772.12**	**−3772.12**	**−3772.12**	**−3772.12**	**−3772.12**	**−3772.12**
		$t_{\text{fuse}}(s)$	0.096	0.008	0.009	0.022	0.021	0.022
dd-ls3	**−3772.12**	*best generated*						
	0.027	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.257	0.035	0.034	0.034	0.034	0.036
		best fused	**−3772.12**	**−3772.12**	**−3772.12**	**−3772.12**	**−3772.12**	**−3772.12**
		$t_{\text{fuse}}(s)$	0.257	0.035	0.034	0.034	0.034	0.036
dd-ls4	**−3772.12**	*best generated*						
	0.193	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.181	0.141	0.141	0.216	0.216	0.143
		best fused	**−3772.12**	**−3772.12**	**−3772.12**	**−3772.12**	**−3772.12**	**−3772.12**
		$t_{\text{fuse}}(s)$	0.181	0.141	0.141	0.216	0.216	0.143
bca-lap	**−3772.12**	*best generated*						
	6.432	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.443	0.401	0.403	0.402	0.402	0.408
		best fused	**−3772.12**	**−3772.12**	**−3772.12**	**−3772.12**	**−3772.12**	**−3772.12**
		$t_{\text{fuse}}(s)$	0.443	0.401	0.403	0.402	0.402	0.408
bca-greedy	**−3772.12**	*best generated*						
	1.386	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.072	0.029	0.029	0.093	0.093	0.111
		best fused	**−3772.12**	**−3772.12**	**−3772.12**	**−3772.12**	**−3772.12**	**−3772.12**
		$t_{\text{fuse}}(s)$	0.072	0.029	0.029	0.093	0.093	0.111
greedy	−3556.59	*best generated*						
	0.010	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.065	0.005	0.005	0.035	0.037	0.157
		best fused	**−3772.12**	**−3772.12**	**−3772.12**	−3556.59	−3556.59	**−3772.12**
		$t_{\text{fuse}}(s)$	0.079	0.006	0.007	0.035	0.037	0.435

A6.3. car

number of instances: 30

maximum number of iterations during generation: 2500

car1, known optimum: -34.88

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−34.88**	*best generated*						
	0.011	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.169	0.007	0.007	0.028	0.027	0.034
		best fused	**−34.88**	**−34.88**	**−34.88**	**−34.88**	**−34.88**	**−34.88**
		$t_{\text{fuse}}(s)$	0.169	0.007	0.007	0.028	0.027	0.034
dd-ls3	**−34.88**	*best generated*						
	0.081	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.251	0.049	0.050	0.106	0.104	0.052
		best fused	**−34.88**	**−34.88**	**−34.88**	**−34.88**	**−34.88**	**−34.88**
		$t_{\text{fuse}}(s)$	0.251	0.049	0.050	0.106	0.104	0.052
dd-ls4	**−34.88**	*best generated*						
	1.012	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.276	0.145	0.146	1.043	1.044	0.147
		best fused	**−34.88**	**−34.88**	**−34.88**	**−34.88**	**−34.88**	**−34.88**
		$t_{\text{fuse}}(s)$	0.276	0.145	0.146	1.043	1.044	0.147
bca-lap	**−34.88**	*best generated*						
	4.010	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.595	0.519	0.519	0.518	0.518	0.524
		best fused	**−34.88**	**−34.88**	**−34.88**	**−34.88**	**−34.88**	**−34.88**
		$t_{\text{fuse}}(s)$	0.595	0.519	0.519	0.518	0.518	0.524
bca-greedy	**−34.88**	*best generated*						
	0.525	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.069	0.012	0.013	0.014	0.013	0.012
		best fused	**−34.88**	**−34.88**	**−34.88**	**−34.88**	**−34.88**	**−34.88**
		$t_{\text{fuse}}(s)$	0.069	0.012	0.013	0.014	0.013	0.012
greedy	**−34.88**	*best generated*						
	0.030	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.143	0.090	0.098	0.098	0.093	0.117
		best fused	**−34.88**	**−34.88**	**−34.88**	**−34.88**	**−34.88**	**−34.88**
		$t_{\text{fuse}}(s)$	1.143	0.090	0.098	0.098	0.093	0.117

car2, known optimum: -48.85

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−48.85**	*best generated*						
	0.038	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.116	0.018	0.019	0.070	0.070	0.021
		best fused	**−48.85**	**−48.85**	**−48.85**	**−48.85**	**−48.85**	**−48.85**
		$t_{\text{fuse}}(s)$	0.116	0.018	0.019	0.070	0.070	0.021
dd-ls3	**−48.85**	*best generated*						
	0.571	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.727	0.049	0.246	0.626	0.630	0.113
		best fused	**−48.85**	**−48.85**	**−48.85**	**−48.85**	**−48.85**	**−48.85**
		$t_{\text{fuse}}(s)$	0.727	0.049	0.246	0.626	0.630	0.113
dd-ls4	**−48.85**	*best generated*						
	2.925	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.922	2.564	2.566	2.978	2.978	2.582
		best fused	**−48.85**	**−48.85**	**−48.85**	**−48.85**	**−48.85**	**−48.85**
		$t_{\text{fuse}}(s)$	2.922	2.564	2.566	2.978	2.978	2.582
bca-lap	**−48.85**	*best generated*						
	1.987	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.133	0.084	0.083	0.083	0.083	0.084
		best fused	**−48.85**	**−48.85**	**−48.85**	**−48.85**	**−48.85**	**−48.85**
		$t_{\text{fuse}}(s)$	0.133	0.084	0.083	0.083	0.083	0.084
bca-greedy	**−48.85**	*best generated*						
	0.100	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.163	0.045	0.046	0.046	0.047	0.050
		best fused	**−48.85**	**−48.85**	**−48.85**	**−48.85**	**−48.85**	**−48.85**
		$t_{\text{fuse}}(s)$	0.163	0.045	0.046	0.046	0.047	0.050
greedy	−46.57	*best generated*						
	0.086	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.683	0.032	0.033	0.272	0.280	0.290
		best fused	**−48.85**	**−48.85**	**−48.85**	−46.57	−46.57	**−48.85**
		$t_{\text{fuse}}(s)$	2.710	0.144	0.149	0.272	0.280	0.294

car3, known optimum: -86.55

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−86.55**	*best generated*						
	0.373	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.339	0.286	0.293	0.519	0.515	0.438
		best fused	**−86.55**	**−86.55**	**−86.55**	**−86.55**	**−86.55**	**−86.55**
		$t_{\text{fuse}}(s)$	1.339	0.286	0.293	0.519	0.515	0.438
dd-ls3	**−86.55**	*best generated*						
	7.842	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	6.645	5.102	5.109	8.025	8.027	5.175
		best fused	**−86.55**	**−86.55**	**−86.55**	**−86.55**	**−86.55**	**−86.55**
		$t_{\text{fuse}}(s)$	6.645	5.102	5.109	8.025	8.027	5.175
dd-ls4	**−86.55**	*best generated*						
	64.664	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	20.677	22.817	42.422	64.995	64.991	42.504
		best fused	**−86.55**	**−86.55**	**−86.55**	**−86.55**	**−86.55**	**−86.55**
		$t_{\text{fuse}}(s)$	20.677	22.817	42.422	64.995	64.991	42.504
bca-lap	**−86.55**	*best generated*						
	34.533	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.731	0.670	0.671	0.670	0.671	0.673
		best fused	**−86.55**	**−86.55**	**−86.55**	**−86.55**	**−86.55**	**−86.55**
		$t_{\text{fuse}}(s)$	0.731	0.670	0.671	0.670	0.671	0.673
bca-greedy	**−86.55**	*best generated*						
	4.479	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.137	0.089	0.092	0.117	0.117	0.090
		best fused	**−86.55**	**−86.55**	**−86.55**	**−86.55**	**−86.55**	**−86.55**
		$t_{\text{fuse}}(s)$	0.137	0.089	0.092	0.117	0.117	0.090
greedy	−76.58	*best generated*						
	0.194	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.958	0.170	0.181	0.630	0.615	0.137
		best fused	−86.34	−86.34	−86.34	−76.58	−76.58	−86.34
		$t_{\text{fuse}}(s)$	14.873	0.332	0.354	0.630	0.615	1.009

car4

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−51.25	*best generated*						
	0.575	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.813	0.438	0.750	0.903	0.904	0.369
		best fused	−51.76	−51.43	−52.20	−51.25	−51.25	−52.34
		$t_{\text{fuse}}(s)$	3.374	0.438	0.821	0.903	0.904	0.412
dd-ls3	−52.09	*best generated*						
	15.093	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	18.353	15.497	15.529	15.554	15.613	8.613
		best fused	−52.23	−52.23	−52.23	−52.09	−52.09	−52.23
		$t_{\text{fuse}}(s)$	19.097	15.768	15.801	15.554	15.613	8.613
dd-ls4	−52.33	*best generated*						
	180.823	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	185.827	181.274	181.317	181.308	181.309	181.605
		best fused	−52.34	−52.34	−52.34	−52.33	−52.33	−52.34
		$t_{\text{fuse}}(s)$	198.557	193.873	193.918	181.308	181.309	194.222
bca-lap	−48.81	*best generated*						
	0.905	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.797	0.719	0.720	0.866	0.866	0.722
		best fused	−49.11	−49.11	−49.11	−48.81	−48.81	−49.11
		$t_{\text{fuse}}(s)$	0.950	0.866	0.867	0.866	0.866	0.869
bca-greedy	−51.49	*best generated*						
	0.484	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.311	0.057	0.059	0.591	0.592	0.151
		best fused	−52.34	−52.34	−52.34	−51.49	−51.49	−52.27
		$t_{\text{fuse}}(s)$	2.016	0.462	0.482	0.591	0.592	0.151
greedy	−48.39	*best generated*						
	0.177	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.609	0.054	0.056	0.589	0.592	0.147
		best fused	−52.27	−50.92	−50.92	−48.39	−48.39	−50.97
		$t_{\text{fuse}}(s)$	5.110	0.144	0.152	0.589	0.592	0.871

car5, known optimum: -66.25

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−66.25**	*best generated*						
	0.740	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.488	0.757	1.056	1.085	1.093	0.927
		best fused	**−66.25**	**−66.25**	**−66.25**	**−66.25**	**−66.25**	**−66.25**
		$t_{\text{fuse}}(s)$	4.488	0.757	1.056	1.085	1.093	0.927
dd-ls3	**−66.25**	*best generated*						
	17.706	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	21.695	16.933	13.695	18.118	18.139	16.181
		best fused	**−66.25**	**−66.25**	**−66.25**	**−66.25**	**−66.25**	**−66.25**
		$t_{\text{fuse}}(s)$	21.695	16.933	13.695	18.118	18.139	16.181
dd-ls4	**−66.25**	*best generated*						
	216.790	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	187.113	217.343	165.012	217.414	217.412	200.825
		best fused	**−66.25**	**−66.25**	**−66.25**	**−66.25**	**−66.25**	**−66.25**
		$t_{\text{fuse}}(s)$	187.113	217.343	165.012	217.414	217.412	200.825
bca-lap	**−66.25**	*best generated*						
	0.953	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.803	0.735	0.736	0.736	0.736	0.738
		best fused	**−66.25**	**−66.25**	**−66.25**	**−66.25**	**−66.25**	**−66.25**
		$t_{\text{fuse}}(s)$	0.803	0.735	0.736	0.736	0.736	0.738
bca-greedy	**−66.25**	*best generated*						
	2.549	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.715	0.651	0.658	1.385	1.396	0.318
		best fused	**−66.25**	**−66.25**	**−66.25**	**−66.25**	**−66.25**	**−66.25**
		$t_{\text{fuse}}(s)$	2.715	0.651	0.658	1.385	1.396	0.318
greedy	−55.23	*best generated*						
	0.197	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.628	0.284	0.315	0.641	0.637	0.395
		best fused	−62.81	−62.27	−62.27	−55.23	−55.23	−62.44
		$t_{\text{fuse}}(s)$	15.642	0.555	0.613	0.641	0.637	0.749

car6, known optimum: -83.78

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−83.78**	*best generated*						
	0.305	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.159	0.111	0.145	0.423	0.433	0.242
		best fused	**−83.78**	**−83.78**	**−83.78**	**−83.78**	**−83.78**	**−83.78**
		$t_{\text{fuse}}(s)$	1.159	0.111	0.145	0.423	0.433	0.242
dd-ls3	**−83.78**	*best generated*						
	10.159	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.531	8.455	8.464	10.327	10.331	4.405
		best fused	**−83.78**	**−83.78**	**−83.78**	**−83.78**	**−83.78**	**−83.78**
		$t_{\text{fuse}}(s)$	3.531	8.455	8.464	10.327	10.331	4.405
dd-ls4	**−83.78**	*best generated*						
	97.725	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	56.181	54.707	54.711	98.152	98.148	54.786
		best fused	**−83.78**	**−83.78**	**−83.78**	**−83.78**	**−83.78**	**−83.78**
		$t_{\text{fuse}}(s)$	56.181	54.707	54.711	98.152	98.148	54.786
bca-lap	−83.10	*best generated*						
	0.370	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.242	0.202	0.201	0.202	0.201	0.202
		best fused	−83.10	−83.10	−83.10	−83.10	−83.10	−83.10
		$t_{\text{fuse}}(s)$	0.242	0.202	0.201	0.202	0.201	0.202
bca-greedy	**−83.78**	*best generated*						
	1.192	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.308	0.113	0.114	0.502	0.504	0.118
		best fused	**−83.78**	**−83.78**	**−83.78**	**−83.78**	**−83.78**	**−83.78**
		$t_{\text{fuse}}(s)$	0.308	0.113	0.114	0.502	0.504	0.118
greedy	−70.39	*best generated*						
	0.132	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.624	0.083	0.091	0.432	0.417	0.369
		best fused	−83.02	−83.02	−83.02	−70.39	−70.39	−80.55
		$t_{\text{fuse}}(s)$	12.093	0.691	0.744	0.432	0.417	0.944

car7, known optimum: -81.95

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−81.95**	*best generated*						
	0.032	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.199	0.036	0.038	0.050	0.050	0.042
		best fused	**−81.95**	**−81.95**	**−81.95**	**−81.95**	**−81.95**	**−81.95**
		$t_{\text{fuse}}(s)$	0.199	0.036	0.038	0.050	0.050	0.042
dd-ls3	**−81.95**	*best generated*						
	0.703	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.189	0.191	0.086	0.743	0.742	0.085
		best fused	**−81.95**	**−81.95**	**−81.95**	**−81.95**	**−81.95**	**−81.95**
		$t_{\text{fuse}}(s)$	0.189	0.191	0.086	0.743	0.742	0.085
dd-ls4	**−81.95**	*best generated*						
	3.896	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.472	0.339	0.340	3.961	3.961	0.342
		best fused	**−81.95**	**−81.95**	**−81.95**	**−81.95**	**−81.95**	**−81.95**
		$t_{\text{fuse}}(s)$	0.472	0.339	0.340	3.961	3.961	0.342
bca-lap	**−81.95**	*best generated*						
	13.281	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.278	0.231	0.231	0.231	0.231	0.233
		best fused	**−81.95**	**−81.95**	**−81.95**	**−81.95**	**−81.95**	**−81.95**
		$t_{\text{fuse}}(s)$	0.278	0.231	0.231	0.231	0.231	0.233
bca-greedy	**−81.95**	*best generated*						
	0.944	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.088	0.031	0.031	0.030	0.031	0.032
		best fused	**−81.95**	**−81.95**	**−81.95**	**−81.95**	**−81.95**	**−81.95**
		$t_{\text{fuse}}(s)$	0.088	0.031	0.031	0.030	0.031	0.032
greedy	**−81.95**	*best generated*						
	0.109	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.382	0.125	0.117	0.354	0.358	0.163
		best fused	**−81.95**	**−81.95**	**−81.95**	**−81.95**	**−81.95**	**−81.95**
		$t_{\text{fuse}}(s)$	2.382	0.125	0.117	0.354	0.358	0.163

car8, known optimum: -44.00

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−44.00**	*best generated*						
	0.156	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.245	0.154	0.162	0.282	0.278	0.280
		best fused	**−44.00**	**−44.00**	**−44.00**	**−44.00**	**−44.00**	**−44.00**
		$t_{\text{fuse}}(s)$	1.245	0.154	0.162	0.282	0.278	0.280
dd-ls3	**−44.00**	*best generated*						
	2.136	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.230	2.023	0.926	2.284	2.288	2.122
		best fused	**−44.00**	**−44.00**	**−44.00**	**−44.00**	**−44.00**	**−44.00**
		$t_{\text{fuse}}(s)$	1.230	2.023	0.926	2.284	2.288	2.122
dd-ls4	**−44.00**	*best generated*						
	28.144	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	9.161	20.333	20.339	28.338	28.337	23.300
		best fused	**−44.00**	**−44.00**	**−44.00**	**−44.00**	**−44.00**	**−44.00**
		$t_{\text{fuse}}(s)$	9.161	20.333	20.339	28.338	28.337	23.300
bca-lap	−43.33	*best generated*						
	0.328	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.381	0.333	0.333	0.334	0.333	0.335
		best fused	−43.56	−43.56	−43.56	−43.33	−43.33	−43.56
		$t_{\text{fuse}}(s)$	0.451	0.397	0.398	0.334	0.333	0.400
bca-greedy	−43.53	*best generated*						
	1.039	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	7.162	1.460	1.466	1.329	1.333	1.649
		best fused	**−44.00**	**−44.00**	**−44.00**	−43.53	−43.53	**−44.00**
		$t_{\text{fuse}}(s)$	7.223	1.474	1.481	1.329	1.333	1.670
greedy	−40.33	*best generated*						
	0.009	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.002	0.015	0.016	0.032	0.031	0.019
		best fused	**−44.00**	**−44.00**	**−44.00**	−40.33	−40.33	**−44.00**
		$t_{\text{fuse}}(s)$	6.886	0.456	0.484	0.032	0.031	0.587

car9, known optimum: -62.40

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−62.40**	*best generated*						
	0.004	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.146	0.006	0.006	0.008	0.008	0.007
		best fused	**−62.40**	**−62.40**	**−62.40**	**−62.40**	**−62.40**	**−62.40**
		$t_{\text{fuse}}(s)$	0.146	0.006	0.006	0.008	0.008	0.007
dd-ls3	**−62.40**	*best generated*						
	0.060	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.092	0.022	0.018	0.071	0.072	0.026
		best fused	**−62.40**	**−62.40**	**−62.40**	**−62.40**	**−62.40**	**−62.40**
		$t_{\text{fuse}}(s)$	0.092	0.022	0.018	0.071	0.072	0.026
dd-ls4	**−62.40**	*best generated*						
	0.323	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.100	0.047	0.047	0.340	0.340	0.068
		best fused	**−62.40**	**−62.40**	**−62.40**	**−62.40**	**−62.40**	**−62.40**
		$t_{\text{fuse}}(s)$	0.100	0.047	0.047	0.340	0.340	0.068
bca-lap	**−62.40**	*best generated*						
	5.510	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.126	0.094	0.094	0.094	0.094	0.094
		best fused	**−62.40**	**−62.40**	**−62.40**	**−62.40**	**−62.40**	**−62.40**
		$t_{\text{fuse}}(s)$	0.126	0.094	0.094	0.094	0.094	0.094
bca-greedy	**−62.40**	*best generated*						
	0.362	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.041	0.006	0.006	0.007	0.007	0.006
		best fused	**−62.40**	**−62.40**	**−62.40**	**−62.40**	**−62.40**	**−62.40**
		$t_{\text{fuse}}(s)$	0.041	0.006	0.006	0.007	0.007	0.006
greedy	**−62.40**	*best generated*						
	0.020	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.082	0.005	0.005	0.067	0.065	0.007
		best fused	**−62.40**	**−62.40**	**−62.40**	**−62.40**	**−62.40**	**−62.40**
		$t_{\text{fuse}}(s)$	0.082	0.005	0.005	0.067	0.065	0.007

car10, known optimum: -57.62

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−57.62**	*best generated*						
	0.063	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.124	0.026	0.026	0.110	0.112	0.032
		best fused	**−57.62**	**−57.62**	**−57.62**	**−57.62**	**−57.62**	**−57.62**
		$t_{\text{fuse}}(s)$	0.124	0.026	0.026	0.110	0.112	0.032
dd-ls3	**−57.62**	*best generated*						
	0.802	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.448	0.192	0.094	0.859	0.861	0.335
		best fused	**−57.62**	**−57.62**	**−57.62**	**−57.62**	**−57.62**	**−57.62**
		$t_{\text{fuse}}(s)$	0.448	0.192	0.094	0.859	0.861	0.335
dd-ls4	**−57.62**	*best generated*						
	8.442	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.559	0.408	0.409	8.544	8.545	0.683
		best fused	**−57.62**	**−57.62**	**−57.62**	**−57.62**	**−57.62**	**−57.62**
		$t_{\text{fuse}}(s)$	0.559	0.408	0.409	8.544	8.545	0.683
bca-lap	**−57.62**	*best generated*						
	15.613	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.179	0.143	0.143	0.143	0.142	0.143
		best fused	**−57.62**	**−57.62**	**−57.62**	**−57.62**	**−57.62**	**−57.62**
		$t_{\text{fuse}}(s)$	0.179	0.143	0.143	0.143	0.142	0.143
bca-greedy	**−57.62**	*best generated*						
	0.974	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.165	0.012	0.013	0.029	0.030	0.018
		best fused	**−57.62**	**−57.62**	**−57.62**	**−57.62**	**−57.62**	**−57.62**
		$t_{\text{fuse}}(s)$	0.165	0.012	0.013	0.029	0.030	0.018
greedy	−51.98	*best generated*						
	0.102	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.744	0.101	0.106	0.327	0.339	0.260
		best fused	**−57.62**	**−57.62**	**−57.62**	−51.98	−51.98	**−57.62**
		$t_{\text{fuse}}(s)$	7.689	0.303	0.319	0.327	0.339	0.631

car11, known optimum: -63.06

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−63.06**	*best generated*						
	0.015	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.156	0.009	0.015	0.026	0.025	0.011
		best fused	**−63.06**	**−63.06**	**−63.06**	**−63.06**	**−63.06**	**−63.06**
		$t_{\text{fuse}}(s)$	0.156	0.009	0.015	0.026	0.025	0.011
dd-ls3	**−63.06**	*best generated*						
	0.273	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.236	0.103	0.106	0.299	0.299	0.088
		best fused	**−63.06**	**−63.06**	**−63.06**	**−63.06**	**−63.06**	**−63.06**
		$t_{\text{fuse}}(s)$	0.236	0.103	0.106	0.299	0.299	0.088
dd-ls4	**−63.06**	*best generated*						
	1.774	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.348	0.165	0.148	1.818	1.818	0.167
		best fused	**−63.06**	**−63.06**	**−63.06**	**−63.06**	**−63.06**	**−63.06**
		$t_{\text{fuse}}(s)$	0.348	0.165	0.148	1.818	1.818	0.167
bca-lap	**−63.06**	*best generated*						
	20.064	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.092	0.060	0.060	0.060	0.060	0.060
		best fused	**−63.06**	**−63.06**	**−63.06**	**−63.06**	**−63.06**	**−63.06**
		$t_{\text{fuse}}(s)$	0.092	0.060	0.060	0.060	0.060	0.060
bca-greedy	**−63.06**	*best generated*						
	1.143	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.039	0.006	0.006	0.006	0.006	0.007
		best fused	**−63.06**	**−63.06**	**−63.06**	**−63.06**	**−63.06**	**−63.06**
		$t_{\text{fuse}}(s)$	0.039	0.006	0.006	0.006	0.006	0.007
greedy	−61.90	*best generated*						
	0.078	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.412	0.113	0.130	0.254	0.242	0.150
		best fused	**−63.06**	**−63.06**	**−63.06**	−61.90	−61.90	**−63.06**
		$t_{\text{fuse}}(s)$	2.744	0.129	0.148	0.254	0.242	0.170

car12, known optimum: -57.36

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−57.36**	*best generated*						
	0.062	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.310	0.033	0.058	0.107	0.107	0.120
		best fused	**−57.36**	**−57.36**	**−57.36**	**−57.36**	**−57.36**	**−57.36**
		$t_{\text{fuse}}(s)$	0.310	0.033	0.058	0.107	0.107	0.120
dd-ls3	**−57.36**	*best generated*						
	0.710	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.743	0.612	0.378	0.759	0.764	0.433
		best fused	**−57.36**	**−57.36**	**−57.36**	**−57.36**	**−57.36**	**−57.36**
		$t_{\text{fuse}}(s)$	0.743	0.612	0.378	0.759	0.764	0.433
dd-ls4	**−57.36**	*best generated*						
	7.125	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.839	2.056	0.668	7.214	7.215	0.671
		best fused	**−57.36**	**−57.36**	**−57.36**	**−57.36**	**−57.36**	**−57.36**
		$t_{\text{fuse}}(s)$	0.839	2.056	0.668	7.214	7.215	0.671
bca-lap	**−57.36**	*best generated*						
	11.461	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.821	0.751	0.751	0.751	0.752	0.754
		best fused	**−57.36**	**−57.36**	**−57.36**	**−57.36**	**−57.36**	**−57.36**
		$t_{\text{fuse}}(s)$	0.821	0.751	0.751	0.751	0.752	0.754
bca-greedy	**−57.36**	*best generated*						
	0.651	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.068	0.008	0.008	0.019	0.019	0.009
		best fused	**−57.36**	**−57.36**	**−57.36**	**−57.36**	**−57.36**	**−57.36**
		$t_{\text{fuse}}(s)$	0.068	0.008	0.008	0.019	0.019	0.009
greedy	−50.86	*best generated*						
	0.177	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.152	0.221	0.233	0.557	0.566	0.283
		best fused	**−57.36**	**−57.36**	**−57.36**	−50.86	−50.86	−54.89
		$t_{\text{fuse}}(s)$	9.597	0.502	0.530	0.557	0.566	0.692

car13, known optimum: -72.15

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−72.15**	*best generated*						
	0.057	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.266	0.020	0.030	0.093	0.092	0.023
		best fused	**−72.15**	**−72.15**	**−72.15**	**−72.15**	**−72.15**	**−72.15**
		$t_{\text{fuse}}(s)$	0.266	0.020	0.030	0.093	0.092	0.023
dd-ls3	**−72.15**	*best generated*						
	0.686	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.266	0.479	0.487	0.732	0.739	0.131
		best fused	**−72.15**	**−72.15**	**−72.15**	**−72.15**	**−72.15**	**−72.15**
		$t_{\text{fuse}}(s)$	0.266	0.479	0.487	0.732	0.739	0.131
dd-ls4	**−72.15**	*best generated*						
	4.502	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.561	0.588	0.255	4.578	4.579	1.129
		best fused	**−72.15**	**−72.15**	**−72.15**	**−72.15**	**−72.15**	**−72.15**
		$t_{\text{fuse}}(s)$	0.561	0.588	0.255	4.578	4.579	1.129
bca-lap	**−72.15**	*best generated*						
	0.244	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.256	0.214	0.214	0.214	0.214	0.215
		best fused	**−72.15**	**−72.15**	**−72.15**	**−72.15**	**−72.15**	**−72.15**
		$t_{\text{fuse}}(s)$	0.256	0.214	0.214	0.214	0.214	0.215
bca-greedy	**−72.15**	*best generated*						
	0.017	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.072	0.011	0.011	0.017	0.018	0.013
		best fused	**−72.15**	**−72.15**	**−72.15**	**−72.15**	**−72.15**	**−72.15**
		$t_{\text{fuse}}(s)$	0.072	0.011	0.011	0.017	0.018	0.013
greedy	−68.93	*best generated*						
	0.053	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.276	0.042	0.176	0.178	0.175	0.138
		best fused	**−72.15**	**−72.15**	**−72.15**	−68.93	−68.93	**−72.15**
		$t_{\text{fuse}}(s)$	3.684	0.103	0.185	0.178	0.175	0.220

car14, known optimum: -97.96

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−97.96**	*best generated*						
	0.222	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.015	0.299	0.304	0.304	0.305	0.333
		best fused	**−97.96**	**−97.96**	**−97.96**	**−97.96**	**−97.96**	**−97.96**
		$t_{\text{fuse}}(s)$	1.015	0.299	0.304	0.304	0.305	0.333
dd-ls3	**−97.96**	*best generated*						
	4.993	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	6.112	5.109	4.338	5.117	5.115	5.166
		best fused	**−97.96**	**−97.96**	**−97.96**	**−97.96**	**−97.96**	**−97.96**
		$t_{\text{fuse}}(s)$	6.112	5.109	4.338	5.117	5.115	5.166
dd-ls4	**−97.96**	*best generated*						
	58.771	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	41.132	59.053	59.058	59.060	59.065	59.120
		best fused	**−97.96**	**−97.96**	**−97.96**	**−97.96**	**−97.96**	**−97.96**
		$t_{\text{fuse}}(s)$	41.132	59.053	59.058	59.060	59.065	59.120
bca-lap	**−97.96**	*best generated*						
	2.321	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.177	0.141	0.142	2.141	2.142	0.142
		best fused	**−97.96**	**−97.96**	**−97.96**	**−97.96**	**−97.96**	**−97.96**
		$t_{\text{fuse}}(s)$	0.177	0.141	0.142	2.141	2.142	0.142
bca-greedy	**−97.96**	*best generated*						
	0.718	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.890	0.514	0.517	0.516	0.516	0.536
		best fused	**−97.96**	**−97.96**	**−97.96**	**−97.96**	**−97.96**	**−97.96**
		$t_{\text{fuse}}(s)$	0.890	0.514	0.517	0.516	0.516	0.536
greedy	−92.53	*best generated*						
	0.290	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.830	0.041	0.043	0.938	0.950	0.041
		best fused	**−97.96**	**−97.96**	**−97.96**	−92.53	−92.53	**−97.96**
		$t_{\text{fuse}}(s)$	15.996	0.891	0.948	0.938	0.950	1.159

car15, known optimum: -66.89

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−66.89**	*best generated*						
	0.029	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.079	0.019	0.018	0.050	0.050	0.011
		best fused	**−66.89**	**−66.89**	**−66.89**	**−66.89**	**−66.89**	**−66.89**
		$t_{\text{fuse}}(s)$	0.079	0.019	0.018	0.050	0.050	0.011
dd-ls3	**−66.89**	*best generated*						
	0.333	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.155	0.033	0.035	0.362	0.365	0.035
		best fused	**−66.89**	**−66.89**	**−66.89**	**−66.89**	**−66.89**	**−66.89**
		$t_{\text{fuse}}(s)$	0.155	0.033	0.035	0.362	0.365	0.035
dd-ls4	**−66.89**	*best generated*						
	1.145	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.865	0.694	0.694	1.176	1.176	0.699
		best fused	**−66.89**	**−66.89**	**−66.89**	**−66.89**	**−66.89**	**−66.89**
		$t_{\text{fuse}}(s)$	0.865	0.694	0.694	1.176	1.176	0.699
bca-lap	**−66.89**	*best generated*						
	13.721	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.162	0.127	0.127	0.127	0.127	0.127
		best fused	**−66.89**	**−66.89**	**−66.89**	**−66.89**	**−66.89**	**−66.89**
		$t_{\text{fuse}}(s)$	0.162	0.127	0.127	0.127	0.127	0.127
bca-greedy	**−66.89**	*best generated*						
	0.735	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.048	0.006	0.006	0.008	0.007	0.006
		best fused	**−66.89**	**−66.89**	**−66.89**	**−66.89**	**−66.89**	**−66.89**
		$t_{\text{fuse}}(s)$	0.048	0.006	0.006	0.008	0.007	0.006
greedy	**−66.89**	*best generated*						
	0.071	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.438	0.032	0.045	0.226	0.225	0.042
		best fused	**−66.89**	**−66.89**	**−66.89**	**−66.89**	**−66.89**	**−66.89**
		$t_{\text{fuse}}(s)$	0.438	0.032	0.045	0.226	0.225	0.042

car16, known optimum: -68.21

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−68.21**	*best generated*						
	0.036	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.111	0.014	0.014	0.059	0.060	0.016
		best fused	**−68.21**	**−68.21**	**−68.21**	**−68.21**	**−68.21**	**−68.21**
		$t_{\text{fuse}}(s)$	0.111	0.014	0.014	0.059	0.060	0.016
dd-ls3	**−68.21**	*best generated*						
	0.798	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.366	0.060	0.134	0.851	0.853	0.067
		best fused	**−68.21**	**−68.21**	**−68.21**	**−68.21**	**−68.21**	**−68.21**
		$t_{\text{fuse}}(s)$	0.366	0.060	0.134	0.851	0.853	0.067
dd-ls4	**−68.21**	*best generated*						
	4.843	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.223	0.246	0.246	4.915	4.916	1.662
		best fused	**−68.21**	**−68.21**	**−68.21**	**−68.21**	**−68.21**	**−68.21**
		$t_{\text{fuse}}(s)$	0.223	0.246	0.246	4.915	4.916	1.662
bca-lap	**−68.21**	*best generated*						
	5.927	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.151	0.116	0.116	0.116	0.116	0.117
		best fused	**−68.21**	**−68.21**	**−68.21**	**−68.21**	**−68.21**	**−68.21**
		$t_{\text{fuse}}(s)$	0.151	0.116	0.116	0.116	0.116	0.117
bca-greedy	**−68.21**	*best generated*						
	0.391	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.050	0.008	0.007	0.008	0.008	0.007
		best fused	**−68.21**	**−68.21**	**−68.21**	**−68.21**	**−68.21**	**−68.21**
		$t_{\text{fuse}}(s)$	0.050	0.008	0.007	0.008	0.008	0.007
greedy	−64.94	*best generated*						
	0.044	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.469	0.028	0.030	0.146	0.148	0.047
		best fused	**−68.21**	**−68.21**	**−68.21**	−64.94	−64.94	**−68.21**
		$t_{\text{fuse}}(s)$	0.469	0.028	0.030	0.146	0.148	0.057

car17, known optimum: -57.09

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−57.09**	*best generated*						
	0.048	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.159	0.026	0.027	0.083	0.082	0.045
		best fused	**−57.09**	**−57.09**	**−57.09**	**−57.09**	**−57.09**	**−57.09**
		$t_{\text{fuse}}(s)$	0.159	0.026	0.027	0.083	0.082	0.045
dd-ls3	**−57.09**	*best generated*						
	1.389	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.348	0.119	0.121	1.444	1.446	0.472
		best fused	**−57.09**	**−57.09**	**−57.09**	**−57.09**	**−57.09**	**−57.09**
		$t_{\text{fuse}}(s)$	0.348	0.119	0.121	1.444	1.446	0.472
dd-ls4	**−57.09**	*best generated*						
	9.613	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.802	1.130	1.472	9.713	9.710	2.428
		best fused	**−57.09**	**−57.09**	**−57.09**	**−57.09**	**−57.09**	**−57.09**
		$t_{\text{fuse}}(s)$	1.802	1.130	1.472	9.713	9.710	2.428
bca-lap	**−57.09**	*best generated*						
	11.365	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.491	0.417	0.417	0.416	0.417	0.419
		best fused	**−57.09**	**−57.09**	**−57.09**	**−57.09**	**−57.09**	**−57.09**
		$t_{\text{fuse}}(s)$	0.491	0.417	0.417	0.416	0.417	0.419
bca-greedy	**−57.09**	*best generated*						
	0.596	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.123	0.029	0.029	0.030	0.030	0.031
		best fused	**−57.09**	**−57.09**	**−57.09**	**−57.09**	**−57.09**	**−57.09**
		$t_{\text{fuse}}(s)$	0.123	0.029	0.029	0.030	0.030	0.031
greedy	**−57.09**	*best generated*						
	0.123	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.347	0.021	0.023	0.391	0.396	0.029
		best fused	**−57.09**	**−57.09**	**−57.09**	**−57.09**	**−57.09**	**−57.09**
		$t_{\text{fuse}}(s)$	0.347	0.021	0.023	0.391	0.396	0.029

car18, known optimum: -92.18

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−92.18**	*best generated*						
	0.097	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.137	0.025	0.025	0.140	0.142	0.027
		best fused	**−92.18**	**−92.18**	**−92.18**	**−92.18**	**−92.18**	**−92.18**
		$t_{\text{fuse}}(s)$	0.137	0.025	0.025	0.140	0.142	0.027
dd-ls3	**−92.18**	*best generated*						
	2.168	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.400	0.155	0.236	2.249	2.243	0.288
		best fused	**−92.18**	**−92.18**	**−92.18**	**−92.18**	**−92.18**	**−92.18**
		$t_{\text{fuse}}(s)$	0.400	0.155	0.236	2.249	2.243	0.288
dd-ls4	**−92.18**	*best generated*						
	11.498	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.855	0.727	0.727	11.628	11.627	1.249
		best fused	**−92.18**	**−92.18**	**−92.18**	**−92.18**	**−92.18**	**−92.18**
		$t_{\text{fuse}}(s)$	0.855	0.727	0.727	11.628	11.627	1.249
bca-lap	**−92.18**	*best generated*						
	21.160	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.159	0.125	0.125	0.125	0.125	0.126
		best fused	**−92.18**	**−92.18**	**−92.18**	**−92.18**	**−92.18**	**−92.18**
		$t_{\text{fuse}}(s)$	0.159	0.125	0.125	0.125	0.125	0.126
bca-greedy	**−92.18**	*best generated*						
	1.534	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.051	0.012	0.012	0.049	0.049	0.013
		best fused	**−92.18**	**−92.18**	**−92.18**	**−92.18**	**−92.18**	**−92.18**
		$t_{\text{fuse}}(s)$	0.051	0.012	0.012	0.049	0.049	0.013
greedy	−89.92	*best generated*						
	0.069	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.183	0.051	0.058	0.225	0.221	0.072
		best fused	**−92.18**	**−92.18**	**−92.18**	−89.92	−89.92	**−92.18**
		$t_{\text{fuse}}(s)$	3.277	0.150	0.168	0.225	0.221	0.203

car19, known optimum: -115.11

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−115.11**	*best generated*						
	0.209	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.418	0.101	0.104	0.276	0.275	0.111
		best fused	**−115.11**	**−115.11**	**−115.11**	**−115.11**	**−115.11**	**−115.11**
		$t_{\text{fuse}}(s)$	0.418	0.101	0.104	0.276	0.275	0.111
dd-ls3	**−115.11**	*best generated*						
	5.996	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.495	2.337	1.899	6.141	6.130	1.388
		best fused	**−115.11**	**−115.11**	**−115.11**	**−115.11**	**−115.11**	**−115.11**
		$t_{\text{fuse}}(s)$	1.495	2.337	1.899	6.141	6.130	1.388
dd-ls4	**−115.11**	*best generated*						
	33.063	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	6.958	2.591	2.593	33.375	33.375	2.305
		best fused	**−115.11**	**−115.11**	**−115.11**	**−115.11**	**−115.11**	**−115.11**
		$t_{\text{fuse}}(s)$	6.958	2.591	2.593	33.375	33.375	2.305
bca-lap	**−115.11**	*best generated*						
	76.316	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.344	0.300	0.301	0.301	0.301	0.303
		best fused	**−115.11**	**−115.11**	**−115.11**	**−115.11**	**−115.11**	**−115.11**
		$t_{\text{fuse}}(s)$	0.344	0.300	0.301	0.301	0.301	0.303
bca-greedy	**−115.11**	*best generated*						
	6.226	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.140	0.054	0.054	0.086	0.086	0.059
		best fused	**−115.11**	**−115.11**	**−115.11**	**−115.11**	**−115.11**	**−115.11**
		$t_{\text{fuse}}(s)$	0.140	0.054	0.054	0.086	0.086	0.059
greedy	−92.48	*best generated*						
	0.128	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.589	0.023	0.027	0.435	0.429	0.030
		best fused	**−115.11**	**−115.11**	**−115.11**	−92.48	−92.48	**−115.11**
		$t_{\text{fuse}}(s)$	9.431	0.942	1.001	0.435	0.429	1.229

car20, known optimum: -106.69

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−106.69**	*best generated*						
	0.062	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.080	0.020	0.013	0.088	0.087	0.015
		best fused	**−106.69**	**−106.69**	**−106.69**	**−106.69**	**−106.69**	**−106.69**
		$t_{\text{fuse}}(s)$	0.080	0.020	0.013	0.088	0.087	0.015
dd-ls3	**−106.69**	*best generated*						
	1.323	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.344	0.210	0.212	1.378	1.377	0.226
		best fused	**−106.69**	**−106.69**	**−106.69**	**−106.69**	**−106.69**	**−106.69**
		$t_{\text{fuse}}(s)$	0.344	0.210	0.212	1.378	1.377	0.226
dd-ls4	**−106.69**	*best generated*						
	6.800	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.443	0.357	0.357	6.904	6.904	0.671
		best fused	**−106.69**	**−106.69**	**−106.69**	**−106.69**	**−106.69**	**−106.69**
		$t_{\text{fuse}}(s)$	0.443	0.357	0.357	6.904	6.904	0.671
bca-lap	**−106.69**	*best generated*						
	29.776	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.131	0.098	0.098	0.097	0.098	0.098
		best fused	**−106.69**	**−106.69**	**−106.69**	**−106.69**	**−106.69**	**−106.69**
		$t_{\text{fuse}}(s)$	0.131	0.098	0.098	0.097	0.098	0.098
bca-greedy	**−106.69**	*best generated*						
	3.402	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.066	0.016	0.016	0.023	0.023	0.021
		best fused	**−106.69**	**−106.69**	**−106.69**	**−106.69**	**−106.69**	**−106.69**
		$t_{\text{fuse}}(s)$	0.066	0.016	0.016	0.023	0.023	0.021
greedy	**−106.69**	*best generated*						
	0.229	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.277	0.159	0.170	0.699	0.702	0.219
		best fused	**−106.69**	**−106.69**	**−106.69**	**−106.69**	**−106.69**	**−106.69**
		$t_{\text{fuse}}(s)$	3.277	0.159	0.170	0.699	0.702	0.219

car21, known optimum: -94.55

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−94.55**	*best generated*						
	0.164	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.312	0.076	0.078	0.229	0.230	0.116
		best fused	**−94.55**	**−94.55**	**−94.55**	**−94.55**	**−94.55**	**−94.55**
		$t_{\text{fuse}}(s)$	0.312	0.076	0.078	0.229	0.230	0.116
dd-ls3	**−94.55**	*best generated*						
	4.651	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.526	0.368	2.339	4.776	4.777	0.583
		best fused	**−94.55**	**−94.55**	**−94.55**	**−94.55**	**−94.55**	**−94.55**
		$t_{\text{fuse}}(s)$	1.526	0.368	2.339	4.776	4.777	0.583
dd-ls4	**−94.55**	*best generated*						
	20.363	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.554	2.365	3.380	20.548	20.549	2.914
		best fused	**−94.55**	**−94.55**	**−94.55**	**−94.55**	**−94.55**	**−94.55**
		$t_{\text{fuse}}(s)$	1.554	2.365	3.380	20.548	20.549	2.914
bca-lap	**−94.55**	*best generated*						
	56.521	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.192	0.153	0.153	0.153	0.154	0.154
		best fused	**−94.55**	**−94.55**	**−94.55**	**−94.55**	**−94.55**	**−94.55**
		$t_{\text{fuse}}(s)$	0.192	0.153	0.153	0.153	0.154	0.154
bca-greedy	**−94.55**	*best generated*						
	4.336	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.124	0.034	0.034	0.059	0.059	0.036
		best fused	**−94.55**	**−94.55**	**−94.55**	**−94.55**	**−94.55**	**−94.55**
		$t_{\text{fuse}}(s)$	0.124	0.034	0.034	0.059	0.059	0.036
greedy	−85.05	*best generated*						
	0.207	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.916	0.145	0.153	0.642	0.668	0.146
		best fused	**−94.55**	**−94.55**	**−94.55**	−85.05	−85.05	**−94.55**
		$t_{\text{fuse}}(s)$	13.492	0.196	0.207	0.642	0.668	0.942

car22, known optimum: -55.58

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−55.58**	*best generated*						
	0.036	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.095	0.013	0.013	0.063	0.062	0.016
		best fused	**−55.58**	**−55.58**	**−55.58**	**−55.58**	**−55.58**	**−55.58**
		$t_{\text{fuse}}(s)$	0.095	0.013	0.013	0.063	0.062	0.016
dd-ls3	**−55.58**	*best generated*						
	0.304	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.092	0.028	0.023	0.336	0.337	0.025
		best fused	**−55.58**	**−55.58**	**−55.58**	**−55.58**	**−55.58**	**−55.58**
		$t_{\text{fuse}}(s)$	0.092	0.028	0.023	0.336	0.337	0.025
dd-ls4	**−55.58**	*best generated*						
	1.329	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.237	0.336	0.140	1.364	1.365	0.141
		best fused	**−55.58**	**−55.58**	**−55.58**	**−55.58**	**−55.58**	**−55.58**
		$t_{\text{fuse}}(s)$	0.237	0.336	0.140	1.364	1.365	0.141
bca-lap	**−55.58**	*best generated*						
	6.768	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.094	0.058	0.058	0.058	0.058	0.058
		best fused	**−55.58**	**−55.58**	**−55.58**	**−55.58**	**−55.58**	**−55.58**
		$t_{\text{fuse}}(s)$	0.094	0.058	0.058	0.058	0.058	0.058
bca-greedy	**−55.58**	*best generated*						
	0.392	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.046	0.006	0.006	0.008	0.007	0.011
		best fused	**−55.58**	**−55.58**	**−55.58**	**−55.58**	**−55.58**	**−55.58**
		$t_{\text{fuse}}(s)$	0.046	0.006	0.006	0.008	0.007	0.011
greedy	**−55.58**	*best generated*						
	0.040	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.606	0.031	0.036	0.134	0.129	0.025
		best fused	**−55.58**	**−55.58**	**−55.58**	**−55.58**	**−55.58**	**−55.58**
		$t_{\text{fuse}}(s)$	0.606	0.031	0.036	0.134	0.129	0.025

car23, known optimum: -70.20

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−70.20**	*best generated*						
	0.101	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.326	0.053	0.053	0.158	0.157	0.121
		best fused	**−70.20**	**−70.20**	**−70.20**	**−70.20**	**−70.20**	**−70.20**
		$t_{\text{fuse}}(s)$	0.326	0.053	0.053	0.158	0.157	0.121
dd-ls3	**−70.20**	*best generated*						
	1.438	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.987	0.574	0.577	1.511	1.508	0.867
		best fused	**−70.20**	**−70.20**	**−70.20**	**−70.20**	**−70.20**	**−70.20**
		$t_{\text{fuse}}(s)$	0.987	0.574	0.577	1.511	1.508	0.867
dd-ls4	**−70.20**	*best generated*						
	16.127	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.735	2.461	2.461	16.270	16.269	0.750
		best fused	**−70.20**	**−70.20**	**−70.20**	**−70.20**	**−70.20**	**−70.20**
		$t_{\text{fuse}}(s)$	1.735	2.461	2.461	16.270	16.269	0.750
bca-lap	**−70.20**	*best generated*						
	29.696	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.217	0.151	0.151	0.152	0.152	0.152
		best fused	**−70.20**	**−70.20**	**−70.20**	**−70.20**	**−70.20**	**−70.20**
		$t_{\text{fuse}}(s)$	0.217	0.151	0.151	0.152	0.152	0.152
bca-greedy	**−70.20**	*best generated*						
	1.889	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.054	0.010	0.010	0.029	0.029	0.011
		best fused	**−70.20**	**−70.20**	**−70.20**	**−70.20**	**−70.20**	**−70.20**
		$t_{\text{fuse}}(s)$	0.054	0.010	0.010	0.029	0.029	0.011
greedy	−59.84	*best generated*						
	0.088	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.327	0.018	0.020	0.295	0.288	0.103
		best fused	**−70.20**	**−70.20**	**−70.20**	−59.84	−59.84	**−70.20**
		$t_{\text{fuse}}(s)$	8.343	0.525	0.572	0.295	0.288	0.600

car24, known optimum: -64.58

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−64.58**	*best generated*						
	0.095	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.212	0.033	0.034	0.151	0.153	0.039
		best fused	**−64.58**	**−64.58**	**−64.58**	**−64.58**	**−64.58**	**−64.58**
		$t_{\text{fuse}}(s)$	0.212	0.033	0.034	0.151	0.153	0.039
dd-ls3	**−64.58**	*best generated*						
	1.631	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.513	0.270	0.272	1.714	1.712	0.503
		best fused	**−64.58**	**−64.58**	**−64.58**	**−64.58**	**−64.58**	**−64.58**
		$t_{\text{fuse}}(s)$	0.513	0.270	0.272	1.714	1.712	0.503
dd-ls4	**−64.58**	*best generated*						
	7.923	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.524	1.265	1.266	8.025	8.022	3.200
		best fused	**−64.58**	**−64.58**	**−64.58**	**−64.58**	**−64.58**	**−64.58**
		$t_{\text{fuse}}(s)$	1.524	1.265	1.266	8.025	8.022	3.200
bca-lap	**−64.58**	*best generated*						
	6.717	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.953	2.768	2.769	2.769	2.768	2.779
		best fused	**−64.58**	**−64.58**	**−64.58**	**−64.58**	**−64.58**	**−64.58**
		$t_{\text{fuse}}(s)$	2.953	2.768	2.769	2.769	2.768	2.779
bca-greedy	**−64.58**	*best generated*						
	0.391	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.270	0.104	0.109	0.106	0.105	0.116
		best fused	**−64.58**	**−64.58**	**−64.58**	**−64.58**	**−64.58**	**−64.58**
		$t_{\text{fuse}}(s)$	0.270	0.104	0.109	0.106	0.105	0.116
greedy	−60.07	*best generated*						
	0.193	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.711	0.043	0.046	0.621	0.611	0.082
		best fused	**−64.58**	**−64.58**	**−64.58**	−60.07	−60.07	**−64.58**
		$t_{\text{fuse}}(s)$	1.094	0.066	0.070	0.621	0.611	0.359

car25, known optimum: -34.19

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−34.19**	*best generated*						
	0.047	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.532	0.056	0.058	0.097	0.097	0.050
		best fused	**−34.19**	**−34.19**	**−34.19**	**−34.19**	**−34.19**	**−34.19**
		$t_{\text{fuse}}(s)$	0.532	0.056	0.058	0.097	0.097	0.050
dd-ls3	**−34.19**	*best generated*						
	0.326	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.608	0.185	0.188	0.376	0.377	0.205
		best fused	**−34.19**	**−34.19**	**−34.19**	**−34.19**	**−34.19**	**−34.19**
		$t_{\text{fuse}}(s)$	0.608	0.185	0.188	0.376	0.377	0.205
dd-ls4	**−34.19**	*best generated*						
	2.320	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.086	0.783	0.784	2.370	2.368	0.218
		best fused	**−34.19**	**−34.19**	**−34.19**	**−34.19**	**−34.19**	**−34.19**
		$t_{\text{fuse}}(s)$	1.086	0.783	0.784	2.370	2.368	0.218
bca-lap	**−34.19**	*best generated*						
	0.060	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.169	0.069	0.069	0.069	0.068	0.069
		best fused	**−34.19**	**−34.19**	**−34.19**	**−34.19**	**−34.19**	**−34.19**
		$t_{\text{fuse}}(s)$	0.169	0.069	0.069	0.069	0.068	0.069
bca-greedy	**−34.19**	*best generated*						
	0.708	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.084	0.006	0.006	0.018	0.019	0.006
		best fused	**−34.19**	**−34.19**	**−34.19**	**−34.19**	**−34.19**	**−34.19**
		$t_{\text{fuse}}(s)$	0.084	0.006	0.006	0.018	0.019	0.006
greedy	−30.07	*best generated*						
	0.111	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.138	0.005	0.006	0.354	0.365	0.006
		best fused	**−34.19**	**−34.19**	**−34.19**	−30.07	−30.07	**−34.19**
		$t_{\text{fuse}}(s)$	3.586	0.204	0.215	0.354	0.365	0.272

car26, known optimum: -59.92

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−59.92**	*best generated*						
	0.066	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.284	0.046	0.047	0.111	0.111	0.123
		best fused	**−59.92**	**−59.92**	**−59.92**	**−59.92**	**−59.92**	**−59.92**
		$t_{\text{fuse}}(s)$	0.284	0.046	0.047	0.111	0.111	0.123
dd-ls3	**−59.92**	*best generated*						
	1.060	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.494	0.853	0.858	1.123	1.126	0.838
		best fused	**−59.92**	**−59.92**	**−59.92**	**−59.92**	**−59.92**	**−59.92**
		$t_{\text{fuse}}(s)$	1.494	0.853	0.858	1.123	1.126	0.838
dd-ls4	**−59.92**	*best generated*						
	6.481	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.200	3.725	3.727	6.567	6.568	6.610
		best fused	**−59.92**	**−59.92**	**−59.92**	**−59.92**	**−59.92**	**−59.92**
		$t_{\text{fuse}}(s)$	4.200	3.725	3.727	6.567	6.568	6.610
bca-lap	**−59.92**	*best generated*						
	11.076	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.104	1.019	1.020	1.019	1.019	1.024
		best fused	**−59.92**	**−59.92**	**−59.92**	**−59.92**	**−59.92**	**−59.92**
		$t_{\text{fuse}}(s)$	1.104	1.019	1.020	1.019	1.019	1.024
bca-greedy	**−59.92**	*best generated*						
	0.657	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.109	0.033	0.033	0.099	0.097	0.045
		best fused	**−59.92**	**−59.92**	**−59.92**	**−59.92**	**−59.92**	**−59.92**
		$t_{\text{fuse}}(s)$	0.109	0.033	0.033	0.099	0.097	0.045
greedy	−58.36	*best generated*						
	0.015	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.323	0.023	0.024	0.049	0.051	0.056
		best fused	**−59.92**	**−59.92**	**−59.92**	−58.36	−58.36	**−59.92**
		$t_{\text{fuse}}(s)$	0.887	0.059	0.063	0.049	0.051	0.086

car27, known optimum: -67.95

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−67.95**	*best generated*						
	0.067	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.444	0.082	0.085	0.108	0.106	0.096
		best fused	**−67.95**	**−67.95**	**−67.95**	**−67.95**	**−67.95**	**−67.95**
		$t_{\text{fuse}}(s)$	0.444	0.082	0.085	0.108	0.106	0.096
dd-ls3	**−67.95**	*best generated*						
	0.910	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.698	0.877	0.879	0.975	0.965	0.896
		best fused	**−67.95**	**−67.95**	**−67.95**	**−67.95**	**−67.95**	**−67.95**
		$t_{\text{fuse}}(s)$	0.698	0.877	0.879	0.975	0.965	0.896
dd-ls4	**−67.95**	*best generated*						
	4.748	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.510	0.487	0.487	4.821	4.822	4.844
		best fused	**−67.95**	**−67.95**	**−67.95**	**−67.95**	**−67.95**	**−67.95**
		$t_{\text{fuse}}(s)$	4.510	0.487	0.487	4.821	4.822	4.844
bca-lap	**−67.95**	*best generated*						
	4.481	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.266	0.222	0.222	0.222	0.223	0.224
		best fused	**−67.95**	**−67.95**	**−67.95**	**−67.95**	**−67.95**	**−67.95**
		$t_{\text{fuse}}(s)$	0.266	0.222	0.222	0.222	0.223	0.224
bca-greedy	**−67.95**	*best generated*						
	0.285	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.160	0.014	0.014	0.020	0.019	0.015
		best fused	**−67.95**	**−67.95**	**−67.95**	**−67.95**	**−67.95**	**−67.95**
		$t_{\text{fuse}}(s)$	0.160	0.014	0.014	0.020	0.019	0.015
greedy	−66.00	*best generated*						
	0.080	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	6.099	0.282	0.307	0.262	0.255	0.366
		best fused	**−67.95**	**−67.95**	**−67.95**	−66.00	−66.00	**−67.95**
		$t_{\text{fuse}}(s)$	6.546	0.304	0.331	0.262	0.255	0.394

car28, known optimum: -75.70

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−75.70**	*best generated*						
	1.332	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	6.301	1.520	1.553	1.828	1.812	1.909
		best fused	**−75.70**	**−75.70**	**−75.70**	**−75.70**	**−75.70**	**−75.70**
		$t_{\text{fuse}}(s)$	6.301	1.520	1.553	1.828	1.812	1.909
dd-ls3	**−75.70**	*best generated*						
	20.054	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	20.837	20.379	20.394	20.454	20.449	20.909
		best fused	**−75.70**	**−75.70**	**−75.70**	**−75.70**	**−75.70**	**−75.70**
		$t_{\text{fuse}}(s)$	20.837	20.379	20.394	20.454	20.449	20.909
dd-ls4	**−75.70**	*best generated*						
	572.740	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	310.976	331.099	331.116	573.676	573.686	271.501
		best fused	**−75.70**	**−75.70**	**−75.70**	**−75.70**	**−75.70**	**−75.70**
		$t_{\text{fuse}}(s)$	310.976	331.099	331.116	573.676	573.686	271.501
bca-lap	−72.63	*best generated*						
	3.898	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.849	0.782	0.783	3.631	3.632	0.785
		best fused	−73.85	−73.85	−73.85	−72.63	−72.63	−72.93
		$t_{\text{fuse}}(s)$	1.873	1.746	1.748	3.631	3.632	0.785
bca-greedy	−71.58	*best generated*						
	0.146	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.285	0.069	0.069	0.175	0.174	0.207
		best fused	**−75.70**	**−75.70**	**−75.70**	−71.58	−71.58	−75.51
		$t_{\text{fuse}}(s)$	3.641	1.082	1.092	0.175	0.174	1.722
greedy	−65.80	*best generated*						
	0.264	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	9.054	0.369	0.385	0.866	0.859	0.605
		best fused	−73.70	−72.36	−72.36	−65.80	−65.80	−69.31
		$t_{\text{fuse}}(s)$	17.659	0.880	0.932	0.866	0.859	1.149

car29, known optimum: -84.31

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−84.31**	*best generated*						
	0.134	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.865	0.053	0.054	0.191	0.193	0.211
		best fused	**−84.31**	**−84.31**	**−84.31**	**−84.31**	**−84.31**	**−84.31**
		$t_{\text{fuse}}(s)$	0.865	0.053	0.054	0.191	0.193	0.211
dd-ls3	**−84.31**	*best generated*						
	3.904	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.026	2.440	0.327	4.031	4.013	3.394
		best fused	**−84.31**	**−84.31**	**−84.31**	**−84.31**	**−84.31**	**−84.31**
		$t_{\text{fuse}}(s)$	3.026	2.440	0.327	4.031	4.013	3.394
dd-ls4	**−84.31**	*best generated*						
	39.826	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	9.998	2.836	2.838	40.072	40.073	3.973
		best fused	**−84.31**	**−84.31**	**−84.31**	**−84.31**	**−84.31**	**−84.31**
		$t_{\text{fuse}}(s)$	9.998	2.836	2.838	40.072	40.073	3.973
bca-lap	**−84.31**	*best generated*						
	10.448	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	10.924	10.366	10.369	10.369	10.367	10.404
		best fused	**−84.31**	**−84.31**	**−84.31**	**−84.31**	**−84.31**	**−84.31**
		$t_{\text{fuse}}(s)$	10.924	10.366	10.369	10.369	10.367	10.404
bca-greedy	**−84.31**	*best generated*						
	0.210	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.111	0.038	0.038	0.137	0.134	0.041
		best fused	**−84.31**	**−84.31**	**−84.31**	**−84.31**	**−84.31**	**−84.31**
		$t_{\text{fuse}}(s)$	0.111	0.038	0.038	0.137	0.134	0.041
greedy	−76.00	*best generated*						
	0.262	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.592	0.031	0.034	0.850	0.822	0.042
		best fused	**−84.31**	**−84.31**	**−84.31**	−76.00	−76.00	**−84.31**
		$t_{\text{fuse}}(s)$	0.993	0.053	0.058	0.850	0.822	0.071

car30, known optimum: -58.85

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	$\mathbf{-58.85}$	*best generated*						
	0.059	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.493	0.077	0.080	0.100	0.101	0.089
		best fused	$\mathbf{-58.85}$	$\mathbf{-58.85}$	$\mathbf{-58.85}$	$\mathbf{-58.85}$	$\mathbf{-58.85}$	$\mathbf{-58.85}$
		$t_{\text{fuse}}(s)$	0.493	0.077	0.080	0.100	0.101	0.089
dd-ls3	$\mathbf{-58.85}$	*best generated*						
	0.972	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.506	0.848	0.850	1.050	1.036	0.822
		best fused	$\mathbf{-58.85}$	$\mathbf{-58.85}$	$\mathbf{-58.85}$	$\mathbf{-58.85}$	$\mathbf{-58.85}$	$\mathbf{-58.85}$
		$t_{\text{fuse}}(s)$	1.506	0.848	0.850	1.050	1.036	0.822
dd-ls4	$\mathbf{-58.85}$	*best generated*						
	5.785	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.395	3.239	3.242	5.865	5.865	5.878
		best fused	$\mathbf{-58.85}$	$\mathbf{-58.85}$	$\mathbf{-58.85}$	$\mathbf{-58.85}$	$\mathbf{-58.85}$	$\mathbf{-58.85}$
		$t_{\text{fuse}}(s)$	1.395	3.239	3.242	5.865	5.865	5.878
bca-lap	-58.34	*best generated*						
	0.795	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.407	0.356	0.356	0.356	0.356	0.358
		best fused	$\mathbf{-58.85}$	$\mathbf{-58.85}$	$\mathbf{-58.85}$	-58.34	-58.34	$\mathbf{-58.85}$
		$t_{\text{fuse}}(s)$	0.407	0.356	0.356	0.356	0.356	0.358
bca-greedy	$\mathbf{-58.85}$	*best generated*						
	1.466	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.069	0.016	0.017	0.017	0.018	0.017
		best fused	$\mathbf{-58.85}$	$\mathbf{-58.85}$	$\mathbf{-58.85}$	$\mathbf{-58.85}$	$\mathbf{-58.85}$	$\mathbf{-58.85}$
		$t_{\text{fuse}}(s)$	0.069	0.016	0.017	0.017	0.018	0.017
greedy	-56.65	*best generated*						
	0.142	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.448	0.024	0.027	0.446	0.450	0.138
		best fused	$\mathbf{-58.85}$	$\mathbf{-58.85}$	$\mathbf{-58.85}$	-56.65	-56.65	$\mathbf{-58.85}$
		$t_{\text{fuse}}(s)$	6.991	0.111	0.121	0.446	0.450	0.522

A6.4. motor

number of instances: 20

maximum number of iterations during generation: 1500

motor1, known optimum: -94.18

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−94.18**	*best generated*						
	0.367	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.414	0.085	0.088	0.497	0.502	0.100
		best fused	**−94.18**	**−94.18**	**−94.18**	**−94.18**	**−94.18**	**−94.18**
		$t_{\text{fuse}}(s)$	0.414	0.085	0.088	0.497	0.502	0.100
dd-ls3	**−94.18**	*best generated*						
	7.162	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.322	3.336	5.467	7.317	7.319	3.465
		best fused	**−94.18**	**−94.18**	**−94.18**	**−94.18**	**−94.18**	**−94.18**
		$t_{\text{fuse}}(s)$	4.322	3.336	5.467	7.317	7.319	3.465
dd-ls4	**−94.18**	*best generated*						
	55.664	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	44.008	28.969	44.550	56.006	56.004	42.815
		best fused	**−94.18**	**−94.18**	**−94.18**	**−94.18**	**−94.18**	**−94.18**
		$t_{\text{fuse}}(s)$	44.008	28.969	44.550	56.006	56.004	42.815
bca-lap	**−94.18**	*best generated*						
	2.342	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.211	0.154	0.155	0.154	0.154	0.155
		best fused	**−94.18**	**−94.18**	**−94.18**	**−94.18**	**−94.18**	**−94.18**
		$t_{\text{fuse}}(s)$	0.211	0.154	0.155	0.154	0.154	0.155
bca-greedy	**−94.18**	*best generated*						
	3.315	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.174	0.071	0.072	0.177	0.177	0.079
		best fused	**−94.18**	**−94.18**	**−94.18**	**−94.18**	**−94.18**	**−94.18**
		$t_{\text{fuse}}(s)$	0.174	0.071	0.072	0.177	0.177	0.079
greedy	−85.38	*best generated*						
	0.145	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.376	0.142	0.150	0.484	0.482	0.193
		best fused	−91.09	−91.09	−91.09	−85.38	−85.38	−91.09
		$t_{\text{fuse}}(s)$	8.181	0.428	0.453	0.484	0.482	0.577

motor2, known optimum: -94.93

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−94.93**	*best generated*						
	0.027	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.046	0.006	0.007	0.042	0.043	0.008
		best fused	**−94.93**	**−94.93**	**−94.93**	**−94.93**	**−94.93**	**−94.93**
		$t_{\text{fuse}}(s)$	0.046	0.006	0.007	0.042	0.043	0.008
dd-ls3	**−94.93**	*best generated*						
	0.301	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.066	0.019	0.020	0.327	0.327	0.020
		best fused	**−94.93**	**−94.93**	**−94.93**	**−94.93**	**−94.93**	**−94.93**
		$t_{\text{fuse}}(s)$	0.066	0.019	0.020	0.327	0.327	0.020
dd-ls4	**−94.93**	*best generated*						
	0.079	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.127	0.091	0.091	0.092	0.091	0.083
		best fused	**−94.93**	**−94.93**	**−94.93**	**−94.93**	**−94.93**	**−94.93**
		$t_{\text{fuse}}(s)$	0.127	0.091	0.091	0.092	0.091	0.083
bca-lap	**−94.93**	*best generated*						
	17.194	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.131	0.089	0.089	0.089	0.089	0.089
		best fused	**−94.93**	**−94.93**	**−94.93**	**−94.93**	**−94.93**	**−94.93**
		$t_{\text{fuse}}(s)$	0.131	0.089	0.089	0.089	0.089	0.089
bca-greedy	**−94.93**	*best generated*						
	1.702	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.042	0.008	0.008	0.009	0.009	0.009
		best fused	**−94.93**	**−94.93**	**−94.93**	**−94.93**	**−94.93**	**−94.93**
		$t_{\text{fuse}}(s)$	0.042	0.008	0.008	0.009	0.009	0.009
greedy	**−94.93**	*best generated*						
	0.008	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.108	0.009	0.010	0.024	0.026	0.012
		best fused	**−94.93**	**−94.93**	**−94.93**	**−94.93**	**−94.93**	**−94.93**
		$t_{\text{fuse}}(s)$	0.108	0.009	0.010	0.024	0.026	0.012

motor3, known optimum: -45.37

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−45.37**	*best generated*						
	0.015	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.056	0.005	0.005	0.031	0.032	0.006
		best fused	**−45.37**	**−45.37**	**−45.37**	**−45.37**	**−45.37**	**−45.37**
		$t_{\text{fuse}}(s)$	0.056	0.005	0.005	0.031	0.032	0.006
dd-ls3	**−45.37**	*best generated*						
	0.093	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.096	0.021	0.021	0.109	0.109	0.033
		best fused	**−45.37**	**−45.37**	**−45.37**	**−45.37**	**−45.37**	**−45.37**
		$t_{\text{fuse}}(s)$	0.096	0.021	0.021	0.109	0.109	0.033
dd-ls4	**−45.37**	*best generated*						
	0.671	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.109	0.052	0.052	0.696	0.696	0.050
		best fused	**−45.37**	**−45.37**	**−45.37**	**−45.37**	**−45.37**	**−45.37**
		$t_{\text{fuse}}(s)$	0.109	0.052	0.052	0.696	0.696	0.050
bca-lap	**−45.37**	*best generated*						
	8.183	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.505	0.404	0.404	0.403	0.404	0.406
		best fused	**−45.37**	**−45.37**	**−45.37**	**−45.37**	**−45.37**	**−45.37**
		$t_{\text{fuse}}(s)$	0.505	0.404	0.404	0.403	0.404	0.406
bca-greedy	**−45.37**	*best generated*						
	0.445	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.066	0.010	0.010	0.011	0.010	0.011
		best fused	**−45.37**	**−45.37**	**−45.37**	**−45.37**	**−45.37**	**−45.37**
		$t_{\text{fuse}}(s)$	0.066	0.010	0.010	0.011	0.010	0.011
greedy	**−45.37**	*best generated*						
	0.016	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.111	0.008	0.008	0.052	0.053	0.009
		best fused	**−45.37**	**−45.37**	**−45.37**	**−45.37**	**−45.37**	**−45.37**
		$t_{\text{fuse}}(s)$	0.111	0.008	0.008	0.052	0.053	0.009

motor4, known optimum: -27.50

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−27.50**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.055	0.004	0.004	0.005	0.005	0.005
		best fused	**−27.50**	**−27.50**	**−27.50**	**−27.50**	**−27.50**	**−27.50**
		$t_{\text{fuse}}(s)$	0.055	0.004	0.004	0.005	0.005	0.005
dd-ls3	**−27.50**	*best generated*						
	0.006	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.053	0.005	0.007	0.013	0.010	0.005
		best fused	**−27.50**	**−27.50**	**−27.50**	**−27.50**	**−27.50**	**−27.50**
		$t_{\text{fuse}}(s)$	0.053	0.005	0.007	0.013	0.010	0.005
dd-ls4	**−27.50**	*best generated*						
	0.018	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.073	0.019	0.021	0.023	0.023	0.020
		best fused	**−27.50**	**−27.50**	**−27.50**	**−27.50**	**−27.50**	**−27.50**
		$t_{\text{fuse}}(s)$	0.073	0.019	0.021	0.023	0.023	0.020
bca-lap	**−27.50**	*best generated*						
	3.483	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.098	0.043	0.044	0.043	0.043	0.043
		best fused	**−27.50**	**−27.50**	**−27.50**	**−27.50**	**−27.50**	**−27.50**
		$t_{\text{fuse}}(s)$	0.098	0.043	0.044	0.043	0.043	0.043
bca-greedy	**−27.50**	*best generated*						
	0.197	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.058	0.007	0.008	0.009	0.008	0.009
		best fused	**−27.50**	**−27.50**	**−27.50**	**−27.50**	**−27.50**	**−27.50**
		$t_{\text{fuse}}(s)$	0.058	0.007	0.008	0.009	0.008	0.009
greedy	−26.50	*best generated*						
	0.036	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.078	0.005	0.005	0.116	0.114	0.006
		best fused	**−27.50**	**−27.50**	**−27.50**	−26.50	−26.50	**−27.50**
		$t_{\text{fuse}}(s)$	0.106	0.009	0.009	0.116	0.114	0.009

motor5, known optimum: -29.91

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−29.91**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.034	0.003	0.003	0.004	0.003	0.002
		best fused	**−29.91**	**−29.91**	**−29.91**	**−29.91**	**−29.91**	**−29.91**
		$t_{\text{fuse}}(s)$	0.034	0.003	0.003	0.004	0.003	0.002
dd-ls3	**−29.91**	*best generated*						
	0.006	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.044	0.004	0.005	0.011	0.012	0.006
		best fused	**−29.91**	**−29.91**	**−29.91**	**−29.91**	**−29.91**	**−29.91**
		$t_{\text{fuse}}(s)$	0.044	0.004	0.005	0.011	0.012	0.006
dd-ls4	**−29.91**	*best generated*						
	0.003	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.035	0.006	0.005	0.005	0.005	0.007
		best fused	**−29.91**	**−29.91**	**−29.91**	**−29.91**	**−29.91**	**−29.91**
		$t_{\text{fuse}}(s)$	0.035	0.006	0.005	0.005	0.005	0.007
bca-lap	**−29.91**	*best generated*						
	3.227	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.183	0.042	0.041	0.042	0.041	0.041
		best fused	**−29.91**	**−29.91**	**−29.91**	**−29.91**	**−29.91**	**−29.91**
		$t_{\text{fuse}}(s)$	0.183	0.042	0.041	0.042	0.041	0.041
bca-greedy	**−29.91**	*best generated*						
	0.173	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.032	0.003	0.005	0.004	0.004	0.005
		best fused	**−29.91**	**−29.91**	**−29.91**	**−29.91**	**−29.91**	**−29.91**
		$t_{\text{fuse}}(s)$	0.032	0.003	0.005	0.004	0.004	0.005
greedy	**−29.91**	*best generated*						
	0.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.054	0.006	0.005	0.007	0.007	0.006
		best fused	**−29.91**	**−29.91**	**−29.91**	**−29.91**	**−29.91**	**−29.91**
		$t_{\text{fuse}}(s)$	0.054	0.006	0.005	0.007	0.007	0.006

motor6, known optimum: -51.51

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−51.51**	*best generated*						
	0.013	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.093	0.006	0.007	0.026	0.026	0.008
		best fused	**−51.51**	**−51.51**	**−51.51**	**−51.51**	**−51.51**	**−51.51**
		$t_{\text{fuse}}(s)$	0.093	0.006	0.007	0.026	0.026	0.008
dd-ls3	**−51.51**	*best generated*						
	0.093	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.070	0.012	0.013	0.108	0.108	0.021
		best fused	**−51.51**	**−51.51**	**−51.51**	**−51.51**	**−51.51**	**−51.51**
		$t_{\text{fuse}}(s)$	0.070	0.012	0.013	0.108	0.108	0.021
dd-ls4	**−51.51**	*best generated*						
	0.590	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.100	0.068	0.069	0.614	0.614	0.045
		best fused	**−51.51**	**−51.51**	**−51.51**	**−51.51**	**−51.51**	**−51.51**
		$t_{\text{fuse}}(s)$	0.100	0.068	0.069	0.614	0.614	0.045
bca-lap	**−51.51**	*best generated*						
	4.323	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.094	0.047	0.047	0.046	0.046	0.047
		best fused	**−51.51**	**−51.51**	**−51.51**	**−51.51**	**−51.51**	**−51.51**
		$t_{\text{fuse}}(s)$	0.094	0.047	0.047	0.046	0.046	0.047
bca-greedy	**−51.51**	*best generated*						
	0.240	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.038	0.004	0.004	0.005	0.005	0.005
		best fused	**−51.51**	**−51.51**	**−51.51**	**−51.51**	**−51.51**	**−51.51**
		$t_{\text{fuse}}(s)$	0.038	0.004	0.004	0.005	0.005	0.005
greedy	**−51.51**	*best generated*						
	0.002	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.060	0.004	0.003	0.008	0.008	0.004
		best fused	**−51.51**	**−51.51**	**−51.51**	**−51.51**	**−51.51**	**−51.51**
		$t_{\text{fuse}}(s)$	0.060	0.004	0.003	0.008	0.008	0.004

motor7, known optimum: -64.93

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−64.93**	*best generated*						
	0.044	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.147	0.025	0.026	0.077	0.074	0.026
		best fused	**−64.93**	**−64.93**	**−64.93**	**−64.93**	**−64.93**	**−64.93**
		$t_{\text{fuse}}(s)$	0.147	0.025	0.026	0.077	0.074	0.026
dd-ls3	**−64.93**	*best generated*						
	0.537	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.349	0.162	0.164	0.576	0.577	0.167
		best fused	**−64.93**	**−64.93**	**−64.93**	**−64.93**	**−64.93**	**−64.93**
		$t_{\text{fuse}}(s)$	0.349	0.162	0.164	0.576	0.577	0.167
dd-ls4	**−64.93**	*best generated*						
	2.652	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.632	1.409	1.411	2.709	2.711	1.416
		best fused	**−64.93**	**−64.93**	**−64.93**	**−64.93**	**−64.93**	**−64.93**
		$t_{\text{fuse}}(s)$	1.632	1.409	1.411	2.709	2.711	1.416
bca-lap	**−64.93**	*best generated*						
	6.751	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.200	0.163	0.162	0.163	0.162	0.164
		best fused	**−64.93**	**−64.93**	**−64.93**	**−64.93**	**−64.93**	**−64.93**
		$t_{\text{fuse}}(s)$	0.200	0.163	0.162	0.163	0.162	0.164
bca-greedy	**−64.93**	*best generated*						
	0.402	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.069	0.018	0.019	0.019	0.019	0.020
		best fused	**−64.93**	**−64.93**	**−64.93**	**−64.93**	**−64.93**	**−64.93**
		$t_{\text{fuse}}(s)$	0.069	0.018	0.019	0.019	0.019	0.020
greedy	−64.06	*best generated*						
	0.089	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.200	0.063	0.066	0.273	0.277	0.017
		best fused	**−64.93**	**−64.93**	**−64.93**	−64.06	−64.06	**−64.93**
		$t_{\text{fuse}}(s)$	0.604	0.081	0.085	0.273	0.277	0.054

motor8, known optimum: -79.71

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−79.71**	*best generated*						
	0.113	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.306	0.035	0.036	0.166	0.165	0.039
		best fused	**−79.71**	**−79.71**	**−79.71**	**−79.71**	**−79.71**	**−79.71**
		$t_{\text{fuse}}(s)$	0.306	0.035	0.036	0.166	0.165	0.039
dd-ls3	**−79.71**	*best generated*						
	2.757	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.520	1.034	1.036	2.848	2.848	0.596
		best fused	**−79.71**	**−79.71**	**−79.71**	**−79.71**	**−79.71**	**−79.71**
		$t_{\text{fuse}}(s)$	1.520	1.034	1.036	2.848	2.848	0.596
dd-ls4	**−79.71**	*best generated*						
	16.918	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.845	0.984	0.730	17.064	17.067	1.290
		best fused	**−79.71**	**−79.71**	**−79.71**	**−79.71**	**−79.71**	**−79.71**
		$t_{\text{fuse}}(s)$	0.845	0.984	0.730	17.064	17.067	1.290
bca-lap	**−79.71**	*best generated*						
	28.974	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.679	0.608	0.609	0.608	0.608	0.611
		best fused	**−79.71**	**−79.71**	**−79.71**	**−79.71**	**−79.71**	**−79.71**
		$t_{\text{fuse}}(s)$	0.679	0.608	0.609	0.608	0.608	0.611
bca-greedy	**−79.71**	*best generated*						
	1.918	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.062	0.015	0.015	0.042	0.042	0.016
		best fused	**−79.71**	**−79.71**	**−79.71**	**−79.71**	**−79.71**	**−79.71**
		$t_{\text{fuse}}(s)$	0.062	0.015	0.015	0.042	0.042	0.016
greedy	−71.63	*best generated*						
	0.021	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.540	0.075	0.075	0.070	0.067	0.059
		best fused	**−79.71**	**−79.71**	**−79.71**	−71.63	−71.63	**−79.71**
		$t_{\text{fuse}}(s)$	1.478	0.339	0.347	0.070	0.067	0.111

motor9, known optimum: -55.17

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−55.17**	*best generated*						
	0.026	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.072	0.007	0.007	0.047	0.049	0.008
		best fused	**−55.17**	**−55.17**	**−55.17**	**−55.17**	**−55.17**	**−55.17**
		$t_{\text{fuse}}(s)$	0.072	0.007	0.007	0.047	0.049	0.008
dd-ls3	**−55.17**	*best generated*						
	0.306	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.107	0.029	0.029	0.339	0.340	0.031
		best fused	**−55.17**	**−55.17**	**−55.17**	**−55.17**	**−55.17**	**−55.17**
		$t_{\text{fuse}}(s)$	0.107	0.029	0.029	0.339	0.340	0.031
dd-ls4	**−55.17**	*best generated*						
	1.504	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.256	0.136	0.137	1.541	1.542	0.138
		best fused	**−55.17**	**−55.17**	**−55.17**	**−55.17**	**−55.17**	**−55.17**
		$t_{\text{fuse}}(s)$	0.256	0.136	0.137	1.541	1.542	0.138
bca-lap	**−55.17**	*best generated*						
	6.078	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.113	0.080	0.080	0.079	0.079	0.080
		best fused	**−55.17**	**−55.17**	**−55.17**	**−55.17**	**−55.17**	**−55.17**
		$t_{\text{fuse}}(s)$	0.113	0.080	0.080	0.079	0.079	0.080
bca-greedy	**−55.17**	*best generated*						
	0.326	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.059	0.008	0.008	0.025	0.025	0.009
		best fused	**−55.17**	**−55.17**	**−55.17**	**−55.17**	**−55.17**	**−55.17**
		$t_{\text{fuse}}(s)$	0.059	0.008	0.008	0.025	0.025	0.009
greedy	−52.94	*best generated*						
	0.023	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.155	0.031	0.032	0.074	0.073	0.016
		best fused	**−55.17**	**−55.17**	**−55.17**	−52.94	−52.94	**−55.17**
		$t_{\text{fuse}}(s)$	0.161	0.063	0.066	0.074	0.073	0.017

motor10, known optimum: -48.95

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−48.95**	*best generated*						
	0.009	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.065	0.008	0.008	0.018	0.019	0.009
		best fused	**−48.95**	**−48.95**	**−48.95**	**−48.95**	**−48.95**	**−48.95**
		$t_{\text{fuse}}(s)$	0.065	0.008	0.008	0.018	0.019	0.009
dd-ls3	**−48.95**	*best generated*						
	0.150	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.084	0.019	0.019	0.174	0.174	0.020
		best fused	**−48.95**	**−48.95**	**−48.95**	**−48.95**	**−48.95**	**−48.95**
		$t_{\text{fuse}}(s)$	0.084	0.019	0.019	0.174	0.174	0.020
dd-ls4	**−48.95**	*best generated*						
	0.251	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.099	0.082	0.082	0.267	0.267	0.040
		best fused	**−48.95**	**−48.95**	**−48.95**	**−48.95**	**−48.95**	**−48.95**
		$t_{\text{fuse}}(s)$	0.099	0.082	0.082	0.267	0.267	0.040
bca-lap	**−48.95**	*best generated*						
	3.843	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.099	0.069	0.069	0.069	0.069	0.069
		best fused	**−48.95**	**−48.95**	**−48.95**	**−48.95**	**−48.95**	**−48.95**
		$t_{\text{fuse}}(s)$	0.099	0.069	0.069	0.069	0.069	0.069
bca-greedy	**−48.95**	*best generated*						
	0.216	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.041	0.006	0.006	0.006	0.006	0.007
		best fused	**−48.95**	**−48.95**	**−48.95**	**−48.95**	**−48.95**	**−48.95**
		$t_{\text{fuse}}(s)$	0.041	0.006	0.006	0.006	0.006	0.007
greedy	**−48.95**	*best generated*						
	0.000	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.062	0.003	0.003	0.003	0.004	0.003
		best fused	**−48.95**	**−48.95**	**−48.95**	**−48.95**	**−48.95**	**−48.95**
		$t_{\text{fuse}}(s)$	0.062	0.003	0.003	0.003	0.004	0.003

motor11, known optimum: -50.16

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−50.16**	*best generated*						
	0.010	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.060	0.006	0.006	0.020	0.021	0.008
		best fused	**−50.16**	**−50.16**	**−50.16**	**−50.16**	**−50.16**	**−50.16**
		$t_{\text{fuse}}(s)$	0.060	0.006	0.006	0.020	0.021	0.008
dd-ls3	**−50.16**	*best generated*						
	0.174	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.052	0.028	0.029	0.196	0.196	0.011
		best fused	**−50.16**	**−50.16**	**−50.16**	**−50.16**	**−50.16**	**−50.16**
		$t_{\text{fuse}}(s)$	0.052	0.028	0.029	0.196	0.196	0.011
dd-ls4	**−50.16**	*best generated*						
	0.173	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.087	0.082	0.082	0.186	0.186	0.084
		best fused	**−50.16**	**−50.16**	**−50.16**	**−50.16**	**−50.16**	**−50.16**
		$t_{\text{fuse}}(s)$	0.087	0.082	0.082	0.186	0.186	0.084
bca-lap	**−50.16**	*best generated*						
	4.270	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.111	0.051	0.051	0.051	0.051	0.051
		best fused	**−50.16**	**−50.16**	**−50.16**	**−50.16**	**−50.16**	**−50.16**
		$t_{\text{fuse}}(s)$	0.111	0.051	0.051	0.051	0.051	0.051
bca-greedy	**−50.16**	*best generated*						
	0.289	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.042	0.005	0.005	0.008	0.008	0.005
		best fused	**−50.16**	**−50.16**	**−50.16**	**−50.16**	**−50.16**	**−50.16**
		$t_{\text{fuse}}(s)$	0.042	0.005	0.005	0.008	0.008	0.005
greedy	**−50.16**	*best generated*						
	0.065	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.278	0.010	0.010	0.204	0.206	0.013
		best fused	**−50.16**	**−50.16**	**−50.16**	**−50.16**	**−50.16**	**−50.16**
		$t_{\text{fuse}}(s)$	0.278	0.010	0.010	0.204	0.206	0.013

motor12, known optimum: -55.81

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−55.81**	*best generated*						
	0.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.088	0.011	0.011	0.064	0.065	0.012
		best fused	**−55.81**	**−55.81**	**−55.81**	**−55.81**	**−55.81**	**−55.81**
		$t_{\text{fuse}}(s)$	0.088	0.011	0.011	0.064	0.065	0.012
dd-ls3	**−55.81**	*best generated*						
	0.530	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.340	0.129	0.130	0.573	0.572	0.134
		best fused	**−55.81**	**−55.81**	**−55.81**	**−55.81**	**−55.81**	**−55.81**
		$t_{\text{fuse}}(s)$	0.340	0.129	0.130	0.573	0.572	0.134
dd-ls4	**−55.81**	*best generated*						
	4.146	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.179	0.119	0.119	4.211	4.212	0.120
		best fused	**−55.81**	**−55.81**	**−55.81**	**−55.81**	**−55.81**	**−55.81**
		$t_{\text{fuse}}(s)$	0.179	0.119	0.119	4.211	4.212	0.120
bca-lap	**−55.81**	*best generated*						
	10.781	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.351	0.216	0.216	3.042	3.043	0.217
		best fused	**−55.81**	**−55.81**	**−55.81**	**−55.81**	**−55.81**	**−55.81**
		$t_{\text{fuse}}(s)$	0.351	0.216	0.216	3.042	3.043	0.217
bca-greedy	**−55.81**	*best generated*						
	0.538	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.040	0.006	0.006	0.034	0.035	0.006
		best fused	**−55.81**	**−55.81**	**−55.81**	**−55.81**	**−55.81**	**−55.81**
		$t_{\text{fuse}}(s)$	0.040	0.006	0.006	0.034	0.035	0.006
greedy	−52.52	*best generated*						
	0.024	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.364	0.023	0.024	0.078	0.075	0.138
		best fused	**−55.81**	**−55.81**	**−55.81**	−52.52	−52.52	**−55.81**
		$t_{\text{fuse}}(s)$	4.339	0.329	0.353	0.078	0.075	0.456

motor13, known optimum: -36.35

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−36.35**	*best generated*						
	0.046	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.651	0.039	0.065	0.097	0.097	0.090
		best fused	**−36.35**	**−36.35**	**−36.35**	**−36.35**	**−36.35**	**−36.35**
		$t_{\text{fuse}}(s)$	0.651	0.039	0.065	0.097	0.097	0.090
dd-ls3	**−36.35**	*best generated*						
	0.432	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.739	0.252	0.256	0.486	0.487	0.134
		best fused	**−36.35**	**−36.35**	**−36.35**	**−36.35**	**−36.35**	**−36.35**
		$t_{\text{fuse}}(s)$	0.739	0.252	0.256	0.486	0.487	0.134
dd-ls4	**−36.35**	*best generated*						
	4.047	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.728	2.195	2.198	4.118	4.117	0.513
		best fused	**−36.35**	**−36.35**	**−36.35**	**−36.35**	**−36.35**	**−36.35**
		$t_{\text{fuse}}(s)$	2.728	2.195	2.198	4.118	4.117	0.513
bca-lap	−35.45	*best generated*						
	1.615	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.382	0.317	0.317	0.497	0.499	0.319
		best fused	**−36.35**	**−36.35**	**−36.35**	−35.45	−35.45	**−36.35**
		$t_{\text{fuse}}(s)$	2.044	1.860	1.863	0.497	0.499	1.873
bca-greedy	**−36.35**	*best generated*						
	0.235	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.172	0.028	0.028	0.028	0.028	0.036
		best fused	**−36.35**	**−36.35**	**−36.35**	**−36.35**	**−36.35**	**−36.35**
		$t_{\text{fuse}}(s)$	0.172	0.028	0.028	0.028	0.028	0.036
greedy	−32.03	*best generated*						
	0.036	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.585	0.048	0.053	0.129	0.123	0.040
		best fused	−33.69	−33.69	−33.69	−32.03	−32.03	−33.69
		$t_{\text{fuse}}(s)$	3.406	0.244	0.270	0.129	0.123	0.326

motor14, known optimum: -43.80

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−43.80**	*best generated*						
	0.082	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.026	0.140	0.145	0.147	0.148	0.206
		best fused	**−43.80**	**−43.80**	**−43.80**	**−43.80**	**−43.80**	**−43.80**
		$t_{\text{fuse}}(s)$	1.026	0.140	0.145	0.147	0.148	0.206
dd-ls3	**−43.80**	*best generated*						
	1.273	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.603	1.354	1.358	1.368	1.367	1.419
		best fused	**−43.80**	**−43.80**	**−43.80**	**−43.80**	**−43.80**	**−43.80**
		$t_{\text{fuse}}(s)$	2.603	1.354	1.358	1.368	1.367	1.419
dd-ls4	**−43.80**	*best generated*						
	13.576	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	11.638	10.679	8.982	13.694	13.697	13.766
		best fused	**−43.80**	**−43.80**	**−43.80**	**−43.80**	**−43.80**	**−43.80**
		$t_{\text{fuse}}(s)$	11.638	10.679	8.982	13.694	13.697	13.766
bca-lap	−42.92	*best generated*						
	0.370	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.424	0.366	0.367	0.366	0.367	0.368
		best fused	−42.92	−42.92	−42.92	−42.92	−42.92	−42.92
		$t_{\text{fuse}}(s)$	0.424	0.366	0.367	0.366	0.367	0.368
bca-greedy	−43.47	*best generated*						
	0.264	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.196	0.034	0.035	0.345	0.346	0.031
		best fused	**−43.80**	**−43.80**	**−43.80**	−43.47	−43.47	**−43.80**
		$t_{\text{fuse}}(s)$	0.196	0.034	0.035	0.345	0.346	0.031
greedy	−42.37	*best generated*						
	0.018	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.434	0.056	0.060	0.057	0.060	0.072
		best fused	−43.70	−43.72	−43.72	−42.37	−42.37	−43.72
		$t_{\text{fuse}}(s)$	4.739	0.056	0.060	0.057	0.060	0.072

motor15, known optimum: -32.30

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−32.30**	*best generated*						
	0.040	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.267	0.027	0.028	0.088	0.086	0.110
		best fused	**−32.30**	**−32.30**	**−32.30**	**−32.30**	**−32.30**	**−32.30**
		$t_{\text{fuse}}(s)$	0.267	0.027	0.028	0.088	0.086	0.110
dd-ls3	**−32.30**	*best generated*						
	0.356	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.200	0.159	0.043	0.409	0.410	0.128
		best fused	**−32.30**	**−32.30**	**−32.30**	**−32.30**	**−32.30**	**−32.30**
		$t_{\text{fuse}}(s)$	0.200	0.159	0.043	0.409	0.410	0.128
dd-ls4	**−32.30**	*best generated*						
	3.162	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.619	0.116	1.188	3.227	3.229	3.292
		best fused	**−32.30**	**−32.30**	**−32.30**	**−32.30**	**−32.30**	**−32.30**
		$t_{\text{fuse}}(s)$	1.619	0.116	1.188	3.227	3.229	3.292
bca-lap	**−32.30**	*best generated*						
	0.152	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.095	0.060	0.059	0.059	0.059	0.060
		best fused	**−32.30**	**−32.30**	**−32.30**	**−32.30**	**−32.30**	**−32.30**
		$t_{\text{fuse}}(s)$	0.095	0.060	0.059	0.059	0.059	0.060
bca-greedy	**−32.30**	*best generated*						
	0.314	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.084	0.013	0.014	0.031	0.030	0.031
		best fused	**−32.30**	**−32.30**	**−32.30**	**−32.30**	**−32.30**	**−32.30**
		$t_{\text{fuse}}(s)$	0.084	0.013	0.014	0.031	0.030	0.031
greedy	−29.23	*best generated*						
	0.057	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.489	0.028	0.030	0.184	0.189	0.037
		best fused	−32.06	−32.06	−32.06	−29.23	−29.23	−32.06
		$t_{\text{fuse}}(s)$	4.211	0.233	0.260	0.184	0.189	0.309

motor16, known optimum: -75.13

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−75.13**	*best generated*						
	0.037	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.111	0.016	0.016	0.059	0.058	0.018
		best fused	**−75.13**	**−75.13**	**−75.13**	**−75.13**	**−75.13**	**−75.13**
		$t_{\text{fuse}}(s)$	0.111	0.016	0.016	0.059	0.058	0.018
dd-ls3	**−75.13**	*best generated*						
	2.403	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.147	0.072	0.073	2.464	2.466	0.074
		best fused	**−75.13**	**−75.13**	**−75.13**	**−75.13**	**−75.13**	**−75.13**
		$t_{\text{fuse}}(s)$	0.147	0.072	0.073	2.464	2.466	0.074
dd-ls4	**−75.13**	*best generated*						
	6.265	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.211	1.063	1.063	6.365	6.364	2.766
		best fused	**−75.13**	**−75.13**	**−75.13**	**−75.13**	**−75.13**	**−75.13**
		$t_{\text{fuse}}(s)$	1.211	1.063	1.063	6.365	6.364	2.766
bca-lap	**−75.13**	*best generated*						
	12.469	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.123	0.081	0.081	0.081	0.081	0.081
		best fused	**−75.13**	**−75.13**	**−75.13**	**−75.13**	**−75.13**	**−75.13**
		$t_{\text{fuse}}(s)$	0.123	0.081	0.081	0.081	0.081	0.081
bca-greedy	**−75.13**	*best generated*						
	0.840	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.054	0.007	0.008	0.015	0.015	0.007
		best fused	**−75.13**	**−75.13**	**−75.13**	**−75.13**	**−75.13**	**−75.13**
		$t_{\text{fuse}}(s)$	0.054	0.007	0.008	0.015	0.015	0.007
greedy	−67.85	*best generated*						
	0.061	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.296	0.061	0.069	0.200	0.203	0.083
		best fused	**−75.13**	**−75.13**	**−75.13**	−67.85	−67.85	**−75.13**
		$t_{\text{fuse}}(s)$	5.896	0.168	0.186	0.200	0.203	0.227

motor17, known optimum: -84.38

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−84.38**	*best generated*						
	0.120	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.606	0.148	0.151	0.176	0.175	0.166
		best fused	**−84.38**	**−84.38**	**−84.38**	**−84.38**	**−84.38**	**−84.38**
		$t_{\text{fuse}}(s)$	0.606	0.148	0.151	0.176	0.175	0.166
dd-ls3	**−84.38**	*best generated*						
	1.899	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.565	1.105	1.108	1.972	1.974	1.168
		best fused	**−84.38**	**−84.38**	**−84.38**	**−84.38**	**−84.38**	**−84.38**
		$t_{\text{fuse}}(s)$	1.565	1.105	1.108	1.972	1.974	1.168
dd-ls4	**−84.38**	*best generated*						
	12.288	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.846	4.449	4.450	12.416	12.417	4.469
		best fused	**−84.38**	**−84.38**	**−84.38**	**−84.38**	**−84.38**	**−84.38**
		$t_{\text{fuse}}(s)$	4.846	4.449	4.450	12.416	12.417	4.469
bca-lap	**−84.38**	*best generated*						
	0.089	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.141	0.106	0.105	0.106	0.105	0.106
		best fused	**−84.38**	**−84.38**	**−84.38**	**−84.38**	**−84.38**	**−84.38**
		$t_{\text{fuse}}(s)$	0.141	0.106	0.105	0.106	0.105	0.106
bca-greedy	**−84.38**	*best generated*						
	1.239	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.080	0.024	0.024	0.024	0.024	0.030
		best fused	**−84.38**	**−84.38**	**−84.38**	**−84.38**	**−84.38**	**−84.38**
		$t_{\text{fuse}}(s)$	0.080	0.024	0.024	0.024	0.024	0.030
greedy	−78.95	*best generated*						
	0.147	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.847	0.045	0.051	0.455	0.470	0.040
		best fused	**−84.38**	**−84.38**	**−84.38**	−78.95	−78.95	**−84.38**
		$t_{\text{fuse}}(s)$	5.790	0.335	0.367	0.455	0.470	0.441

motor18, known optimum: -131.41

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−131.41**	*best generated*						
	0.130	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.123	0.023	0.024	0.169	0.168	0.032
		best fused	**−131.41**	**−131.41**	**−131.41**	**−131.41**	**−131.41**	**−131.41**
		$t_{\text{fuse}}(s)$	0.123	0.023	0.024	0.169	0.168	0.032
dd-ls3	**−131.41**	*best generated*						
	3.104	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.572	0.596	0.382	3.189	3.189	0.603
		best fused	**−131.41**	**−131.41**	**−131.41**	**−131.41**	**−131.41**	**−131.41**
		$t_{\text{fuse}}(s)$	0.572	0.596	0.382	3.189	3.189	0.603
dd-ls4	**−131.41**	*best generated*						
	14.619	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.815	3.406	3.408	14.801	14.801	1.527
		best fused	**−131.41**	**−131.41**	**−131.41**	**−131.41**	**−131.41**	**−131.41**
		$t_{\text{fuse}}(s)$	1.815	3.406	3.408	14.801	14.801	1.527
bca-lap	**−131.41**	*best generated*						
	17.871	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.187	0.130	0.130	0.131	0.130	0.131
		best fused	**−131.41**	**−131.41**	**−131.41**	**−131.41**	**−131.41**	**−131.41**
		$t_{\text{fuse}}(s)$	0.187	0.130	0.130	0.131	0.130	0.131
bca-greedy	**−131.41**	*best generated*						
	2.249	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.062	0.017	0.017	0.038	0.037	0.017
		best fused	**−131.41**	**−131.41**	**−131.41**	**−131.41**	**−131.41**	**−131.41**
		$t_{\text{fuse}}(s)$	0.062	0.017	0.017	0.038	0.037	0.017
greedy	−123.38	*best generated*						
	0.100	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.269	0.029	0.029	0.311	0.308	0.021
		best fused	**−131.41**	**−131.41**	**−131.41**	−123.38	−123.38	**−131.41**
		$t_{\text{fuse}}(s)$	1.064	0.073	0.076	0.311	0.308	0.086

motor19, known optimum: -75.29

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−75.29**	*best generated*						
	0.017	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.051	0.007	0.007	0.030	0.030	0.007
		best fused	**−75.29**	**−75.29**	**−75.29**	**−75.29**	**−75.29**	**−75.29**
		$t_{\text{fuse}}(s)$	0.051	0.007	0.007	0.030	0.030	0.007
dd-ls3	**−75.29**	*best generated*						
	0.101	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.118	0.016	0.016	0.115	0.115	0.017
		best fused	**−75.29**	**−75.29**	**−75.29**	**−75.29**	**−75.29**	**−75.29**
		$t_{\text{fuse}}(s)$	0.118	0.016	0.016	0.115	0.115	0.017
dd-ls4	**−75.29**	*best generated*						
	1.770	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.141	0.082	0.082	1.813	1.813	0.119
		best fused	**−75.29**	**−75.29**	**−75.29**	**−75.29**	**−75.29**	**−75.29**
		$t_{\text{fuse}}(s)$	0.141	0.082	0.082	1.813	1.813	0.119
bca-lap	**−75.29**	*best generated*						
	6.908	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.102	0.069	0.068	0.069	0.068	0.069
		best fused	**−75.29**	**−75.29**	**−75.29**	**−75.29**	**−75.29**	**−75.29**
		$t_{\text{fuse}}(s)$	0.102	0.069	0.068	0.069	0.068	0.069
bca-greedy	**−75.29**	*best generated*						
	0.428	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.050	0.012	0.012	0.011	0.012	0.012
		best fused	**−75.29**	**−75.29**	**−75.29**	**−75.29**	**−75.29**	**−75.29**
		$t_{\text{fuse}}(s)$	0.050	0.012	0.012	0.011	0.012	0.012
greedy	**−75.29**	*best generated*						
	0.060	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.444	0.025	0.027	0.197	0.191	0.032
		best fused	**−75.29**	**−75.29**	**−75.29**	**−75.29**	**−75.29**	**−75.29**
		$t_{\text{fuse}}(s)$	0.444	0.025	0.027	0.197	0.191	0.032

motor20, known optimum: -82.10

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−82.10**	*best generated*						
	0.084	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.247	0.045	0.046	0.126	0.124	0.081
		best fused	**−82.10**	**−82.10**	**−82.10**	**−82.10**	**−82.10**	**−82.10**
		$t_{\text{fuse}}(s)$	0.247	0.045	0.046	0.126	0.124	0.081
dd-ls3	**−82.10**	*best generated*						
	2.292	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.442	0.241	0.241	2.377	2.378	0.186
		best fused	**−82.10**	**−82.10**	**−82.10**	**−82.10**	**−82.10**	**−82.10**
		$t_{\text{fuse}}(s)$	0.442	0.241	0.241	2.377	2.378	0.186
dd-ls4	**−82.10**	*best generated*						
	14.748	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.347	1.166	1.167	14.894	14.894	2.653
		best fused	**−82.10**	**−82.10**	**−82.10**	**−82.10**	**−82.10**	**−82.10**
		$t_{\text{fuse}}(s)$	1.347	1.166	1.167	14.894	14.894	2.653
bca-lap	**−82.10**	*best generated*						
	8.677	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.338	0.294	0.294	0.294	0.294	0.296
		best fused	**−82.10**	**−82.10**	**−82.10**	**−82.10**	**−82.10**	**−82.10**
		$t_{\text{fuse}}(s)$	0.338	0.294	0.294	0.294	0.294	0.296
bca-greedy	**−82.10**	*best generated*						
	0.611	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.146	0.054	0.054	0.054	0.054	0.057
		best fused	**−82.10**	**−82.10**	**−82.10**	**−82.10**	**−82.10**	**−82.10**
		$t_{\text{fuse}}(s)$	0.146	0.054	0.054	0.054	0.054	0.057
greedy	−80.99	*best generated*						
	0.045	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.862	0.031	0.035	0.161	0.150	0.212
		best fused	**−82.10**	**−82.10**	**−82.10**	−80.99	−80.99	−81.55
		$t_{\text{fuse}}(s)$	1.862	0.031	0.035	0.161	0.150	0.212

A6.5. flow

number of instances: 6

maximum number of iterations during generation: 2000

flow1 (*board*), known optimum: -2262.66

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−2262.66** 0.616	*best generated* $t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.323	0.365	0.427	1.228	1.300	2.026
		best fused $t_{\text{fuse}}(s)$	**−2262.66** 3.323	**−2262.66** 0.365	**−2262.66** 0.427	**−2262.66** 1.228	**−2262.66** 1.300	**−2262.66** 2.026
dd-ls3	**−2262.66** 0.922	*best generated* $t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.618	0.268	0.277	1.361	1.307	2.070
		best fused $t_{\text{fuse}}(s)$	**−2262.66** 1.618	**−2262.66** 0.268	**−2262.66** 0.277	**−2262.66** 1.361	**−2262.66** 1.307	**−2262.66** 2.070
dd-ls4	**−2262.66** 1.593	*best generated* $t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.878	0.603	0.622	1.927	1.909	2.227
		best fused $t_{\text{fuse}}(s)$	**−2262.66** 1.878	**−2262.66** 0.603	**−2262.66** 0.622	**−2262.66** 1.927	**−2262.66** 1.909	**−2262.66** 2.227
bca-lap	**−2262.66** 15.045	*best generated* $t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.603	4.080	4.124	4.194	4.171	4.360
		best fused $t_{\text{fuse}}(s)$	**−2262.66** 4.603	**−2262.66** 4.080	**−2262.66** 4.124	**−2262.66** 4.194	**−2262.66** 4.171	**−2262.66** 4.360
bca-greedy	**−2262.66** 3.294	*best generated* $t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.092	0.024	0.024	0.166	0.171	0.212
		best fused $t_{\text{fuse}}(s)$	**−2262.66** 0.092	**−2262.66** 0.024	**−2262.66** 0.024	**−2262.66** 0.166	**−2262.66** 0.171	**−2262.66** 0.212
greedy	−2261.62 0.056	*best generated* $t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.127	0.007	0.008	0.248	0.246	0.702
		best fused $t_{\text{fuse}}(s)$	**−2262.66** 0.175	**−2262.66** 0.013	**−2262.66** 0.017	−2261.62 0.248	−2261.62 0.246	**−2262.66** 2.691

flow2 (*books*)

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−4021.66	*best generated*						
	6.127	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.848	0.733	0.833	10.838	10.753	9.081
		best fused	−4110.35	−4110.35	−4110.35	−4021.66	−4021.66	−4058.88
		$t_{\text{fuse}}(s)$	18.774	4.993	5.543	10.838	10.753	13.169
dd-ls3	−4100.28	*best generated*						
	16.043	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	8.441	2.841	2.939	22.195	21.860	14.642
		best fused	−4135.27	−4134.77	−4134.77	−4100.28	−4100.28	−4112.27
		$t_{\text{fuse}}(s)$	34.243	19.953	17.708	22.195	21.860	21.152
dd-ls4	−4103.72	*best generated*						
	34.242	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	7.285	3.133	15.697	39.493	39.579	28.200
		best fused	−4135.27	−4134.77	−4134.77	−4103.72	−4103.72	−4134.75
		$t_{\text{fuse}}(s)$	51.039	33.232	33.894	39.493	39.579	49.819
bca-lap	−4076.69	*best generated*						
	25.417	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	17.971	16.757	17.008	28.194	28.313	28.669
		best fused	−4127.84	−4127.84	−4127.84	−4076.69	−4076.69	−4081.90
		$t_{\text{fuse}}(s)$	57.972	54.322	55.137	28.194	28.313	74.822
bca-greedy	−4133.46	*best generated*						
	26.953	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.493	3.246	3.357	33.823	33.658	20.385
		best fused	−4135.27	−4135.27	−4135.27	−4133.46	−4133.46	−4135.27
		$t_{\text{fuse}}(s)$	4.493	3.246	3.357	33.823	33.658	23.380
greedy	−3912.25	*best generated*						
	1.138	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.131	0.013	0.015	5.923	6.507	3.385
		best fused	−4124.40	−4124.40	−4124.40	−3912.25	−3912.25	−4052.33
		$t_{\text{fuse}}(s)$	0.811	0.102	0.127	5.923	6.507	16.245

flow3 (*hammer*), known optimum: -2097.78

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−2097.78**	*best generated*						
	3.189	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.974	0.629	1.857	5.555	5.549	5.033
		best fused	**−2097.78**	**−2097.78**	**−2097.78**	**−2097.78**	**−2097.78**	**−2097.78**
		$t_{\text{fuse}}(s)$	3.974	0.629	1.857	5.555	5.549	5.033
dd-ls3	**−2097.78**	*best generated*						
	3.744	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.721	0.495	0.471	4.910	4.922	5.219
		best fused	**−2097.78**	**−2097.78**	**−2097.78**	**−2097.78**	**−2097.78**	**−2097.78**
		$t_{\text{fuse}}(s)$	2.721	0.495	0.471	4.910	4.922	5.219
dd-ls4	**−2097.78**	*best generated*						
	11.117	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.040	1.689	1.718	12.536	12.365	14.143
		best fused	**−2097.78**	**−2097.78**	**−2097.78**	**−2097.78**	**−2097.78**	**−2097.78**
		$t_{\text{fuse}}(s)$	4.040	1.689	1.718	12.536	12.365	14.143
bca-lap	−1907.12	*best generated*						
	3.714	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.397	3.061	3.084	3.179	3.154	3.271
		best fused	−2029.20	−2011.13	−2029.20	−1907.12	−1907.12	−1934.52
		$t_{\text{fuse}}(s)$	38.231	3.061	35.582	3.179	3.154	38.298
bca-greedy	**−2097.78**	*best generated*						
	12.600	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.339	0.173	0.179	5.427	5.541	5.529
		best fused	**−2097.78**	**−2097.78**	**−2097.78**	**−2097.78**	**−2097.78**	**−2097.78**
		$t_{\text{fuse}}(s)$	0.339	0.173	0.179	5.427	5.541	5.529
greedy	−1995.84	*best generated*						
	0.190	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.087	0.010	0.010	1.164	1.040	4.471
		best fused	**−2097.78**	**−2097.78**	**−2097.78**	−1995.84	−1995.84	−2036.68
		$t_{\text{fuse}}(s)$	0.237	0.030	0.032	1.164	1.040	14.117

flow4 (*party*), known optimum: -3629.91

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−3629.72	*best generated*						
	3.250	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	9.113	1.731	1.862	6.141	6.249	10.374
		best fused	**−3629.91**	**−3629.91**	**−3629.91**	−3629.72	−3629.72	−3629.72
		$t_{\text{fuse}}(s)$	9.113	1.731	1.862	6.141	6.249	10.374
dd-ls3	**−3629.91**	*best generated*						
	3.772	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	9.318	3.490	3.719	5.250	5.321	7.906
		best fused	**−3629.91**	**−3629.91**	**−3629.91**	**−3629.91**	**−3629.91**	**−3629.91**
		$t_{\text{fuse}}(s)$	9.318	3.490	3.719	5.250	5.321	7.906
dd-ls4	**−3629.91**	*best generated*						
	10.735	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	10.045	6.939	5.711	12.627	12.752	15.942
		best fused	**−3629.91**	**−3629.91**	**−3629.91**	**−3629.91**	**−3629.91**	**−3629.91**
		$t_{\text{fuse}}(s)$	10.045	6.939	5.711	12.627	12.752	15.942
bca-lap	**−3629.91**	*best generated*						
	31.380	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	23.529	20.891	21.185	21.860	22.181	22.905
		best fused	**−3629.91**	**−3629.91**	**−3629.91**	**−3629.91**	**−3629.91**	**−3629.91**
		$t_{\text{fuse}}(s)$	23.529	20.891	21.185	21.860	22.181	22.905
bca-greedy	**−3629.91**	*best generated*						
	13.599	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.406	0.199	0.213	1.561	1.637	1.932
		best fused	**−3629.91**	**−3629.91**	**−3629.91**	**−3629.91**	**−3629.91**	**−3629.91**
		$t_{\text{fuse}}(s)$	0.406	0.199	0.213	1.561	1.637	1.932
greedy	−3570.66	*best generated*						
	0.248	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.458	0.017	0.022	1.696	1.636	5.235
		best fused	**−3629.91**	**−3629.91**	**−3629.91**	−3570.66	−3570.66	−3601.79
		$t_{\text{fuse}}(s)$	3.884	0.455	0.609	1.696	1.636	6.750

flow5 (*table*), known optimum: -3288.51

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−3275.31	*best generated*						
	2.894	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	6.528	1.553	1.698	5.548	5.750	5.008
		best fused	**−3288.51**	−3288.10	**−3288.51**	−3275.31	−3275.31	−3277.98
		$t_{\text{fuse}}(s)$	6.528	1.553	1.698	5.548	5.750	6.786
dd-ls3	**−3288.51**	*best generated*						
	3.358	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	7.077	3.140	3.304	4.683	4.705	5.909
		best fused	**−3288.51**	**−3288.51**	**−3288.51**	**−3288.51**	**−3288.51**	**−3288.51**
		$t_{\text{fuse}}(s)$	7.077	3.140	3.304	4.683	4.705	5.909
dd-ls4	**−3288.51**	*best generated*						
	5.406	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	8.123	4.812	4.931	6.366	6.454	7.720
		best fused	**−3288.51**	**−3288.51**	**−3288.51**	**−3288.51**	**−3288.51**	**−3288.51**
		$t_{\text{fuse}}(s)$	8.123	4.812	4.931	6.366	6.454	7.720
bca-lap	−3147.98	*best generated*						
	7.543	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	6.609	5.814	5.917	8.113	8.118	8.469
		best fused	−3170.68	−3170.68	−3170.68	−3147.98	−3147.98	−3148.29
		$t_{\text{fuse}}(s)$	16.886	15.077	15.340	8.113	8.118	8.469
bca-greedy	−3277.26	*best generated*						
	0.818	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.301	0.120	0.123	1.074	1.048	0.308
		best fused	**−3288.51**	**−3288.51**	**−3288.51**	−3277.26	−3277.26	**−3288.51**
		$t_{\text{fuse}}(s)$	0.384	0.163	0.167	1.074	1.048	13.547
greedy	−3192.41	*best generated*						
	0.341	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.197	0.010	0.009	1.751	1.609	3.164
		best fused	**−3288.51**	**−3288.51**	**−3288.51**	−3192.41	−3192.41	−3276.50
		$t_{\text{fuse}}(s)$	0.638	0.073	0.085	1.751	1.609	5.975

flow6 (*walking*), known optimum: -1625.85

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**−1625.85**	*best generated*						
	0.689	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.216	0.065	0.070	1.095	1.098	1.840
		best fused	**−1625.85**	**−1625.85**	**−1625.85**	**−1625.85**	**−1625.85**	**−1625.85**
		$t_{\text{fuse}}(s)$	1.216	0.065	0.070	1.095	1.098	1.840
dd-ls3	**−1625.85**	*best generated*						
	2.085	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.077	0.695	0.703	2.379	2.387	3.048
		best fused	**−1625.85**	**−1625.85**	**−1625.85**	**−1625.85**	**−1625.85**	**−1625.85**
		$t_{\text{fuse}}(s)$	3.077	0.695	0.703	2.379	2.387	3.048
dd-ls4	**−1625.85**	*best generated*						
	4.902	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.348	1.310	1.315	5.215	5.188	5.119
		best fused	**−1625.85**	**−1625.85**	**−1625.85**	**−1625.85**	**−1625.85**	**−1625.85**
		$t_{\text{fuse}}(s)$	3.348	1.310	1.315	5.215	5.188	5.119
bca-lap	−1625.55	*best generated*						
	2.122	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.202	1.077	1.082	1.086	1.092	1.130
		best fused	−1625.55	−1625.55	−1625.55	−1625.55	−1625.55	−1625.55
		$t_{\text{fuse}}(s)$	1.202	1.077	1.082	1.086	1.092	1.130
bca-greedy	**−1625.85**	*best generated*						
	0.607	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.099	0.028	0.029	0.262	0.250	0.325
		best fused	**−1625.85**	**−1625.85**	**−1625.85**	**−1625.85**	**−1625.85**	**−1625.85**
		$t_{\text{fuse}}(s)$	0.099	0.028	0.029	0.262	0.250	0.325
greedy	−1623.27	*best generated*						
	0.280	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.214	0.014	0.016	1.257	1.161	0.706
		best fused	**−1625.85**	**−1625.85**	**−1625.85**	−1623.27	−1623.27	**−1625.85**
		$t_{\text{fuse}}(s)$	0.214	0.014	0.016	1.257	1.161	1.056

A6.6. opengm

number of instances: 4

maximum number of iterations during generation: 3000

opengm0 (*matching0*), known optimum: 19.36

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	60.14	*best generated*						
	0.958	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.030	0.069	0.062	1.394	1.393	0.070
		best fused	32.93	33.95	39.20	60.14	60.14	39.20
		$t_{\text{fuse}}(s)$	24.895	0.695	0.455	1.394	1.393	0.437
dd-ls3	**19.36**	*best generated*						
	3.264	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	69.549	3.528	3.560	3.682	3.694	3.760
		best fused	**19.36**	**19.36**	**19.36**	**19.36**	**19.36**	**19.36**
		$t_{\text{fuse}}(s)$	69.549	3.528	3.560	3.682	3.694	3.760
dd-ls4	**19.36**	*best generated*						
	25.738	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	80.629	25.433	22.885	26.121	26.119	22.988
		best fused	**19.36**	**19.36**	**19.36**	**19.36**	**19.36**	**19.36**
		$t_{\text{fuse}}(s)$	80.629	25.433	22.885	26.121	26.119	22.988
bca-lap	72.62	*best generated*						
	0.397	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.897	0.386	0.388	0.388	0.387	0.392
		best fused	72.57	72.57	72.57	72.62	72.62	72.57
		$t_{\text{fuse}}(s)$	4.306	1.697	1.707	0.388	0.387	1.731
bca-greedy	**19.36**	*best generated*						
	0.006	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.429	0.009	0.009	0.010	0.010	0.020
		best fused	**19.36**	**19.36**	**19.36**	**19.36**	**19.36**	**19.36**
		$t_{\text{fuse}}(s)$	0.429	0.009	0.009	0.010	0.010	0.020
greedy	**19.36**	*best generated*						
	0.004	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.277	0.017	0.016	0.017	0.016	0.121
		best fused	**19.36**	**19.36**	**19.36**	**19.36**	**19.36**	**19.36**
		$t_{\text{fuse}}(s)$	2.277	0.017	0.016	0.017	0.016	0.121

opengm1 (*matching1*), known optimum: 23.58

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**23.58**	*best generated*						
	0.763	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	22.826	0.779	0.793	1.003	1.002	0.313
		best fused	**23.58**	**23.58**	**23.58**	**23.58**	**23.58**	**23.58**
		$t_{\text{fuse}}(s)$	22.826	0.779	0.793	1.003	1.002	0.313
dd-ls3	**23.58**	*best generated*						
	1.858	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	5.147	0.330	0.171	2.162	2.163	1.509
		best fused	**23.58**	**23.58**	**23.58**	**23.58**	**23.58**	**23.58**
		$t_{\text{fuse}}(s)$	5.147	0.330	0.171	2.162	2.163	1.509
dd-ls4	**23.58**	*best generated*						
	9.441	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	15.191	5.507	7.109	9.726	9.725	7.212
		best fused	**23.58**	**23.58**	**23.58**	**23.58**	**23.58**	**23.58**
		$t_{\text{fuse}}(s)$	15.191	5.507	7.109	9.726	9.725	7.212
bca-lap	**23.58**	*best generated*						
	16.040	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.477	0.120	0.121	0.149	0.149	0.121
		best fused	**23.58**	**23.58**	**23.58**	**23.58**	**23.58**	**23.58**
		$t_{\text{fuse}}(s)$	0.477	0.120	0.121	0.149	0.149	0.121
bca-greedy	**23.58**	*best generated*						
	2.426	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.801	0.009	0.009	0.009	0.009	0.029
		best fused	**23.58**	**23.58**	**23.58**	**23.58**	**23.58**	**23.58**
		$t_{\text{fuse}}(s)$	0.801	0.009	0.009	0.009	0.009	0.029
greedy	**23.58**	*best generated*						
	0.074	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.091	0.009	0.009	0.269	0.257	0.118
		best fused	**23.58**	**23.58**	**23.58**	**23.58**	**23.58**	**23.58**
		$t_{\text{fuse}}(s)$	3.091	0.009	0.009	0.269	0.257	0.118

opengm2 (*matching2*), known optimum: 26.08

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**26.08**	*best generated*						
	1.001	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	31.515	1.170	1.193	1.280	1.277	0.440
		best fused	**26.08**	**26.08**	**26.08**	**26.08**	**26.08**	**26.08**
		$t_{\text{fuse}}(s)$	31.515	1.170	1.193	1.280	1.277	0.440
dd-ls3	**26.08**	*best generated*						
	2.032	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	24.450	1.647	1.668	2.268	2.266	2.231
		best fused	**26.08**	**26.08**	**26.08**	**26.08**	**26.08**	**26.08**
		$t_{\text{fuse}}(s)$	24.450	1.647	1.668	2.268	2.266	2.231
dd-ls4	**26.08**	*best generated*						
	15.703	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	34.218	8.934	8.961	15.998	16.008	9.049
		best fused	**26.08**	**26.08**	**26.08**	**26.08**	**26.08**	**26.08**
		$t_{\text{fuse}}(s)$	34.218	8.934	8.961	15.998	16.008	9.049
bca-lap	26.32	*best generated*						
	16.621	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.604	0.102	0.103	0.103	0.103	0.104
		best fused	26.32	26.32	26.32	26.32	26.32	26.32
		$t_{\text{fuse}}(s)$	0.604	0.102	0.103	0.103	0.103	0.104
bca-greedy	**26.08**	*best generated*						
	2.640	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.526	0.013	0.013	0.013	0.013	0.027
		best fused	**26.08**	**26.08**	**26.08**	**26.08**	**26.08**	**26.08**
		$t_{\text{fuse}}(s)$	0.526	0.013	0.013	0.013	0.013	0.027
greedy	**26.08**	*best generated*						
	0.087	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.599	0.012	0.014	0.294	0.294	0.082
		best fused	**26.08**	**26.08**	**26.08**	**26.08**	**26.08**	**26.08**
		$t_{\text{fuse}}(s)$	2.599	0.012	0.014	0.294	0.294	0.082

opengm3 (*matching3*), known optimum: 15.86

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	**15.86**	*best generated*						
	1.023	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	54.705	1.035	1.039	1.438	1.441	1.273
		best fused	**15.86**	**15.86**	**15.86**	**15.86**	**15.86**	**15.86**
		$t_{\text{fuse}}(s)$	54.705	1.035	1.039	1.438	1.441	1.273
dd-ls3	**15.86**	*best generated*						
	3.105	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	59.497	2.926	2.955	3.497	3.491	3.115
		best fused	**15.86**	**15.86**	**15.86**	**15.86**	**15.86**	**15.86**
		$t_{\text{fuse}}(s)$	59.497	2.926	2.955	3.497	3.491	3.115
dd-ls4	**15.86**	*best generated*						
	23.475	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	74.308	23.409	3.624	23.865	23.869	23.562
		best fused	**15.86**	**15.86**	**15.86**	**15.86**	**15.86**	**15.86**
		$t_{\text{fuse}}(s)$	74.308	23.409	3.624	23.865	23.869	23.562
bca-lap	77.44	*best generated*						
	0.405	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.503	0.248	0.249	0.423	0.423	0.252
		best fused	76.52	77.24	74.42	77.44	77.44	76.52
		$t_{\text{fuse}}(s)$	0.835	0.248	0.921	0.423	0.423	0.406
bca-greedy	**15.86**	*best generated*						
	0.094	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	5.234	0.105	0.109	0.010	0.010	0.372
		best fused	**15.86**	**15.86**	**15.86**	**15.86**	**15.86**	**15.86**
		$t_{\text{fuse}}(s)$	5.234	0.105	0.109	0.010	0.010	0.372
greedy	**15.86**	*best generated*						
	0.023	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.010	0.011	0.013	0.085	0.080	0.073
		best fused	**15.86**	**15.86**	**15.86**	**15.86**	**15.86**	**15.86**
		$t_{\text{fuse}}(s)$	2.010	0.011	0.013	0.085	0.080	0.073

A6.7. worms

number of instances: 30

maximum number of iterations during generation: 5000

worms1 (*C18G1_2L1_1*), known optimum: -46310.55

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−39123.13	*best generated*						
	321.057	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	193.197	28.161	26.462	334.728	330.858	333.326
		best fused	−46110.89	−46140.40	−46140.40	−39123.13	−39123.13	−45652.79
		$t_{\text{fuse}}(s)$	1428.422	327.855	332.943	334.728	330.858	454.881
dd-ls3	−41028.12	*best generated*						
	718.373	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	342.020	74.922	67.186	728.688	728.070	636.536
		best fused	−46177.87	−46197.14	−46177.87	−41028.12	−41028.12	−45677.03
		$t_{\text{fuse}}(s)$	1581.419	763.133	612.877	728.688	728.070	916.310
dd-ls4	−42447.88	*best generated*						
	2993.446	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	591.860	388.972	250.156	3008.302	3005.457	1707.042
		best fused	−46303.15	−46310.40	−46297.96	−42447.88	−42447.88	−46044.28
		$t_{\text{fuse}}(s)$	4161.920	3042.246	2659.009	3008.302	3005.457	2926.553
bca-lap	−46256.37	*best generated*						
	409.225	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	44.866	39.980	39.901	387.634	388.060	101.367
		best fused	−46284.76	−46284.76	−46284.76	−46256.37	−46256.37	−46272.53
		$t_{\text{fuse}}(s)$	111.940	101.069	100.836	387.634	388.060	320.515
bca-greedy	−46300.66	*best generated*						
	57.720	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.886	1.283	1.390	63.877	67.049	7.384
		best fused	**−46310.55**	**−46310.55**	**−46310.55**	−46300.66	−46300.66	−46310.51
		$t_{\text{fuse}}(s)$	6.193	2.340	2.534	63.877	67.049	14.504
greedy	−43178.01	*best generated*						
	5.367	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.448	0.028	0.029	9.583	9.624	3.698
		best fused	**−46310.55**	**−46310.55**	**−46310.55**	−43178.01	−43178.01	−45989.36
		$t_{\text{fuse}}(s)$	895.717	21.984	22.712	9.583	9.624	171.191

worms2 (*cnd1threeL1_1213061*), known optimum: -49998.17

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−48691.75	*best generated*						
	433.962	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	183.566	44.886	44.330	446.760	443.881	393.566
		best fused	**−49998.17**	**−49998.17**	**−49998.17**	−48691.75	−48691.75	−49971.36
		$t_{\text{fuse}}(s)$	1163.376	461.577	459.958	446.760	443.881	548.800
dd-ls3	−48777.45	*best generated*						
	721.248	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	144.342	143.115	43.783	730.584	730.996	606.015
		best fused	**−49998.17**	−49996.36	−49996.36	−48777.45	−48777.45	−49985.90
		$t_{\text{fuse}}(s)$	1336.586	643.136	369.809	730.584	730.996	913.895
dd-ls4	−48596.61	*best generated*						
	2628.949	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	562.969	159.621	131.331	2639.493	2643.540	1752.037
		best fused	**−49998.17**	−49996.36	−49996.36	−48596.61	−48596.61	−49978.42
		$t_{\text{fuse}}(s)$	1991.114	1315.869	1316.266	2639.493	2643.540	3079.617
bca-lap	−49996.82	*best generated*						
	77.999	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	51.714	47.628	47.546	55.456	55.441	33.200
		best fused	−49996.82	−49996.82	−49996.82	−49996.82	−49996.82	−49996.82
		$t_{\text{fuse}}(s)$	51.714	47.628	47.546	55.456	55.441	33.200
bca-greedy	**−49998.17**	*best generated*						
	118.332	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	231.913	134.989	139.474	131.642	138.316	150.605
		best fused	**−49998.17**	**−49998.17**	**−49998.17**	**−49998.17**	**−49998.17**	**−49998.17**
		$t_{\text{fuse}}(s)$	231.913	134.989	139.474	131.642	138.316	150.605
greedy	−48177.87	*best generated*						
	8.884	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.374	0.026	0.029	15.642	15.638	1.088
		best fused	**−49998.17**	**−49998.17**	**−49998.17**	−48177.87	−48177.87	−49870.22
		$t_{\text{fuse}}(s)$	12.723	0.280	0.312	15.642	15.638	113.519

worms3 (*cnd1threeL1_1228061*), known optimum: -50553.88

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−49392.28	*best generated*						
	474.198	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	136.306	32.931	35.155	487.153	485.371	415.597
		best fused	**−50553.88**	−50553.55	−50553.55	−49392.28	−49392.28	−50395.56
		$t_{\text{fuse}}(s)$	911.263	285.523	289.201	487.153	485.371	604.231
dd-ls3	−49490.58	*best generated*						
	779.423	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	225.968	64.694	64.836	791.110	789.975	666.117
		best fused	−50553.00	**−50553.88**	−50553.00	−49490.58	−49490.58	−50527.60
		$t_{\text{fuse}}(s)$	1230.522	519.134	520.292	791.110	789.975	943.460
dd-ls4	−49900.52	*best generated*						
	2689.057	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	588.075	296.214	296.717	2703.118	2704.609	2058.103
		best fused	**−50553.88**	**−50553.88**	**−50553.88**	−49900.52	−49900.52	−50550.83
		$t_{\text{fuse}}(s)$	2666.419	1868.033	1870.549	2703.118	2704.609	3107.303
bca-lap	−50529.05	*best generated*						
	1206.781	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	16.370	14.787	14.809	1190.562	1191.026	24.200
		best fused	−50546.78	−50546.78	−50546.78	−50529.05	−50529.05	−50533.11
		$t_{\text{fuse}}(s)$	381.478	351.370	351.895	1190.562	1191.026	26.193
bca-greedy	−50553.58	*best generated*						
	97.724	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.626	3.928	4.224	112.919	114.402	3.086
		best fused	**−50553.88**	**−50553.88**	**−50553.88**	−50553.58	−50553.58	**−50553.88**
		$t_{\text{fuse}}(s)$	1.885	3.928	4.224	112.919	114.402	3.086
greedy	−49365.34	*best generated*						
	3.100	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.379	0.031	0.033	5.784	5.853	0.966
		best fused	**−50553.88**	**−50553.88**	**−50553.88**	−49365.34	−49365.34	−50486.13
		$t_{\text{fuse}}(s)$	48.775	1.650	1.753	5.784	5.853	109.296

worms4 (*cnd1threeL1_1229061*), known optimum: -49113.44

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−44484.95	*best generated*						
	488.240	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	62.074	12.786	11.921	501.508	497.841	389.189
		best fused	−49060.21	−49059.06	−49059.06	−44484.95	−44484.95	−48512.97
		$t_{\text{fuse}}(s)$	1185.184	485.719	487.959	501.508	497.841	618.574
dd-ls3	−45623.39	*best generated*						
	702.342	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	95.457	22.418	21.922	712.637	712.029	588.154
		best fused	−49078.71	−49073.97	−49071.13	−45623.39	−45623.39	−48748.03
		$t_{\text{fuse}}(s)$	1358.181	746.631	714.440	712.637	712.029	857.982
dd-ls4	−45598.32	*best generated*						
	2386.137	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	107.118	41.621	45.346	2395.856	2395.795	1610.971
		best fused	−49078.71	−49078.62	−49078.62	−45598.32	−45598.32	−48530.96
		$t_{\text{fuse}}(s)$	3218.362	2096.595	2097.337	2395.856	2395.795	2937.980
bca-lap	−49075.54	*best generated*						
	634.797	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	60.836	55.493	55.537	641.711	641.439	93.879
		best fused	−49104.71	−49096.29	−49104.71	−49075.54	−49075.54	−49093.55
		$t_{\text{fuse}}(s)$	483.800	231.019	447.201	641.711	641.439	304.018
bca-greedy	−49110.36	*best generated*						
	61.101	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.849	0.290	0.295	70.929	67.811	12.284
		best fused	**−49113.44**	**−49113.44**	**−49113.44**	−49110.36	−49110.36	−49113.04
		$t_{\text{fuse}}(s)$	2.222	0.443	0.449	70.929	67.811	36.247
greedy	−47420.86	*best generated*						
	3.488	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.906	0.029	0.026	6.212	6.589	3.179
		best fused	−49113.35	−49113.35	−49113.35	−47420.86	−47420.86	−48791.20
		$t_{\text{fuse}}(s)$	555.895	19.969	18.627	6.212	6.589	111.499

worms5 (*cnd1threeL1_1229062*), known optimum: -49419.53

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−43007.12	*best generated*						
	464.143	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	45.731	7.908	8.076	475.077	473.294	373.936
		best fused	−49303.37	−49299.95	−49304.59	−43007.12	−43007.12	−48594.38
		$t_{\text{fuse}}(s)$	1206.866	432.643	430.799	475.077	473.294	595.230
dd-ls3	−45274.84	*best generated*						
	696.314	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	58.325	14.789	15.572	706.081	706.364	515.169
		best fused	−49399.09	−49399.09	−49399.09	−45274.84	−45274.84	−49066.58
		$t_{\text{fuse}}(s)$	1304.514	583.618	585.512	706.081	706.364	805.792
dd-ls4	−45310.57	*best generated*						
	2592.202	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	93.218	33.887	33.882	2603.710	2603.026	1301.383
		best fused	−49397.69	−49396.50	−49396.50	−45310.57	−45310.57	−48882.40
		$t_{\text{fuse}}(s)$	3074.849	2229.263	2228.953	2603.710	2603.026	2640.210
bca-lap	−49299.77	*best generated*						
	137.259	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	13.077	11.080	11.095	138.979	139.023	63.365
		best fused	−49405.38	−49405.38	−49405.38	−49299.77	−49299.77	−49381.19
		$t_{\text{fuse}}(s)$	175.107	157.892	158.107	138.979	139.023	90.794
bca-greedy	−49415.52	*best generated*						
	91.879	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.823	1.142	1.205	106.063	102.147	23.071
		best fused	**−49419.53**	**−49419.53**	**−49419.53**	−49415.52	−49415.52	−49418.68
		$t_{\text{fuse}}(s)$	2.813	1.905	2.009	106.063	102.147	130.723
greedy	−47722.06	*best generated*						
	16.188	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.754	0.020	0.022	29.763	28.813	2.074
		best fused	−49412.94	−49412.05	−49412.05	−47722.06	−47722.06	−49271.68
		$t_{\text{fuse}}(s)$	211.444	0.374	0.381	29.763	28.813	165.332

worms6 (*cnd1threeL1_1229063*), known optimum: -50480.36

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−48283.46	*best generated*						
	671.578	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	500.338	150.355	200.262	683.117	681.605	571.469
		best fused	−50427.62	−50427.62	−50427.62	−48283.46	−48283.46	−50233.49
		$t_{\text{fuse}}(s)$	1365.224	572.513	574.085	683.117	681.605	800.780
dd-ls3	−49059.67	*best generated*						
	690.313	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	876.681	278.411	279.379	699.672	699.937	646.841
		best fused	−50430.25	−50430.25	−50430.25	−49059.67	−49059.67	−50303.85
		$t_{\text{fuse}}(s)$	1525.641	663.222	665.131	699.672	699.937	844.897
dd-ls4	−50283.72	*best generated*						
	3436.307	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	987.044	523.262	524.222	3451.071	3453.746	2001.204
		best fused	**−50480.36**	**−50480.36**	−50479.70	−50283.72	−50283.72	−50471.68
		$t_{\text{fuse}}(s)$	2854.578	2079.596	2526.645	3451.071	3453.746	3636.511
bca-lap	−50460.50	*best generated*						
	24.279	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	20.296	18.430	18.462	24.554	24.547	18.761
		best fused	−50476.63	−50476.63	−50476.63	−50460.50	−50460.50	−50476.63
		$t_{\text{fuse}}(s)$	141.772	131.006	131.197	24.554	24.547	141.486
bca-greedy	**−50480.36**	*best generated*						
	85.555	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	152.219	90.222	89.574	92.567	92.898	96.366
		best fused	**−50480.36**	**−50480.36**	**−50480.36**	**−50480.36**	**−50480.36**	**−50480.36**
		$t_{\text{fuse}}(s)$	152.219	90.222	89.574	92.567	92.898	96.366
greedy	−49203.46	*best generated*						
	1.870	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.236	0.034	0.036	3.335	4.245	1.908
		best fused	**−50480.36**	**−50480.36**	**−50480.36**	−49203.46	−49203.46	−50334.19
		$t_{\text{fuse}}(s)$	60.803	1.784	1.911	3.335	4.245	113.826

worms7 (*eft3RW10035L1_0125071*), known optimum: -47057.33

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−39794.13	*best generated*						
	603.511	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	52.171	11.520	11.605	614.393	612.429	530.374
		best fused	−46693.42	−46720.21	−46720.21	−39794.13	−39794.13	−44624.72
		$t_{\text{fuse}}(s)$	1295.296	470.684	473.115	614.393	612.429	728.913
dd-ls3	−43972.38	*best generated*						
	837.726	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	132.285	27.478	26.628	850.431	849.992	674.645
		best fused	−47035.51	−46923.69	−46919.71	−43972.38	−43972.38	−46397.24
		$t_{\text{fuse}}(s)$	1682.279	712.851	750.217	850.431	849.992	917.964
dd-ls4	−42646.19	*best generated*						
	2598.876	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	151.150	38.390	55.939	2610.883	2609.511	1734.126
		best fused	−46945.80	−46945.80	−46945.80	−42646.19	−42646.19	−46301.98
		$t_{\text{fuse}}(s)$	2747.707	1826.032	1825.613	2610.883	2609.511	2625.940
bca-lap	−46964.53	*best generated*						
	515.751	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	65.346	57.485	57.596	520.940	521.843	190.737
		best fused	−46988.44	−46988.44	−46988.44	−46964.53	−46964.53	−46966.99
		$t_{\text{fuse}}(s)$	119.083	106.142	106.327	520.940	521.843	190.737
bca-greedy	−47030.24	*best generated*						
	24.571	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	5.859	0.602	0.645	27.239	28.392	19.101
		best fused	**−47057.33**	−47057.10	−47057.10	−47030.24	−47030.24	−47057.10
		$t_{\text{fuse}}(s)$	21.306	6.776	7.319	27.239	28.392	70.863
greedy	−44561.77	*best generated*						
	2.633	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.578	0.028	0.029	4.802	6.017	3.368
		best fused	−47050.21	−47050.21	−47050.21	−44561.77	−44561.77	−46716.50
		$t_{\text{fuse}}(s)$	46.300	0.960	0.963	4.802	6.017	178.876

worms8 (*eft3RW10035L1_0125072*), known optimum: -49244.01

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−48177.51	*best generated*						
	660.238	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	500.325	161.867	162.228	669.858	672.693	545.689
		best fused	−49243.90	−49243.61	−49243.61	−48177.51	−48177.51	−49171.54
		$t_{\text{fuse}}(s)$	1397.104	509.709	510.694	669.858	672.693	810.971
dd-ls3	−48598.61	*best generated*						
	767.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	219.224	78.717	78.820	776.301	776.267	620.616
		best fused	−49243.72	−49243.72	−49243.72	−48598.61	−48598.61	−49223.78
		$t_{\text{fuse}}(s)$	1066.395	519.570	520.259	776.301	776.267	1005.263
dd-ls4	−48640.11	*best generated*						
	2729.297	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	366.882	159.708	200.834	2740.769	2741.423	1919.238
		best fused	**−49244.01**	−49243.72	−49243.72	−48640.11	−48640.11	−49240.92
		$t_{\text{fuse}}(s)$	2815.227	2092.486	2093.290	2740.769	2741.423	2956.309
bca-lap	−49221.47	*best generated*						
	1269.452	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	105.568	1208.500	1207.127	1206.569	1206.537	1223.603
		best fused	−49229.38	−49221.47	−49221.47	−49221.47	−49221.47	−49221.47
		$t_{\text{fuse}}(s)$	105.568	1208.500	1207.127	1206.569	1206.537	1223.603
bca-greedy	−49241.94	*best generated*						
	24.932	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.181	0.824	0.778	28.453	28.946	11.729
		best fused	**−49244.01**	**−49244.01**	**−49244.01**	−49241.94	−49241.94	−49243.21
		$t_{\text{fuse}}(s)$	24.259	1.853	1.749	28.453	28.946	12.042
greedy	−48063.58	*best generated*						
	3.477	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.770	0.025	0.024	6.496	7.802	2.173
		best fused	**−49244.01**	**−49244.01**	**−49244.01**	−48063.58	−48063.58	−49133.64
		$t_{\text{fuse}}(s)$	195.644	2.736	2.527	6.496	7.802	150.250

worms9 (*eft3RW10035L1_0125073*), known optimum: -45149.41

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−34536.21	*best generated*						
	657.078	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	44.690	9.047	7.792	666.505	667.321	635.141
		best fused	−44627.82	−44628.12	−44628.12	−34536.21	−34536.21	−41035.73
		$t_{\text{fuse}}(s)$	1733.546	661.378	661.607	666.505	667.321	782.214
dd-ls3	−40047.61	*best generated*						
	817.318	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	203.074	42.874	43.822	828.860	827.511	693.818
		best fused	−45120.72	−45120.72	−45120.72	−40047.61	−40047.61	−44212.99
		$t_{\text{fuse}}(s)$	1583.269	611.956	614.296	828.860	827.511	1005.641
dd-ls4	−40471.85	*best generated*						
	2853.635	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	287.657	194.102	137.304	2867.155	2868.561	1791.886
		best fused	−45120.72	−45120.72	−45120.72	−40471.85	−40471.85	−44661.73
		$t_{\text{fuse}}(s)$	3187.456	1674.704	2216.292	2867.155	2868.561	3176.951
bca-lap	−45096.98	*best generated*						
	208.579	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	45.191	41.282	41.367	211.261	210.902	91.004
		best fused	−45147.73	−45147.73	−45147.73	−45096.98	−45096.98	−45147.24
		$t_{\text{fuse}}(s)$	642.538	601.305	602.439	211.261	210.902	612.540
bca-greedy	−45149.13	*best generated*						
	90.037	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	6.980	2.210	2.362	99.725	105.187	115.300
		best fused	**−45149.41**	**−45149.41**	**−45149.41**	−45149.13	−45149.13	**−45149.41**
		$t_{\text{fuse}}(s)$	8.329	2.761	2.950	99.725	105.187	136.032
greedy	−41403.04	*best generated*						
	9.670	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.405	0.046	0.042	17.425	17.739	6.730
		best fused	**−45149.41**	**−45149.41**	**−45149.41**	−41403.04	−41403.04	−44427.72
		$t_{\text{fuse}}(s)$	1202.275	10.479	9.992	17.425	17.739	241.062

worms10 (*egl5L1_0606074*)

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−14345.06	*best generated*						
	567.829	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	20.224	2.938	2.675	581.041	577.744	296.904
		best fused	−41973.41	−41862.94	−41865.87	−14345.06	−14345.06	−32929.86
		$t_{\text{fuse}}(s)$	1811.659	573.637	572.878	581.041	577.744	690.105
dd-ls3	−23433.16	*best generated*						
	844.026	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	37.442	5.366	5.380	854.295	853.555	530.818
		best fused	−42070.04	−42062.85	−42065.74	−23433.16	−23433.16	−35760.78
		$t_{\text{fuse}}(s)$	1932.712	794.207	686.877	854.295	853.555	1003.357
dd-ls4	−21041.73	*best generated*						
	3215.666	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	38.575	8.079	8.100	3226.837	3226.587	903.208
		best fused	−42115.59	−42069.53	−42117.07	−21041.73	−21041.73	−37669.83
		$t_{\text{fuse}}(s)$	3377.292	2218.603	2283.128	3226.837	3226.587	3459.221
bca-lap	−41090.97	*best generated*						
	281.695	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	12.951	11.215	11.228	284.810	284.935	270.344
		best fused	−41868.42	−41868.42	−41868.42	−41090.97	−41090.97	−41421.86
		$t_{\text{fuse}}(s)$	323.794	291.647	291.941	284.810	284.935	734.324
bca-greedy	−42227.79	*best generated*						
	31.501	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	5.699	3.474	3.537	35.196	37.163	18.598
		best fused	−42383.83	−42383.83	−42383.83	−42227.79	−42227.79	−42372.76
		$t_{\text{fuse}}(s)$	52.896	24.314	24.707	35.196	37.163	94.162
greedy	−38024.79	*best generated*						
	16.459	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.739	0.021	0.027	30.949	31.835	1.154
		best fused	−42306.99	−42280.37	−42279.90	−38024.79	−38024.79	−40770.96
		$t_{\text{fuse}}(s)$	1017.486	13.184	2.996	30.949	31.835	277.948

worms11 (*elt3L1_0503071*), known optimum: -48664.98

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−44518.81	*best generated*						
	371.537	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	186.565	30.376	29.024	386.940	385.492	352.548
		best fused	−48570.89	−48570.00	−48570.89	−44518.81	−44518.81	−48123.06
		$t_{\text{fuse}}(s)$	1235.114	242.879	295.715	386.940	385.492	504.517
dd-ls3	−45354.56	*best generated*						
	800.895	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	226.259	72.218	97.410	811.212	810.712	614.360
		best fused	−48570.89	−48572.85	−48572.85	−45354.56	−45354.56	−47941.38
		$t_{\text{fuse}}(s)$	1192.565	437.533	437.471	811.212	810.712	958.440
dd-ls4	−46115.16	*best generated*						
	3006.709	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	200.185	78.713	79.370	3021.220	3023.128	1842.742
		best fused	−48570.73	−48570.73	−48570.73	−46115.16	−46115.16	−48420.15
		$t_{\text{fuse}}(s)$	2543.062	2382.926	2383.999	3021.220	3023.128	3202.194
bca-lap	−48651.14	*best generated*						
	94.703	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	21.995	19.904	19.927	93.939	93.851	95.020
		best fused	−48660.25	−48660.25	−48660.25	−48651.14	−48651.14	−48652.79
		$t_{\text{fuse}}(s)$	1060.917	984.426	985.593	93.939	93.851	190.793
bca-greedy	−48661.44	*best generated*						
	118.429	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.073	6.148	6.419	131.927	139.353	10.576
		best fused	**−48664.98**	**−48664.98**	**−48664.98**	−48661.44	−48661.44	**−48664.98**
		$t_{\text{fuse}}(s)$	2.744	6.465	6.747	131.927	139.353	66.810
greedy	−46929.79	*best generated*						
	10.616	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.735	0.039	0.041	19.209	19.290	1.257
		best fused	**−48664.98**	**−48664.98**	**−48664.98**	−46929.79	−46929.79	−48404.61
		$t_{\text{fuse}}(s)$	131.724	1.723	1.865	19.209	19.290	162.345

worms12 (*elt3L1_0503072*), known optimum: -50403.60

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−46749.89	*best generated*						
	324.732	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	98.627	18.023	18.328	337.450	336.679	285.491
		best fused	−50344.86	−50332.70	−50344.86	−46749.89	−46749.89	−50031.73
		$t_{\text{fuse}}(s)$	992.719	254.068	257.863	337.450	336.679	448.001
dd-ls3	−48038.89	*best generated*						
	970.963	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	379.208	59.019	31.284	982.077	984.390	753.755
		best fused	**−50403.60**	**−50403.60**	**−50403.60**	−48038.89	−48038.89	−50252.17
		$t_{\text{fuse}}(s)$	1789.850	921.928	921.454	982.077	984.390	1083.110
dd-ls4	−47601.36	*best generated*						
	2475.406	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	233.266	91.838	91.431	2485.868	2489.959	1401.733
		best fused	−50403.56	**−50403.60**	**−50403.60**	−47601.36	−47601.36	−50299.94
		$t_{\text{fuse}}(s)$	3418.181	2045.375	2045.618	2485.868	2489.959	2705.931
bca-lap	−50395.02	*best generated*						
	893.992	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	44.785	41.266	41.291	884.422	882.254	83.866
		best fused	−50403.36	−50403.36	−50403.36	−50395.02	−50395.02	−50401.25
		$t_{\text{fuse}}(s)$	244.924	221.908	221.735	884.422	882.254	146.041
bca-greedy	**−50403.60**	*best generated*						
	38.415	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	5.290	1.857	1.994	44.158	44.478	12.122
		best fused	**−50403.60**	**−50403.60**	**−50403.60**	**−50403.60**	**−50403.60**	**−50403.60**
		$t_{\text{fuse}}(s)$	5.290	1.857	1.994	44.158	44.478	12.122
greedy	−49064.36	*best generated*						
	6.267	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.743	0.033	0.036	12.425	12.581	1.123
		best fused	**−50403.60**	**−50403.60**	**−50403.60**	−49064.36	−49064.36	−50250.40
		$t_{\text{fuse}}(s)$	62.359	1.309	1.395	12.425	12.581	90.020

worms13 (*elt3L1_0504073*), known optimum: -45831.06

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−40499.68	*best generated*						
	359.235	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	194.890	33.383	33.658	370.886	370.494	375.823
		best fused	−45672.10	−45672.10	−45672.10	−40499.68	−40499.68	−44956.88
		$t_{\text{fuse}}(s)$	1317.725	302.841	306.001	370.886	370.494	538.387
dd-ls3	−43689.43	*best generated*						
	941.279	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	220.272	58.228	57.358	952.579	954.577	798.540
		best fused	−45829.01	−45829.01	−45829.01	−43689.43	−43689.43	−45767.96
		$t_{\text{fuse}}(s)$	1603.918	740.253	764.143	952.579	954.577	1109.242
dd-ls4	−44253.29	*best generated*						
	3063.117	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1595.778	886.715	827.077	3074.967	3079.116	2056.076
		best fused	**−45831.06**	−45829.01	−45829.01	−44253.29	−44253.29	−45768.68
		$t_{\text{fuse}}(s)$	2973.587	1807.671	2057.633	3074.967	3079.116	3369.290
bca-lap	−45828.00	*best generated*						
	122.761	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	111.869	101.978	102.043	124.016	124.045	126.057
		best fused	−45829.75	−45829.75	−45829.75	−45828.00	−45828.00	−45829.60
		$t_{\text{fuse}}(s)$	218.605	200.804	200.944	124.016	124.045	203.294
bca-greedy	−45830.99	*best generated*						
	14.787	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	6.045	1.998	1.934	17.210	16.491	13.828
		best fused	**−45831.06**	**−45831.06**	**−45831.06**	−45830.99	−45830.99	**−45831.06**
		$t_{\text{fuse}}(s)$	6.045	1.998	1.934	17.210	16.491	13.828
greedy	−43207.33	*best generated*						
	15.413	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.075	0.026	0.026	29.916	29.111	3.227
		best fused	**−45831.06**	**−45831.06**	**−45831.06**	−43207.33	−43207.33	−45190.00
		$t_{\text{fuse}}(s)$	71.184	1.844	1.812	29.916	29.111	201.481

worms14 (*hlh1fourL1_0417071*)

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−41614.43	*best generated*						
	336.211	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	71.000	15.230	12.973	345.040	348.163	324.409
		best fused	−46876.07	−46874.13	−46910.61	−41614.43	−41614.43	−46394.62
		$t_{\text{fuse}}(s)$	1226.721	386.777	386.181	345.040	348.163	504.794
dd-ls3	−42272.18	*best generated*						
	850.338	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	110.057	25.214	28.555	859.858	860.029	664.945
		best fused	−46944.34	−46933.83	−46954.37	−42272.18	−42272.18	−46494.31
		$t_{\text{fuse}}(s)$	1683.886	725.473	743.403	859.858	860.029	1007.572
dd-ls4	−42534.80	*best generated*						
	2551.090	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	119.307	43.140	42.561	2562.390	2565.698	1558.107
		best fused	−46934.41	−46940.86	−46985.92	−42534.80	−42534.80	−46384.22
		$t_{\text{fuse}}(s)$	3192.512	2689.922	2260.036	2562.390	2565.698	2851.542
bca-lap	−46380.32	*best generated*						
	15.205	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	5.160	3.986	3.992	15.621	15.606	6.775
		best fused	−46935.06	−46899.80	−46935.06	−46380.32	−46380.32	−46802.40
		$t_{\text{fuse}}(s)$	1016.979	851.135	852.242	15.621	15.606	320.721
bca-greedy	−46917.99	*best generated*						
	19.035	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.181	0.240	0.240	22.522	22.434	6.330
		best fused	−46998.31	−46997.81	−46997.81	−46917.99	−46917.99	−46970.89
		$t_{\text{fuse}}(s)$	16.733	5.338	22.636	22.522	22.434	154.879
greedy	−44273.01	*best generated*						
	15.707	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.219	0.024	0.027	32.248	32.484	3.139
		best fused	−46998.31	−46991.91	−46988.32	−44273.01	−44273.01	−46248.91
		$t_{\text{fuse}}(s)$	1427.409	24.485	26.625	32.248	32.484	180.703

worms15 (*hlh1fourL1_0417075*), known optimum: -49550.13

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−48073.05	*best generated*						
	431.349	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	200.535	40.867	42.001	444.829	442.908	377.551
		best fused	−49546.59	−49549.31	−49549.31	−48073.05	−48073.05	−49419.17
		$t_{\text{fuse}}(s)$	1212.633	430.109	429.186	444.829	442.908	550.213
dd-ls3	−48216.50	*best generated*						
	942.422	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1036.523	368.348	64.595	953.849	953.072	778.474
		best fused	**−49550.13**	**−49550.13**	**−49550.13**	−48216.50	−48216.50	−49476.63
		$t_{\text{fuse}}(s)$	1508.307	546.803	648.759	953.849	953.072	1114.500
dd-ls4	−48397.90	*best generated*						
	2954.615	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	243.255	97.561	97.575	2966.946	2966.053	1742.250
		best fused	−49546.59	−49546.59	−49546.59	−48397.90	−48397.90	−49535.50
		$t_{\text{fuse}}(s)$	2189.294	1463.352	1463.244	2966.946	2966.053	3218.521
bca-lap	−49548.60	*best generated*						
	61.130	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	55.176	50.089	50.158	61.720	61.716	62.352
		best fused	−49549.12	−49549.12	−49549.12	−49548.60	−49548.60	−49548.69
		$t_{\text{fuse}}(s)$	61.781	56.206	56.282	61.720	61.716	71.390
bca-greedy	**−49550.13**	*best generated*						
	34.218	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.667	0.482	0.516	37.988	39.566	12.545
		best fused	**−49550.13**	**−49550.13**	**−49550.13**	**−49550.13**	**−49550.13**	**−49550.13**
		$t_{\text{fuse}}(s)$	1.667	0.482	0.516	37.988	39.566	12.545
greedy	−48152.12	*best generated*						
	9.219	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.465	0.028	0.031	18.553	23.397	2.495
		best fused	**−49550.13**	**−49550.13**	**−49550.13**	−48152.12	−48152.12	−49398.55
		$t_{\text{fuse}}(s)$	55.797	1.244	1.411	18.553	23.397	75.286

worms16 (*hlh1fourL1_0417076*), known optimum: -48404.21

	generation		+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−45279.31	*best generated*						
	574.848	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	154.722	30.553	30.427	587.111	589.333	500.795
		best fused	−48369.03	−48369.03	−48369.03	−45279.31	−45279.31	−48117.97
		$t_{\text{fuse}}(s)$	1406.497	497.998	496.327	587.111	589.333	702.471
dd-ls3	−46037.61	*best generated*						
	981.553	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	235.150	68.346	58.978	993.652	992.896	815.875
		best fused	−48400.22	−48400.22	−48401.68	−46037.61	−46037.61	−48189.36
		$t_{\text{fuse}}(s)$	1540.525	726.465	735.746	993.652	992.896	1131.073
dd-ls4	−45686.01	*best generated*						
	2752.931	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	485.012	221.258	221.432	2765.051	2764.773	1643.619
		best fused	−48399.63	−48402.56	−48399.63	−45686.01	−45686.01	−48203.34
		$t_{\text{fuse}}(s)$	2921.456	1810.010	2087.837	2765.051	2764.773	2804.854
bca-lap	−48374.00	*best generated*						
	55.136	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	14.647	13.021	13.035	52.951	52.950	50.550
		best fused	−48394.35	−48394.35	−48394.35	−48374.00	−48374.00	−48386.57
		$t_{\text{fuse}}(s)$	103.133	96.438	96.535	52.951	52.950	131.679
bca-greedy	−48402.03	*best generated*						
	66.882	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.947	0.450	0.480	77.764	77.515	9.561
		best fused	**−48404.21**	**−48404.21**	**−48404.21**	−48402.03	−48402.03	**−48404.21**
		$t_{\text{fuse}}(s)$	4.424	0.474	1.450	77.764	77.515	78.406
greedy	−46662.31	*best generated*						
	5.618	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.806	0.026	0.025	10.540	10.709	1.700
		best fused	**−48404.21**	**−48404.21**	**−48404.21**	−46662.31	−46662.31	−48066.10
		$t_{\text{fuse}}(s)$	77.048	2.146	2.087	10.540	10.709	150.384

worms17 (*hlh1fourL1_0417077*), known optimum: -48071.87

	generation		+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−44616.42	*best generated*						
	563.241	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	125.910	32.221	32.130	576.165	575.941	472.923
		best fused	−48033.92	−48033.92	−48033.92	−44616.42	−44616.42	−47812.45
		$t_{\text{fuse}}(s)$	1407.484	518.885	518.750	576.165	575.941	707.418
dd-ls3	−46726.05	*best generated*						
	900.512	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	236.826	192.832	78.293	911.375	910.446	827.630
		best fused	−48069.66	−48069.66	−48069.66	−46726.05	−46726.05	−48032.87
		$t_{\text{fuse}}(s)$	1702.243	819.555	819.120	911.375	910.446	1130.075
dd-ls4	−46617.70	*best generated*						
	2628.325	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1331.204	717.928	717.964	2642.988	2642.184	1674.106
		best fused	**−48071.87**	**−48071.87**	**−48071.87**	−46617.70	−46617.70	−48056.86
		$t_{\text{fuse}}(s)$	3086.905	2253.888	2254.393	2642.988	2642.184	2988.966
bca-lap	−48061.13	*best generated*						
	60.817	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	36.966	34.029	34.091	59.008	59.008	59.783
		best fused	−48063.70	−48063.70	−48063.70	−48061.13	−48061.13	−48061.13
		$t_{\text{fuse}}(s)$	43.520	40.199	40.271	59.008	59.008	59.783
bca-greedy	−48070.43	*best generated*						
	123.153	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.319	0.721	0.691	141.938	142.147	4.839
		best fused	**−48071.87**	**−48071.87**	**−48071.87**	−48070.43	−48070.43	**−48071.87**
		$t_{\text{fuse}}(s)$	3.374	1.154	1.102	141.938	142.147	4.839
greedy	−45567.88	*best generated*						
	7.136	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.852	0.030	0.033	13.381	13.875	1.769
		best fused	−48070.43	−48070.43	−48070.43	−45567.88	−45567.88	−47732.29
		$t_{\text{fuse}}(s)$	92.963	5.884	6.483	13.381	13.875	141.611

worms18 (*hlh1fourL1_0417078*), known optimum: -48236.29

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−45890.44	*best generated*						
	578.063	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	156.813	87.834	87.372	588.644	590.431	435.204
		best fused	**−48236.29**	−48220.25	−48220.25	−45890.44	−45890.44	−47999.49
		$t_{\text{fuse}}(s)$	1277.060	559.718	556.304	588.644	590.431	693.465
dd-ls3	−46428.64	*best generated*						
	920.498	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	143.049	35.872	35.949	930.436	931.632	731.400
		best fused	−48235.35	−48235.35	**−48236.29**	−46428.64	−46428.64	−48167.60
		$t_{\text{fuse}}(s)$	1780.136	962.231	964.373	930.436	931.632	1144.844
dd-ls4	−47145.61	*best generated*						
	3177.206	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	225.837	95.117	95.206	3194.189	3191.990	1953.547
		best fused	−48235.35	−48235.35	−48235.35	−47145.61	−47145.61	−48207.49
		$t_{\text{fuse}}(s)$	2885.869	2181.460	2182.504	3194.189	3191.990	3278.166
bca-lap	−48228.98	*best generated*						
	131.208	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	121.552	111.592	111.695	123.373	123.224	113.129
		best fused	−48230.22	−48230.22	−48230.22	−48228.98	−48228.98	−48230.22
		$t_{\text{fuse}}(s)$	134.097	123.186	123.304	123.373	123.224	124.894
bca-greedy	**−48236.29**	*best generated*						
	112.496	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	218.989	123.585	130.487	128.852	131.115	133.720
		best fused	**−48236.29**	**−48236.29**	**−48236.29**	**−48236.29**	**−48236.29**	**−48236.29**
		$t_{\text{fuse}}(s)$	218.989	123.585	130.487	128.852	131.115	133.720
greedy	−45826.53	*best generated*						
	11.204	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.127	0.017	0.020	21.605	22.383	1.295
		best fused	**−48236.29**	**−48236.29**	**−48236.29**	−45826.53	−45826.53	−47961.24
		$t_{\text{fuse}}(s)$	40.263	0.943	0.934	21.605	22.383	151.662

worms19 (*mir61L1_1228061*), known optimum: -48787.16

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−46966.78	*best generated*						
	582.599	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	250.380	39.892	39.701	593.239	593.210	479.445
		best fused	−48743.73	−48743.73	−48743.73	−46966.78	−46966.78	−48613.11
		$t_{\text{fuse}}(s)$	1096.605	560.534	559.544	593.239	593.210	705.778
dd-ls3	−46939.28	*best generated*						
	914.664	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	380.521	52.993	71.013	925.017	925.159	755.238
		best fused	−48743.47	−48743.71	−48743.71	−46939.28	−46939.28	−48540.26
		$t_{\text{fuse}}(s)$	1801.899	530.417	531.176	925.017	925.159	1104.888
dd-ls4	−47265.20	*best generated*						
	3149.328	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	437.093	225.855	99.619	3165.845	3160.819	1858.809
		best fused	−48761.71	−48761.71	−48761.71	−47265.20	−47265.20	−48634.51
		$t_{\text{fuse}}(s)$	2748.766	2066.410	2069.274	3165.845	3160.819	3280.411
bca-lap	−48762.12	*best generated*						
	284.423	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	24.977	22.089	22.116	219.489	219.412	49.868
		best fused	−48784.65	−48784.65	−48784.65	−48762.12	−48762.12	−48772.83
		$t_{\text{fuse}}(s)$	127.587	117.046	117.175	219.489	219.412	119.513
bca-greedy	−48785.57	*best generated*						
	46.765	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.189	52.198	0.593	54.692	55.364	4.714
		best fused	**−48787.16**	**−48787.16**	**−48787.16**	−48785.57	−48785.57	**−48787.16**
		$t_{\text{fuse}}(s)$	2.767	56.845	0.776	54.692	55.364	146.800
greedy	−47406.62	*best generated*						
	4.206	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.402	0.033	0.035	8.455	8.524	0.896
		best fused	−48784.83	−48784.83	−48784.83	−47406.62	−47406.62	−48503.03
		$t_{\text{fuse}}(s)$	128.563	2.909	3.017	8.455	8.524	162.455

worms20 (*mir61L1_1228062*), known optimum: -49416.46

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−44546.66	*best generated*						
	526.537	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	71.418	26.215	26.128	537.187	539.332	396.361
		best fused	−49183.83	−49183.83	−49174.26	−44546.66	−44546.66	−48680.04
		$t_{\text{fuse}}(s)$	1160.714	479.870	479.554	537.187	539.332	649.211
dd-ls3	−47716.14	*best generated*						
	687.109	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	106.130	34.183	33.429	698.583	699.447	596.470
		best fused	−49352.55	−49370.08	−49370.08	−47716.14	−47716.14	−49283.18
		$t_{\text{fuse}}(s)$	1303.301	465.766	467.716	698.583	699.447	817.997
dd-ls4	−48016.68	*best generated*						
	3183.582	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	198.700	81.926	82.108	3201.952	3196.147	1891.757
		best fused	−49369.30	−49369.30	−49369.30	−48016.68	−48016.68	−49339.55
		$t_{\text{fuse}}(s)$	3048.064	2292.323	2295.038	3201.952	3196.147	3247.611
bca-lap	−49292.22	*best generated*						
	34.580	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	7.629	6.102	6.112	33.759	33.754	12.082
		best fused	−49373.93	−49373.93	−49373.93	−49292.22	−49292.22	−49362.12
		$t_{\text{fuse}}(s)$	256.348	234.066	234.320	33.759	33.754	182.537
bca-greedy	−49415.70	*best generated*						
	81.490	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	5.746	2.482	2.538	93.187	89.808	99.754
		best fused	**−49416.46**	**−49416.46**	**−49416.46**	−49415.70	−49415.70	**−49416.46**
		$t_{\text{fuse}}(s)$	5.746	2.482	2.538	93.187	89.808	102.937
greedy	−47789.00	*best generated*						
	4.725	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.655	0.041	0.038	8.934	9.440	0.483
		best fused	**−49416.46**	**−49416.46**	**−49416.46**	−47789.00	−47789.00	−49131.39
		$t_{\text{fuse}}(s)$	335.444	1.531	1.432	8.934	9.440	146.639

worms21 (*mir61L1_1229062*), known optimum: -49836.77

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−45033.15	*best generated*						
	523.981	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	60.758	18.821	19.581	534.392	535.321	393.310
		best fused	−49508.21	−49508.21	−49508.21	−45033.15	−45033.15	−48904.90
		$t_{\text{fuse}}(s)$	983.461	360.086	357.783	534.392	535.321	644.039
dd-ls3	−48623.83	*best generated*						
	613.958	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	864.275	228.008	228.570	624.684	624.007	561.326
		best fused	−49831.10	−49831.10	−49831.10	−48623.83	−48623.83	−49733.71
		$t_{\text{fuse}}(s)$	1328.646	475.604	476.521	624.684	624.007	785.956
dd-ls4	−48909.20	*best generated*						
	3000.582	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	401.120	192.584	192.706	3016.672	3015.087	2065.119
		best fused	**−49836.77**	**−49836.77**	**−49836.77**	−48909.20	−48909.20	−49808.04
		$t_{\text{fuse}}(s)$	2953.910	2128.545	2129.529	3016.672	3015.087	3448.203
bca-lap	−49815.22	*best generated*						
	268.775	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	19.170	17.337	17.364	232.906	233.025	25.659
		best fused	**−49836.77**	**−49836.77**	**−49836.77**	−49815.22	−49815.22	−49831.58
		$t_{\text{fuse}}(s)$	56.625	52.730	52.796	232.906	233.025	69.884
bca-greedy	−49834.96	*best generated*						
	26.327	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.624	1.015	1.081	29.095	29.089	36.188
		best fused	**−49836.77**	**−49836.77**	**−49836.77**	−49834.96	−49834.96	**−49836.77**
		$t_{\text{fuse}}(s)$	2.624	1.015	1.081	29.095	29.089	53.806
greedy	−48573.41	*best generated*						
	5.292	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.897	0.019	0.019	10.907	11.100	1.117
		best fused	**−49836.77**	**−49836.77**	**−49836.77**	−48573.41	−48573.41	−49489.21
		$t_{\text{fuse}}(s)$	378.267	10.708	11.835	10.907	11.100	137.114

worms22 (*pha4A7L1_1213061*), known optimum: -47994.44

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−45481.44	*best generated*						
	572.524	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	287.183	40.788	40.809	583.410	585.000	480.667
		best fused	−47952.23	−47956.71	−47954.68	−45481.44	−45481.44	−47735.72
		$t_{\text{fuse}}(s)$	1347.101	329.781	332.628	583.410	585.000	710.277
dd-ls3	−45717.32	*best generated*						
	562.605	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	134.302	34.712	32.834	572.377	572.539	513.376
		best fused	**−47994.44**	**−47994.44**	**−47994.44**	−45717.32	−45717.32	−47791.05
		$t_{\text{fuse}}(s)$	1265.607	586.955	589.478	572.377	572.539	825.142
dd-ls4	−45412.16	*best generated*						
	2556.655	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	304.263	137.914	92.640	2571.283	2567.877	1714.549
		best fused	**−47994.44**	−47992.32	**−47994.44**	−45412.16	−45412.16	−47849.12
		$t_{\text{fuse}}(s)$	2416.052	1827.242	1830.224	2571.283	2567.877	2996.687
bca-lap	−47923.74	*best generated*						
	86.533	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	12.151	10.031	10.036	87.505	87.524	88.186
		best fused	−47973.32	−47972.67	−47973.32	−47923.74	−47923.74	−47924.53
		$t_{\text{fuse}}(s)$	95.516	57.979	85.491	87.505	87.524	88.186
bca-greedy	−47988.73	*best generated*						
	6.117	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.322	0.320	0.350	7.437	7.265	50.234
		best fused	**−47994.44**	**−47994.44**	**−47994.44**	−47988.73	−47988.73	−47994.35
		$t_{\text{fuse}}(s)$	2.826	0.773	0.842	7.437	7.265	71.324
greedy	−46246.78	*best generated*						
	12.519	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.977	0.023	0.025	23.854	24.091	2.669
		best fused	**−47994.44**	**−47994.44**	**−47994.44**	−46246.78	−46246.78	−47635.51
		$t_{\text{fuse}}(s)$	195.424	21.442	24.164	23.854	24.091	149.466

worms23 (*pha4A7L1_1213062*), known optimum: -49985.66

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−48000.33	*best generated*						
	557.036	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	192.881	44.621	44.736	569.452	569.425	432.747
		best fused	−49959.28	−49962.83	−49959.28	−48000.33	−48000.33	−49808.50
		$t_{\text{fuse}}(s)$	1186.093	444.961	445.900	569.452	569.425	655.254
dd-ls3	−49264.13	*best generated*						
	631.604	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	225.558	53.930	56.076	641.737	641.673	569.272
		best fused	−49982.11	−49982.11	−49982.11	−49264.13	−49264.13	−49979.29
		$t_{\text{fuse}}(s)$	1235.472	525.810	526.380	641.737	641.673	853.384
dd-ls4	−49850.80	*best generated*						
	3126.844	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	734.455	387.469	445.299	3139.087	3139.111	2054.883
		best fused	**−49985.66**	**−49985.66**	**−49985.66**	−49850.80	−49850.80	−49980.74
		$t_{\text{fuse}}(s)$	3341.181	2605.135	2606.480	3139.087	3139.111	3060.050
bca-lap	−49985.15	*best generated*						
	1063.597	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	66.771	60.973	61.092	318.880	319.100	322.157
		best fused	**−49985.66**	**−49985.66**	**−49985.66**	−49985.15	−49985.15	−49985.15
		$t_{\text{fuse}}(s)$	66.771	60.973	61.092	318.880	319.100	322.157
bca-greedy	**−49985.66**	*best generated*						
	91.143	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	51.404	30.641	30.958	30.831	30.916	34.922
		best fused	**−49985.66**	**−49985.66**	**−49985.66**	**−49985.66**	**−49985.66**	**−49985.66**
		$t_{\text{fuse}}(s)$	51.404	30.641	30.958	30.831	30.916	34.922
greedy	−48718.69	*best generated*						
	1.617	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.196	0.031	0.034	3.103	3.756	3.012
		best fused	**−49985.66**	**−49985.66**	**−49985.66**	−48718.69	−48718.69	−49798.42
		$t_{\text{fuse}}(s)$	55.549	1.319	1.443	3.103	3.756	127.122

worms24 (*pha4A7L1_1213064*), known optimum: -49309.50

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−44641.80	*best generated*						
	407.212	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	106.444	16.110	16.399	417.182	417.183	388.570
		best fused	−49275.91	−49275.91	−49275.91	−44641.80	−44641.80	−48657.63
		$t_{\text{fuse}}(s)$	1240.790	366.920	367.607	417.182	417.183	574.624
dd-ls3	−46520.06	*best generated*						
	645.929	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	122.281	19.703	19.703	656.191	655.923	561.063
		best fused	**−49309.50**	**−49309.50**	**−49309.50**	−46520.06	−46520.06	−49117.68
		$t_{\text{fuse}}(s)$	1474.548	633.044	633.575	656.191	655.923	782.722
dd-ls4	−46700.02	*best generated*						
	2635.186	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	164.904	67.713	59.517	2646.284	2646.462	1691.717
		best fused	**−49309.50**	**−49309.50**	**−49309.50**	−46700.02	−46700.02	−48998.45
		$t_{\text{fuse}}(s)$	3013.487	2167.104	2168.750	2646.284	2646.462	2653.379
bca-lap	−49297.29	*best generated*						
	293.119	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	200.725	183.262	183.484	291.746	291.843	293.636
		best fused	−49305.20	−49305.20	−49305.20	−49297.29	−49297.29	−49303.48
		$t_{\text{fuse}}(s)$	306.129	277.498	277.827	291.746	291.843	293.636
bca-greedy	−49308.59	*best generated*						
	23.737	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.863	0.774	0.787	28.283	28.567	24.140
		best fused	**−49309.50**	**−49309.50**	**−49309.50**	−49308.59	−49308.59	**−49309.50**
		$t_{\text{fuse}}(s)$	3.853	1.158	1.175	28.283	28.567	24.486
greedy	−48078.74	*best generated*						
	11.543	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.777	0.035	0.042	22.651	22.508	0.842
		best fused	**−49309.50**	**−49309.50**	**−49309.50**	−48078.74	−48078.74	−49139.77
		$t_{\text{fuse}}(s)$	34.027	2.588	0.919	22.651	22.508	87.107

worms25 (*pha4B2L1_0125072*), known optimum: -47233.63

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−40410.39	*best generated*						
	340.798	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	55.153	6.455	6.979	349.420	349.353	384.886
		best fused	−47036.03	−47027.59	−47021.02	−40410.39	−40410.39	−46264.64
		$t_{\text{fuse}}(s)$	1096.209	301.578	305.310	349.420	349.353	541.425
dd-ls3	−44264.60	*best generated*						
	815.747	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	151.617	36.779	32.424	826.969	827.345	701.906
		best fused	−47200.61	−47199.55	−47199.55	−44264.60	−44264.60	−47018.62
		$t_{\text{fuse}}(s)$	1772.980	822.566	824.889	826.969	827.345	985.705
dd-ls4	−43584.31	*best generated*						
	2786.506	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	182.263	67.381	78.400	2797.568	2797.628	1759.186
		best fused	−47162.16	−47162.16	−47162.16	−43584.31	−43584.31	−46631.48
		$t_{\text{fuse}}(s)$	2722.664	1918.991	1919.018	2797.568	2797.628	2970.915
bca-lap	−47209.74	*best generated*						
	257.904	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	128.951	117.030	116.925	257.448	257.230	194.927
		best fused	−47219.96	−47219.96	−47219.96	−47209.74	−47209.74	−47211.57
		$t_{\text{fuse}}(s)$	202.315	183.285	183.123	257.448	257.230	260.131
bca-greedy	−47230.06	*best generated*						
	35.330	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.765	0.603	0.646	41.792	42.283	9.377
		best fused	**−47233.63**	**−47233.63**	**−47233.63**	−47230.06	−47230.06	−47232.59
		$t_{\text{fuse}}(s)$	2.417	0.853	0.904	41.792	42.283	17.071
greedy	−44278.65	*best generated*						
	14.745	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.073	0.025	0.026	29.349	28.298	0.535
		best fused	**−47233.63**	**−47233.63**	**−47233.63**	−44278.65	−44278.65	−46870.37
		$t_{\text{fuse}}(s)$	96.835	0.586	0.606	29.349	28.298	230.675

worms26 (*pha4I2L_0408071*), known optimum: -46119.91

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−40580.74	*best generated*						
	435.120	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	224.247	11.220	11.291	447.634	446.009	456.403
		best fused	−45825.06	−45825.06	−45825.06	−40580.74	−40580.74	−45158.28
		$t_{\text{fuse}}(s)$	1350.394	377.839	377.541	447.634	446.009	597.417
dd-ls3	−40892.62	*best generated*						
	720.006	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	123.178	32.417	23.432	731.813	730.919	579.037
		best fused	−45966.15	−45967.06	−45965.67	−40892.62	−40892.62	−45524.26
		$t_{\text{fuse}}(s)$	1625.674	729.055	507.497	731.813	730.919	899.628
dd-ls4	−42700.91	*best generated*						
	3070.955	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	154.228	47.900	47.909	3087.622	3083.382	1926.849
		best fused	−46077.51	−46077.51	−46076.55	−42700.91	−42700.91	−45895.73
		$t_{\text{fuse}}(s)$	3592.625	2686.924	2714.268	3087.622	3083.382	3263.146
bca-lap	−46041.98	*best generated*						
	1100.639	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	63.144	59.019	59.085	1039.943	1039.555	68.987
		best fused	−46106.35	−46102.53	−46106.35	−46041.98	−46041.98	−46079.45
		$t_{\text{fuse}}(s)$	245.960	231.284	231.550	1039.943	1039.555	330.331
bca-greedy	−46112.46	*best generated*						
	12.875	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.217	0.647	0.631	15.359	15.649	14.183
		best fused	**−46119.91**	**−46119.91**	**−46119.91**	−46112.46	−46112.46	−46118.77
		$t_{\text{fuse}}(s)$	13.050	5.150	5.018	15.359	15.649	84.005
greedy	−42787.68	*best generated*						
	1.357	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.770	0.024	0.030	2.617	2.597	0.966
		best fused	**−46119.91**	−46119.69	−46119.69	−42787.68	−42787.68	−45535.70
		$t_{\text{fuse}}(s)$	1354.701	4.679	5.989	2.617	2.597	163.991

worms27 (*pha4I2L_0408072*), known optimum: -50062.40

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−48332.15	*best generated*						
	393.033	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	159.685	27.238	48.467	404.275	405.523	363.271
		best fused	−50061.94	**−50062.40**	−50061.94	−48332.15	−48332.15	−49910.65
		$t_{\text{fuse}}(s)$	981.308	365.781	303.880	404.275	405.523	524.622
dd-ls3	−49422.69	*best generated*						
	819.145	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	149.040	43.851	43.994	830.340	830.322	695.310
		best fused	−50061.94	−50061.94	−50061.94	−49422.69	−49422.69	−49953.92
		$t_{\text{fuse}}(s)$	1195.216	498.235	499.714	830.340	830.322	947.681
dd-ls4	−49547.02	*best generated*						
	2583.131	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	169.090	83.600	81.460	2598.679	2594.276	1943.079
		best fused	−50061.94	−50061.94	−50061.94	−49547.02	−49547.02	−49952.83
		$t_{\text{fuse}}(s)$	2171.674	1472.129	1473.243	2598.679	2594.276	2713.363
bca-lap	−50061.94	*best generated*						
	173.708	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	191.013	175.557	175.393	175.358	175.511	177.018
		best fused	−50061.94	−50061.94	−50061.94	−50061.94	−50061.94	−50061.94
		$t_{\text{fuse}}(s)$	191.013	175.557	175.393	175.358	175.511	177.018
bca-greedy	**−50062.40**	*best generated*						
	12.892	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.996	0.302	0.330	13.626	13.986	1.236
		best fused	**−50062.40**	**−50062.40**	**−50062.40**	**−50062.40**	**−50062.40**	**−50062.40**
		$t_{\text{fuse}}(s)$	0.996	0.302	0.330	13.626	13.986	1.236
greedy	−48506.93	*best generated*						
	16.697	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.503	0.061	0.069	31.454	31.228	1.556
		best fused	**−50062.40**	**−50062.40**	**−50062.40**	−48506.93	−48506.93	−49999.89
		$t_{\text{fuse}}(s)$	25.991	0.538	0.613	31.454	31.228	102.813

worms28 (*pha4I2L_0408073*), known optimum: -49497.10

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−47484.31	*best generated*						
	551.011	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	188.621	41.942	41.284	562.249	563.737	491.462
		best fused	−49458.97	−49463.31	−49458.92	−47484.31	−47484.31	−49254.19
		$t_{\text{fuse}}(s)$	1513.142	577.574	574.185	562.249	563.737	665.630
dd-ls3	−48039.83	*best generated*						
	806.546	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1073.655	361.952	363.000	819.083	822.326	658.798
		best fused	−49463.05	−49463.05	−49463.05	−48039.83	−48039.83	−49430.66
		$t_{\text{fuse}}(s)$	1606.667	709.488	711.238	819.083	822.326	931.339
dd-ls4	−48855.75	*best generated*						
	3229.234	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1528.114	838.059	838.208	3247.030	3243.361	1911.992
		best fused	**−49497.10**	**−49497.10**	**−49497.10**	−48855.75	−48855.75	−49463.77
		$t_{\text{fuse}}(s)$	3091.279	2147.542	2147.830	3247.030	3243.361	3539.742
bca-lap	−49479.43	*best generated*						
	55.114	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	52.465	46.902	46.965	54.601	54.595	53.286
		best fused	−49484.61	−49484.61	−49484.61	−49479.43	−49479.43	−49482.31
		$t_{\text{fuse}}(s)$	390.506	357.231	357.610	54.601	54.595	55.200
bca-greedy	−49496.97	*best generated*						
	34.356	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.449	0.845	0.896	38.953	38.893	7.078
		best fused	**−49497.10**	**−49497.10**	**−49497.10**	−49496.97	−49496.97	**−49497.10**
		$t_{\text{fuse}}(s)$	2.449	0.845	0.896	38.953	38.893	7.078
greedy	−47702.79	*best generated*						
	1.377	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.245	0.024	0.026	2.664	2.666	0.506
		best fused	**−49497.10**	**−49497.10**	**−49497.10**	−47702.79	−47702.79	−49430.49
		$t_{\text{fuse}}(s)$	272.938	6.803	7.696	2.664	2.666	64.438

worms29 (*unc54L1_0123071*), known optimum: -50069.17

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−48795.38	*best generated*						
	486.719	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	614.054	113.230	107.785	498.147	496.551	395.867
		best fused	−50063.09	−50047.69	−50047.69	−48795.38	−48795.38	−49956.65
		$t_{\text{fuse}}(s)$	1124.328	427.754	427.190	498.147	496.551	609.759
dd-ls3	−49509.08	*best generated*						
	661.707	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	590.318	287.043	286.896	671.262	675.757	612.254
		best fused	−50068.14	−50068.14	−50068.14	−49509.08	−49509.08	−50036.53
		$t_{\text{fuse}}(s)$	1416.590	660.565	660.088	671.262	675.757	906.000
dd-ls4	−48109.92	*best generated*						
	2505.508	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1137.220	580.631	581.708	2519.815	2518.604	1461.610
		best fused	**−50069.17**	**−50069.17**	**−50069.17**	−48109.92	−48109.92	−50031.33
		$t_{\text{fuse}}(s)$	3068.765	2356.842	2264.104	2519.815	2518.604	2695.304
bca-lap	**−50069.17**	*best generated*						
	127.831	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	58.354	54.448	54.518	127.779	127.730	128.493
		best fused	**−50069.17**	**−50069.17**	**−50069.17**	**−50069.17**	**−50069.17**	**−50069.17**
		$t_{\text{fuse}}(s)$	58.354	54.448	54.518	127.779	127.730	128.493
bca-greedy	**−50069.17**	*best generated*						
	13.624	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.511	2.063	2.116	5.844	5.924	3.110
		best fused	**−50069.17**	**−50069.17**	**−50069.17**	**−50069.17**	**−50069.17**	**−50069.17**
		$t_{\text{fuse}}(s)$	4.511	2.063	2.116	5.844	5.924	3.110
greedy	−49034.56	*best generated*						
	2.093	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.932	0.017	0.020	4.222	4.283	0.977
		best fused	**−50069.17**	**−50069.17**	**−50069.17**	−49034.56	−49034.56	−49983.59
		$t_{\text{fuse}}(s)$	54.033	1.363	1.521	4.222	4.283	99.180

worms30 (*unc54L1_0123072*), known optimum: -49775.89

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−47371.72	*best generated*						
	502.234	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	191.032	41.544	47.562	512.461	515.250	425.754
		best fused	−49769.96	−49769.96	−49769.96	−47371.72	−47371.72	−49707.00
		$t_{\text{fuse}}(s)$	1293.836	322.683	292.977	512.461	515.250	656.779
dd-ls3	−49308.89	*best generated*						
	734.261	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	885.267	303.447	303.682	745.303	744.405	656.583
		best fused	−49775.85	−49769.47	−49775.85	−49308.89	−49308.89	−49767.45
		$t_{\text{fuse}}(s)$	1211.961	493.059	493.421	745.303	744.405	973.388
dd-ls4	−49354.42	*best generated*						
	2683.330	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	978.124	854.857	539.742	2698.155	2694.190	1703.415
		best fused	**−49775.89**	**−49775.89**	−49774.99	−49354.42	−49354.42	−49754.83
		$t_{\text{fuse}}(s)$	2031.596	1580.836	2368.479	2698.155	2694.190	2203.605
bca-lap	−49765.18	*best generated*						
	498.829	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	38.954	35.120	35.160	467.845	467.549	177.916
		best fused	−49766.92	−49766.92	−49766.92	−49765.18	−49765.18	−49766.17
		$t_{\text{fuse}}(s)$	242.640	221.678	221.975	467.845	467.549	224.388
bca-greedy	**−49775.89**	*best generated*						
	40.474	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	81.312	47.165	44.540	46.952	45.526	51.366
		best fused	**−49775.89**	**−49775.89**	**−49775.89**	**−49775.89**	**−49775.89**	**−49775.89**
		$t_{\text{fuse}}(s)$	81.312	47.165	44.540	46.952	45.526	51.366
greedy	−48268.19	*best generated*						
	16.528	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.677	0.029	0.030	28.780	28.996	3.102
		best fused	**−49775.89**	**−49775.89**	**−49775.89**	−48268.19	−48268.19	−49660.21
		$t_{\text{fuse}}(s)$	191.868	6.789	6.956	28.780	28.996	89.892

A6.8. pairs

number of instances: 16

maximum number of iterations during generation: 5000

pairs1 (*worm01-worm04*)

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−62323.61	*best generated*						
	225.385	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.789	0.209	0.238	344.081	346.997	55.198
		best fused	−66198.81	−66123.76	−66159.73	−62323.61	−62323.61	−63359.04
		$t_{\text{fuse}}(s)$	633.439	236.402	310.527	344.081	346.997	302.616
dd-ls3	−64038.59	*best generated*						
	660.568	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	20.089	8.807	8.877	770.297	772.007	814.549
		best fused	−66237.05	−66207.37	−66207.37	−64038.59	−64038.59	−65027.35
		$t_{\text{fuse}}(s)$	1054.250	486.425	492.454	770.297	772.007	934.969
dd-ls4	−64349.51	*best generated*						
	1330.636	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	36.998	12.734	19.426	1456.461	1436.319	908.343
		best fused	−66255.68	−66107.07	−65994.56	−64349.51	−64349.51	−65097.66
		$t_{\text{fuse}}(s)$	1425.181	968.407	1414.788	1456.461	1436.319	1604.907
bca-lap	−63148.52	*best generated*						
	0.644	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.240	1.101	1.110	1.141	1.142	1.216
		best fused	−64726.00	−64139.84	−64329.25	−63148.52	−63148.52	−63250.79
		$t_{\text{fuse}}(s)$	1934.312	917.798	922.416	1.141	1.142	1.663
bca-greedy	−60737.06	*best generated*						
	756.951	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.958	1.979	1.344	879.970	900.166	175.436
		best fused	−66179.08	−66141.78	−66197.67	−60737.06	−60737.06	−62488.32
		$t_{\text{fuse}}(s)$	2216.929	572.275	875.892	879.970	900.166	1837.377
greedy	−57559.71	*best generated*						
	103.682	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.665	0.284	0.248	473.068	458.942	19.730
		best fused	−65856.68	−65920.84	−65865.44	−57559.71	−57559.71	−60883.07
		$t_{\text{fuse}}(s)$	1323.739	210.445	147.323	473.068	458.942	770.574

pairs2 (*worm02-worm22*)

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−68763.98	*best generated*						
	178.628	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	50.637	14.415	15.165	275.714	274.005	276.356
		best fused	−69989.17	−69948.49	−69966.07	−68763.98	−68763.98	−69075.53
		$t_{\text{fuse}}(s)$	599.427	311.029	362.007	275.714	274.005	474.033
dd-ls3	−69385.61	*best generated*						
	637.464	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	167.233	89.626	90.348	756.857	757.852	790.979
		best fused	−70024.48	−69927.47	−69857.92	−69385.61	−69385.61	−69385.61
		$t_{\text{fuse}}(s)$	912.930	851.295	461.332	756.857	757.852	790.979
dd-ls4	−69477.29	*best generated*						
	986.763	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	236.789	181.445	213.632	1110.407	1105.436	1148.672
		best fused	−69968.22	−70033.55	−69977.55	−69477.29	−69477.29	−69477.29
		$t_{\text{fuse}}(s)$	1754.051	1459.559	1501.382	1110.407	1105.436	1148.672
bca-lap	−68634.64	*best generated*						
	28.024	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	10.598	9.920	10.140	31.316	31.390	31.402
		best fused	−69330.11	−69283.69	−69283.69	−68634.64	−68634.64	−68717.80
		$t_{\text{fuse}}(s)$	1008.914	844.748	872.235	31.316	31.390	33.477
bca-greedy	−67943.14	*best generated*						
	1205.613	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.997	2.174	2.702	1395.785	1397.557	839.094
		best fused	−69980.76	−69940.80	−69984.35	−67943.14	−67943.14	−68349.39
		$t_{\text{fuse}}(s)$	1264.270	425.481	1485.110	1395.785	1397.557	1518.680
greedy	−62662.39	*best generated*						
	55.527	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.200	0.174	0.196	200.481	229.538	67.227
		best fused	−69777.90	−69868.19	−69800.63	−62662.39	−62662.39	−64573.11
		$t_{\text{fuse}}(s)$	706.087	139.012	232.847	200.481	229.538	440.063

pairs3 (*worm03-worm11*)

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−65443.70	*best generated*						
	270.021	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	10.934	7.609	9.973	418.594	425.106	330.433
		best fused	−67904.95	−67781.37	−67781.37	−65443.70	−65443.70	−66329.54
		$t_{\text{fuse}}(s)$	668.487	319.626	331.806	418.594	425.106	525.852
dd-ls3	−66860.76	*best generated*						
	830.851	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	83.154	46.424	71.692	1008.972	1014.992	925.419
		best fused	−67917.65	−67843.37	−67839.52	−66860.76	−66860.76	−66989.23
		$t_{\text{fuse}}(s)$	1149.491	705.862	640.080	1008.972	1014.992	1167.527
dd-ls4	−67286.85	*best generated*						
	1759.710	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	203.340	97.741	187.420	1929.131	1949.353	1871.347
		best fused	−67925.74	−67889.35	−67796.13	−67286.85	−67286.85	−67358.39
		$t_{\text{fuse}}(s)$	1463.081	837.859	850.326	1929.131	1949.353	1927.942
bca-lap	−64152.33	*best generated*						
	31.709	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.964	2.981	3.082	35.354	34.932	4.505
		best fused	−66169.69	−66001.40	−66005.73	−64152.33	−64152.33	−64538.70
		$t_{\text{fuse}}(s)$	435.495	317.031	330.001	35.354	34.932	140.513
bca-greedy	−63518.69	*best generated*						
	669.350	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.440	2.333	1.425	780.056	781.197	664.823
		best fused	−67719.33	−67842.99	−67807.46	−63518.69	−63518.69	−64360.09
		$t_{\text{fuse}}(s)$	2291.774	791.752	431.626	780.056	781.197	1854.605
greedy	−59697.93	*best generated*						
	7.313	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.251	0.151	0.229	39.058	37.515	73.969
		best fused	−67710.97	−67727.42	−67641.96	−59697.93	−59697.93	−62864.89
		$t_{\text{fuse}}(s)$	1199.464	157.238	215.090	39.058	37.515	806.957

pairs4 (*worm07-worm20*)

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−59010.48	*best generated*						
	205.891	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.040	0.326	0.345	313.819	322.118	85.697
		best fused	−62956.25	−62870.73	−62848.42	−59010.48	−59010.48	−61005.01
		$t_{\text{fuse}}(s)$	690.392	233.220	255.797	313.819	322.118	314.826
dd-ls3	−61417.09	*best generated*						
	733.935	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	28.027	15.415	14.458	884.296	881.834	916.289
		best fused	−62963.73	−62843.26	−62885.11	−61417.09	−61417.09	−61417.09
		$t_{\text{fuse}}(s)$	1067.861	660.836	811.921	884.296	881.834	916.289
dd-ls4	−61235.69	*best generated*						
	885.647	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	30.033	15.352	14.443	986.723	983.553	704.103
		best fused	−62912.23	−63008.66	−62883.80	−61235.69	−61235.69	−61699.48
		$t_{\text{fuse}}(s)$	889.365	792.350	1099.446	986.723	983.553	1432.758
bca-lap	−60684.24	*best generated*						
	40.045	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	13.060	42.169	17.551	44.122	44.059	44.857
		best fused	−61356.83	−61200.16	−61272.79	−60684.24	−60684.24	−60823.51
		$t_{\text{fuse}}(s)$	888.772	723.064	750.636	44.122	44.059	50.674
bca-greedy	−59553.80	*best generated*						
	156.434	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	5.772	2.606	1.784	184.301	180.881	197.565
		best fused	−62970.80	−62943.73	−62939.94	−59553.80	−59553.80	−60225.88
		$t_{\text{fuse}}(s)$	2220.470	1519.703	982.066	184.301	180.881	1716.330
greedy	−55209.09	*best generated*						
	72.492	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.720	0.147	0.141	379.908	367.298	33.206
		best fused	−62824.56	−62825.58	−62845.67	−55209.09	−55209.09	−57835.72
		$t_{\text{fuse}}(s)$	1199.586	188.246	217.494	379.908	367.298	638.929

pairs5 (*worm10-worm27*)

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−58435.60	*best generated*						
	268.482	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	7.813	1.983	2.005	434.164	437.703	351.897
		best fused	−61121.07	−61091.26	−61113.72	−58435.60	−58435.60	−59564.10
		$t_{\text{fuse}}(s)$	579.552	181.005	308.953	434.164	437.703	521.349
dd-ls3	−59255.12	*best generated*						
	780.535	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	26.767	13.296	12.735	964.316	966.621	695.707
		best fused	−61170.68	−61140.14	−61172.94	−59255.12	−59255.12	−59789.30
		$t_{\text{fuse}}(s)$	1217.305	838.567	795.395	964.316	966.621	939.185
dd-ls4	−59695.72	*best generated*						
	1727.199	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	36.492	22.627	22.692	1938.863	1935.184	1042.383
		best fused	−61201.75	−61187.97	−61168.12	−59695.72	−59695.72	−60202.64
		$t_{\text{fuse}}(s)$	1597.650	835.693	836.607	1938.863	1935.184	1962.239
bca-lap	−58487.47	*best generated*						
	40.791	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	14.513	12.235	12.421	46.181	46.873	46.392
		best fused	−59825.23	−59810.02	−59756.95	−58487.47	−58487.47	−58516.37
		$t_{\text{fuse}}(s)$	2006.337	817.417	831.562	46.181	46.873	49.411
bca-greedy	−56690.16	*best generated*						
	1582.648	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.180	2.951	2.431	1925.784	1916.374	287.581
		best fused	−61180.03	−61181.13	−61163.78	−56690.16	−56690.16	−57564.56
		$t_{\text{fuse}}(s)$	2408.642	1431.679	1686.886	1925.784	1916.374	2194.520
greedy	−51709.07	*best generated*						
	32.473	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.761	0.376	0.377	231.201	228.583	27.348
		best fused	−61009.39	−60773.76	−60759.88	−51709.07	−51709.07	−54008.31
		$t_{\text{fuse}}(s)$	1370.492	200.203	227.219	231.201	228.583	913.723

pairs6 (*worm12-worm16*)

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−67396.46	*best generated*						
	438.319	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	71.732	24.981	24.644	544.162	552.163	604.722
		best fused	−68320.05	−68295.53	−68304.57	−67396.46	−67396.46	−67593.53
		$t_{\text{fuse}}(s)$	767.133	211.874	424.658	544.162	552.163	723.749
dd-ls3	−68039.40	*best generated*						
	780.602	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	308.208	175.041	177.356	917.714	915.514	949.190
		best fused	−68322.27	−68329.48	−68329.48	−68039.40	−68039.40	−68089.85
		$t_{\text{fuse}}(s)$	509.833	334.011	337.953	917.714	915.514	1103.800
dd-ls4	−68119.09	*best generated*						
	769.139	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	327.356	247.241	222.152	846.738	841.731	886.232
		best fused	−68351.14	−68349.27	−68349.27	−68119.09	−68119.09	−68214.79
		$t_{\text{fuse}}(s)$	849.907	667.642	658.805	846.738	841.731	2086.937
bca-lap	−66758.26	*best generated*						
	35.649	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	10.223	11.092	9.455	38.470	38.465	40.461
		best fused	−67721.88	−67711.49	−67721.32	−66758.26	−66758.26	−66964.88
		$t_{\text{fuse}}(s)$	1322.699	1417.802	939.010	38.470	38.465	127.916
bca-greedy	−65640.46	*best generated*						
	631.523	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.755	1.503	1.826	718.160	707.236	388.793
		best fused	−68321.83	−68256.61	−68351.14	−65640.46	−65640.46	−66326.67
		$t_{\text{fuse}}(s)$	1403.606	885.821	1064.277	718.160	707.236	1580.749
greedy	−60585.96	*best generated*						
	31.997	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.559	0.149	0.158	110.383	124.811	21.974
		best fused	−68153.09	−68188.90	−68263.90	−60585.96	−60585.96	−63930.45
		$t_{\text{fuse}}(s)$	913.857	164.190	157.618	110.383	124.811	660.373

pairs7 (*worm14-worm06*)

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−59352.55	*best generated*						
	338.629	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.743	0.394	0.392	418.114	425.538	75.492
		best fused	−63237.39	−63187.69	−63207.92	−59352.55	−59352.55	−61944.98
		$t_{\text{fuse}}(s)$	837.611	409.681	409.405	418.114	425.538	628.412
dd-ls3	−61058.18	*best generated*						
	601.017	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.271	2.544	1.883	700.177	699.493	330.922
		best fused	−63277.90	−63252.17	−63206.73	−61058.18	−61058.18	−62176.50
		$t_{\text{fuse}}(s)$	1072.027	398.011	352.796	700.177	699.493	852.730
dd-ls4	−61842.39	*best generated*						
	1242.737	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	22.313	16.857	12.887	1356.511	1356.788	700.796
		best fused	−63262.89	−63324.10	−63183.70	−61842.39	−61842.39	−62628.08
		$t_{\text{fuse}}(s)$	1055.336	962.342	1365.450	1356.511	1356.788	1456.051
bca-lap	−61703.64	*best generated*						
	96.569	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	17.315	15.551	15.260	109.181	108.547	116.200
		best fused	−62548.24	−62478.34	−62529.85	−61703.64	−61703.64	−61849.99
		$t_{\text{fuse}}(s)$	1536.105	1549.989	1588.130	109.181	108.547	981.058
bca-greedy	−60165.25	*best generated*						
	993.164	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.348	1.762	0.917	1138.079	1120.450	146.853
		best fused	−63324.54	−63243.29	−63303.73	−60165.25	−60165.25	−61478.40
		$t_{\text{fuse}}(s)$	1081.270	552.985	848.346	1138.079	1120.450	1673.180
greedy	−56970.78	*best generated*						
	76.805	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.411	0.132	0.145	350.549	359.920	14.813
		best fused	−63266.84	−63194.24	−63248.96	−56970.78	−56970.78	−59277.43
		$t_{\text{fuse}}(s)$	770.996	111.424	111.079	350.549	359.920	612.391

pairs8 (*worm15-worm05*)

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−69219.38	*best generated*						
	392.194	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	29.756	18.219	15.276	493.199	476.609	418.554
		best fused	−70464.01	−70438.71	−70401.17	−69219.38	−69219.38	−69566.25
		$t_{\text{fuse}}(s)$	608.414	391.505	358.736	493.199	476.609	619.198
dd-ls3	−69728.12	*best generated*						
	742.695	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	34.686	32.466	22.038	881.202	882.046	610.304
		best fused	−70438.71	−70388.43	−70464.01	−69728.12	−69728.12	−69942.72
		$t_{\text{fuse}}(s)$	541.526	351.471	339.745	881.202	882.046	1013.475
dd-ls4	−69944.90	*best generated*						
	1376.478	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	73.708	34.570	36.915	1523.706	1528.337	1090.141
		best fused	−70486.60	−70464.01	−70486.60	−69944.90	−69944.90	−70120.24
		$t_{\text{fuse}}(s)$	539.547	1005.352	517.176	1523.706	1528.337	1366.377
bca-lap	−69316.14	*best generated*						
	44.604	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	10.015	9.241	9.438	50.034	49.577	10.651
		best fused	−70116.29	−70019.11	−70098.15	−69316.14	−69316.14	−69558.89
		$t_{\text{fuse}}(s)$	1647.297	1357.019	870.557	50.034	49.577	11.089
bca-greedy	−68577.86	*best generated*						
	888.776	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	5.557	1.930	2.015	992.529	1022.140	865.959
		best fused	−70460.11	−70475.03	−70451.63	−68577.86	−68577.86	−68974.88
		$t_{\text{fuse}}(s)$	1639.294	1234.486	1496.547	992.529	1022.140	1511.708
greedy	−63453.69	*best generated*						
	3.228	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.077	0.131	0.166	13.320	12.994	24.012
		best fused	−70393.00	−70406.36	−70393.68	−63453.69	−63453.69	−65663.07
		$t_{\text{fuse}}(s)$	417.241	121.938	214.136	13.320	12.994	631.432

pairs9 (*worm16-worm03*)

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−66312.79	*best generated*						
	333.338	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.505	0.140	0.156	429.161	425.367	96.084
		best fused	−68944.90	−68866.74	−68872.99	−66312.79	−66312.79	−68022.41
		$t_{\text{fuse}}(s)$	834.976	370.566	242.576	429.161	425.367	649.992
dd-ls3	−67719.90	*best generated*						
	655.959	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	14.353	6.814	7.728	767.343	761.918	432.375
		best fused	−68957.89	−68910.91	−68926.82	−67719.90	−67719.90	−68605.09
		$t_{\text{fuse}}(s)$	1034.926	555.687	407.711	767.343	761.918	913.084
dd-ls4	−68004.11	*best generated*						
	1029.736	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	29.132	17.614	16.091	1132.563	1139.842	598.167
		best fused	−68971.13	−68914.45	−68951.41	−68004.11	−68004.11	−68541.56
		$t_{\text{fuse}}(s)$	1119.128	531.828	1370.011	1132.563	1139.842	1306.457
bca-lap	−68179.87	*best generated*						
	482.039	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	55.476	50.066	54.112	506.009	515.939	304.200
		best fused	−68610.11	−68411.64	−68573.56	−68179.87	−68179.87	−68295.31
		$t_{\text{fuse}}(s)$	699.792	927.525	561.486	506.009	515.939	432.099
bca-greedy	−66485.55	*best generated*						
	1400.920	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.647	2.158	1.952	1585.196	1594.090	441.102
		best fused	−68955.16	−68954.00	−68954.00	−66485.55	−66485.55	−67642.65
		$t_{\text{fuse}}(s)$	405.537	764.113	770.915	1585.196	1594.090	1738.323
greedy	−62640.09	*best generated*						
	48.367	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.926	0.125	0.161	200.439	205.336	22.670
		best fused	−68774.87	−68827.25	−68737.12	−62640.09	−62640.09	−64746.81
		$t_{\text{fuse}}(s)$	571.845	143.519	157.604	200.439	205.336	598.252

pairs10 (*worm19-worm26*)

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−57872.80	*best generated*						
	431.910	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	8.865	3.534	3.587	570.076	566.124	527.260
		best fused	−60580.40	−60570.45	−60533.28	−57872.80	−57872.80	−58943.66
		$t_{\text{fuse}}(s)$	937.652	427.210	438.228	570.076	566.124	640.770
dd-ls3	−59205.04	*best generated*						
	718.726	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	41.690	17.336	17.943	869.505	875.416	858.961
		best fused	−60669.27	−60656.95	−60682.05	−59205.04	−59205.04	−59319.45
		$t_{\text{fuse}}(s)$	1104.943	660.968	699.440	869.505	875.416	908.932
dd-ls4	−59781.61	*best generated*						
	1541.061	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	169.747	73.973	103.797	1708.237	1713.150	1742.680
		best fused	−60777.12	−60778.25	−60785.31	−59781.61	−59781.61	−59781.61
		$t_{\text{fuse}}(s)$	1611.885	1643.122	1346.195	1708.237	1713.150	1742.680
bca-lap	−57767.81	*best generated*						
	20.351	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.857	1.671	1.704	23.642	23.404	25.391
		best fused	−59159.71	−59057.77	−59232.16	−57767.81	−57767.81	−57997.52
		$t_{\text{fuse}}(s)$	818.056	928.044	1641.269	23.642	23.404	40.751
bca-greedy	−56382.86	*best generated*						
	646.693	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	5.631	3.232	2.820	778.382	778.525	306.116
		best fused	−60751.30	−60612.29	−60749.08	−56382.86	−56382.86	−57138.20
		$t_{\text{fuse}}(s)$	1933.949	1375.631	1543.716	778.382	778.525	2019.253
greedy	−52177.25	*best generated*						
	37.315	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.828	0.224	0.215	365.618	379.232	121.754
		best fused	−60619.59	−60499.54	−60540.62	−52177.25	−52177.25	−54614.53
		$t_{\text{fuse}}(s)$	1309.688	155.011	193.781	365.618	379.232	842.068

pairs11 (*worm20-worm12*)

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−60802.88	*best generated*						
	330.941	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.671	1.830	1.508	418.376	420.285	171.939
		best fused	−64134.22	−64340.09	−64191.32	−60802.88	−60802.88	−62778.96
		$t_{\text{fuse}}(s)$	970.470	387.710	457.250	418.376	420.285	565.803
dd-ls3	−62002.67	*best generated*						
	559.477	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	12.771	5.522	4.156	671.021	668.065	354.293
		best fused	−64291.58	−64323.05	−64264.71	−62002.67	−62002.67	−63290.01
		$t_{\text{fuse}}(s)$	871.892	657.581	672.558	671.021	668.065	793.246
dd-ls4	−62301.95	*best generated*						
	1093.928	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	21.210	9.599	9.885	1199.823	1217.818	549.420
		best fused	−64355.30	−64390.31	−64412.51	−62301.95	−62301.95	−63345.58
		$t_{\text{fuse}}(s)$	1755.903	746.586	1062.277	1199.823	1217.818	1361.393
bca-lap	−62733.78	*best generated*						
	835.742	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	51.686	61.227	63.002	916.504	915.236	1019.754
		best fused	−63490.63	−63407.72	−63516.47	−62733.78	−62733.78	−62743.01
		$t_{\text{fuse}}(s)$	1719.886	1704.608	1742.465	916.504	915.236	1939.395
bca-greedy	−61486.39	*best generated*						
	1433.497	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	7.142	2.247	2.308	1648.800	1659.977	691.630
		best fused	−64336.77	−64435.32	−64352.63	−61486.39	−61486.39	−62433.38
		$t_{\text{fuse}}(s)$	488.656	1196.386	1296.391	1648.800	1659.977	1838.179
greedy	−57614.80	*best generated*						
	57.227	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.106	0.150	0.131	291.254	297.717	87.555
		best fused	−64256.21	−64166.27	−64078.77	−57614.80	−57614.80	−59753.30
		$t_{\text{fuse}}(s)$	1221.986	129.106	119.412	291.254	297.717	627.903

pairs12 (*worm21-worm09*)

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−65274.10	*best generated*						
	248.566	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	22.907	5.245	4.905	320.159	320.208	212.249
		best fused	−67293.17	−67232.68	−67259.04	−65274.10	−65274.10	−66106.76
		$t_{\text{fuse}}(s)$	838.330	409.547	335.734	320.159	320.208	605.705
dd-ls3	−66015.95	*best generated*						
	508.817	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	53.020	28.214	14.049	611.729	607.693	391.031
		best fused	−67305.35	−67221.32	−67270.68	−66015.95	−66015.95	−66753.40
		$t_{\text{fuse}}(s)$	864.686	752.699	455.992	611.729	607.693	880.806
dd-ls4	−66334.92	*best generated*						
	1210.430	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	58.381	77.254	75.373	1337.444	1347.318	555.752
		best fused	−67288.77	−67271.91	−67286.65	−66334.92	−66334.92	−66646.17
		$t_{\text{fuse}}(s)$	1684.150	1316.769	844.502	1337.444	1347.318	587.659
bca-lap	−65477.34	*best generated*						
	1687.904	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	36.424	34.507	35.110	1875.205	1868.586	135.297
		best fused	−66644.80	−66410.55	−66415.11	−65477.34	−65477.34	−65922.99
		$t_{\text{fuse}}(s)$	2037.196	1765.756	795.764	1875.205	1868.586	1213.000
bca-greedy	−64487.02	*best generated*						
	378.702	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	5.748	3.081	3.562	431.830	424.579	350.748
		best fused	−67290.28	−67305.96	−67258.27	−64487.02	−64487.02	−65412.90
		$t_{\text{fuse}}(s)$	772.453	953.557	511.162	431.830	424.579	1798.255
greedy	−59760.49	*best generated*						
	23.185	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.123	0.147	0.138	121.054	106.381	50.835
		best fused	−67173.74	−67180.21	−67209.45	−59760.49	−59760.49	−62512.52
		$t_{\text{fuse}}(s)$	944.718	139.685	207.766	121.054	106.381	591.734

pairs13 (*worm22-worm25*)

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−64495.98	*best generated*						
	540.401	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	60.378	34.852	33.200	675.971	673.895	350.397
		best fused	−66220.33	−66253.84	−66234.37	−64495.98	−64495.98	−65128.05
		$t_{\text{fuse}}(s)$	631.110	381.943	416.161	675.971	673.895	491.076
dd-ls3	−65546.07	*best generated*						
	529.794	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	319.195	123.500	98.584	659.461	655.666	708.440
		best fused	−66252.78	−66255.77	−66259.46	−65546.07	−65546.07	−65703.41
		$t_{\text{fuse}}(s)$	1006.101	565.063	337.241	659.461	655.666	907.220
dd-ls4	−65558.80	*best generated*						
	949.005	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	189.952	105.550	181.181	1040.542	1060.899	1096.406
		best fused	−66259.55	−66210.18	−66232.76	−65558.80	−65558.80	−65676.68
		$t_{\text{fuse}}(s)$	616.748	537.547	1520.614	1040.542	1060.899	1310.651
bca-lap	−63891.20	*best generated*						
	37.465	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	13.309	12.923	13.038	41.273	41.605	42.567
		best fused	−64782.00	−64967.18	−64828.55	−63891.20	−63891.20	−63894.34
		$t_{\text{fuse}}(s)$	1427.607	1205.359	1219.947	41.273	41.605	47.366
bca-greedy	−63038.58	*best generated*						
	453.532	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.558	1.681	1.738	550.922	562.715	238.336
		best fused	−66215.82	−66252.94	−66211.31	−63038.58	−63038.58	−64002.03
		$t_{\text{fuse}}(s)$	1219.435	363.373	651.267	550.922	562.715	1333.721
greedy	−58097.29	*best generated*						
	30.317	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.603	0.113	0.190	182.284	184.989	22.548
		best fused	−66052.12	−66106.75	−66130.10	−58097.29	−58097.29	−61089.59
		$t_{\text{fuse}}(s)$	1134.013	119.947	169.513	182.284	184.989	607.387

pairs14 (*worm25-worm18*)

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−65124.56	*best generated*						
	522.739	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	1.931	1.545	0.883	639.249	637.212	228.965
		best fused	−67123.00	−67168.97	−67123.00	−65124.56	−65124.56	−66246.07
		$t_{\text{fuse}}(s)$	624.042	375.501	335.753	639.249	637.212	740.169
dd-ls3	−65548.37	*best generated*						
	417.892	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	14.986	8.110	8.315	513.129	509.933	310.830
		best fused	−67195.54	−67139.54	−66975.36	−65548.37	−65548.37	−66482.83
		$t_{\text{fuse}}(s)$	835.798	441.866	304.855	513.129	509.933	609.074
dd-ls4	−65715.62	*best generated*						
	882.842	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	22.434	12.854	12.829	958.442	976.172	418.606
		best fused	−67212.82	−67171.71	−67210.17	−65715.62	−65715.62	−66622.77
		$t_{\text{fuse}}(s)$	1138.770	767.227	834.028	958.442	976.172	915.050
bca-lap	−65871.31	*best generated*						
	214.748	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	63.884	94.066	61.214	218.582	220.823	129.606
		best fused	−66345.87	−66253.42	−66297.69	−65871.31	−65871.31	−66027.37
		$t_{\text{fuse}}(s)$	852.173	1339.132	1567.298	218.582	220.823	477.196
bca-greedy	−64192.01	*best generated*						
	150.080	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.977	1.968	1.210	175.414	172.774	123.999
		best fused	−67227.47	−67098.63	−67212.30	−64192.01	−64192.01	−65649.79
		$t_{\text{fuse}}(s)$	1484.417	796.738	605.433	175.414	172.774	1001.729
greedy	−60923.98	*best generated*						
	19.891	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.868	0.093	0.124	101.165	101.483	10.062
		best fused	−67048.48	−67176.09	−67114.78	−60923.98	−60923.98	−62825.28
		$t_{\text{fuse}}(s)$	979.478	152.441	31.225	101.165	101.483	532.903

pairs15 (*worm29-worm10*)

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−58501.06	*best generated*						
	474.105	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.234	0.618	0.666	594.999	574.853	120.148
		best fused	−62604.08	−62517.94	−62491.69	−58501.06	−58501.06	−61293.51
		$t_{\text{fuse}}(s)$	850.289	274.979	285.274	594.999	574.853	630.379
dd-ls3	−60651.86	*best generated*						
	519.567	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	17.447	2.904	2.594	644.994	643.189	311.264
		best fused	−62664.12	−62611.25	−62660.99	−60651.86	−60651.86	−61901.19
		$t_{\text{fuse}}(s)$	1080.282	650.914	519.575	644.994	643.189	839.806
dd-ls4	−61251.32	*best generated*						
	985.329	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	70.954	23.989	19.208	1074.985	1085.390	745.036
		best fused	−62737.08	−62731.48	−62719.54	−61251.32	−61251.32	−62136.28
		$t_{\text{fuse}}(s)$	1561.512	1489.977	1098.439	1074.985	1085.390	1460.789
bca-lap	−59411.17	*best generated*						
	63.852	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.260	3.395	3.088	70.366	69.820	38.897
		best fused	−61118.31	−61170.12	−61134.69	−59411.17	−59411.17	−59942.45
		$t_{\text{fuse}}(s)$	1430.041	1429.066	1105.566	70.366	69.820	267.852
bca-greedy	−58260.32	*best generated*						
	799.335	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	4.654	2.385	1.232	1017.211	1031.738	247.867
		best fused	−62602.72	−62559.20	−62632.57	−58260.32	−58260.32	−59634.95
		$t_{\text{fuse}}(s)$	1719.295	381.981	594.603	1017.211	1031.738	1113.447
greedy	−54572.31	*best generated*						
	16.089	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	2.162	0.152	0.192	127.075	138.153	47.721
		best fused	−62421.94	−62317.54	−62351.75	−54572.31	−54572.31	−56910.62
		$t_{\text{fuse}}(s)$	1239.378	122.924	165.537	127.075	138.153	810.663

pairs16 (*worm30-worm24*)

generation			+ fusion					
			ilp	qpbo	qpbo-i	qpbo-p	qpbo-pi	lsatr
dd-ls0	−66930.42	*best generated*						
	373.689	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	51.973	14.517	13.055	465.735	466.303	295.429
		best fused	−68514.68	−68519.91	−68501.62	−66930.42	−66930.42	−67811.09
		$t_{\text{fuse}}(s)$	962.066	211.720	222.974	465.735	466.303	779.842
dd-ls3	−67880.07	*best generated*						
	365.432	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	111.097	54.730	50.762	467.932	463.630	294.497
		best fused	−68641.31	−68609.32	−68606.48	−67880.07	−67880.07	−68168.43
		$t_{\text{fuse}}(s)$	870.010	552.864	577.833	467.932	463.630	599.154
dd-ls4	−68066.52	*best generated*						
	1366.473	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	201.251	116.252	83.422	1506.379	1520.751	591.036
		best fused	−68535.31	−68600.26	−68592.56	−68066.52	−68066.52	−68280.73
		$t_{\text{fuse}}(s)$	937.398	603.115	347.027	1506.379	1520.751	1510.095
bca-lap	−67310.94	*best generated*						
	79.041	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	59.877	55.809	78.309	86.435	87.235	89.291
		best fused	−67938.04	−67877.61	−67906.20	−67310.94	−67310.94	−67341.79
		$t_{\text{fuse}}(s)$	831.601	1041.442	1029.391	86.435	87.235	97.349
bca-greedy	−65981.34	*best generated*						
	394.109	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	3.814	2.016	2.097	482.736	490.634	169.687
		best fused	−68602.77	−68514.06	−68518.90	−65981.34	−65981.34	−67023.57
		$t_{\text{fuse}}(s)$	1230.825	248.996	405.268	482.736	490.634	956.900
greedy	−60968.82	*best generated*						
	17.928	$t_{\text{gen}}(s)$ | $t_{\text{beat}}(s)$	0.973	0.108	0.171	97.081	108.983	30.767
		best fused	−68452.62	−68380.37	−68453.19	−60968.82	−60968.82	−63176.06
		$t_{\text{fuse}}(s)$	734.007	98.381	177.845	97.081	108.983	581.942

A7. Qualitative results

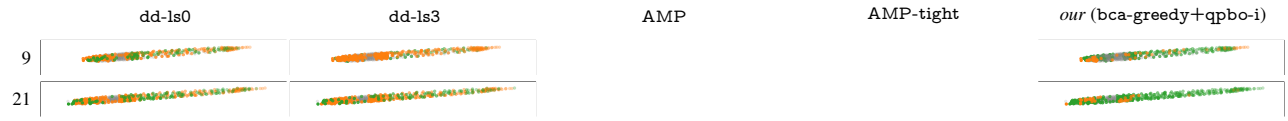
Below we show some qualitative results for the worms and pairs datasets. As the instances of the datasets hotel, house, car, motor are largely solved to optimality by all state-of-the-art methods, *c.f.* Tables 2 and A4, we do not show qualitative results for these as they would be essentially identical for all methods. Unfortunately, for the datasets opengm, flow to the best of our knowledge no visualization corresponding to the models is publicly available.

A7.1. worms

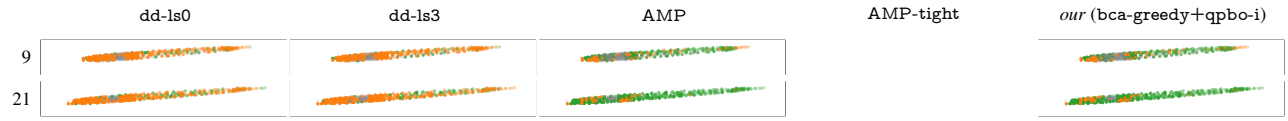
Below we show qualitative results for the worms dataset for the methods and time budgets also stated in Table A4. Each column corresponds to one of the methods dd-ls0 [47], dd-ls3 [47], AMP [46], AMP-tight [46], and our proposed method bca-greedy+qpbo-i. As HBP [56] did not yield any results within the given time budget we omit it here.

Each line corresponds to an instance of the dataset numbered in the same manner as in Section A6.7. Nodes labeled correctly according to the atlas are marked in green, nodes labeled with the wrong label are marked in orange, and labeled nodes with no ground truth known are shown in grey. Simply put, the more green, the better the result.

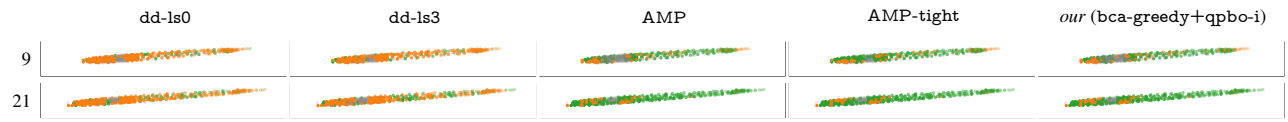
Results for a time budget of 1 second.



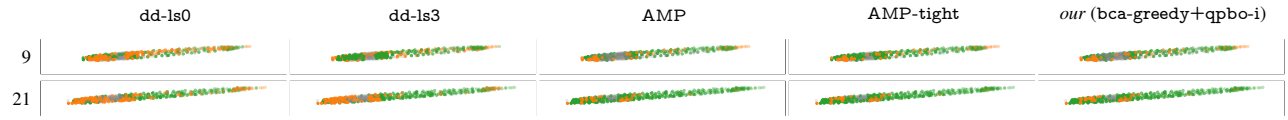
Results for a time budget of 10 seconds.



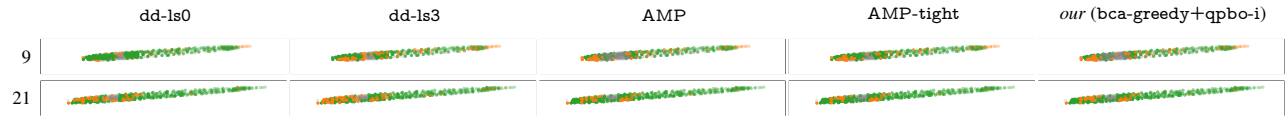
Results for a time budget of 30 seconds.



Results for a time budget of 180 seconds.

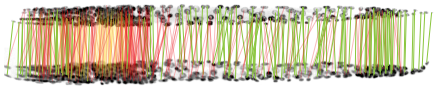
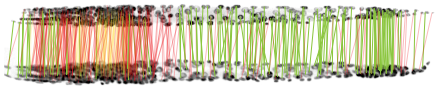
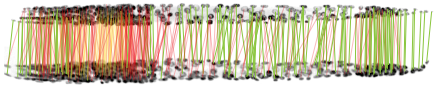
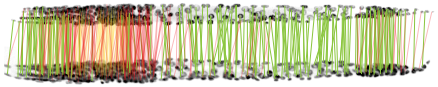
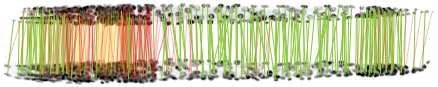
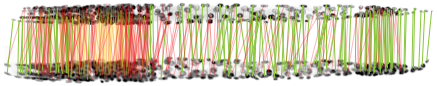
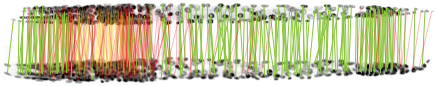
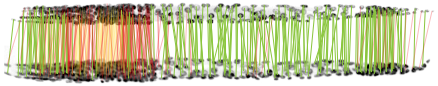
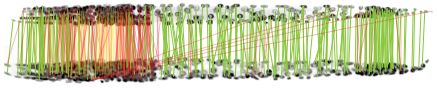
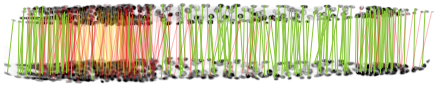
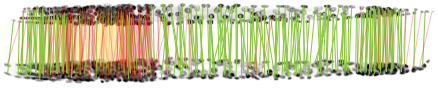


Results for a time budget of 300 seconds.



A7.2. pairs

Below we show qualitative data for the pairs dataset for the methods dd-ls0 [47], AMP [46], and our proposed method bca-greedy+qpbo-i. Green lines indicate correct matchings when using the same labelings as for the atlas in the worms dataset. Red lines indicate errors, and for yellow lines it is not known whether they are correct or not. Shown is the result for pairs instance 12, which is also depicted in the teaser figure in the main paper.

time budget	dd-ls0	AMP	*our* (bca-greedy+qpbo-i)
1 second			
10 seconds			
30 seconds			
180 seconds			
300 seconds