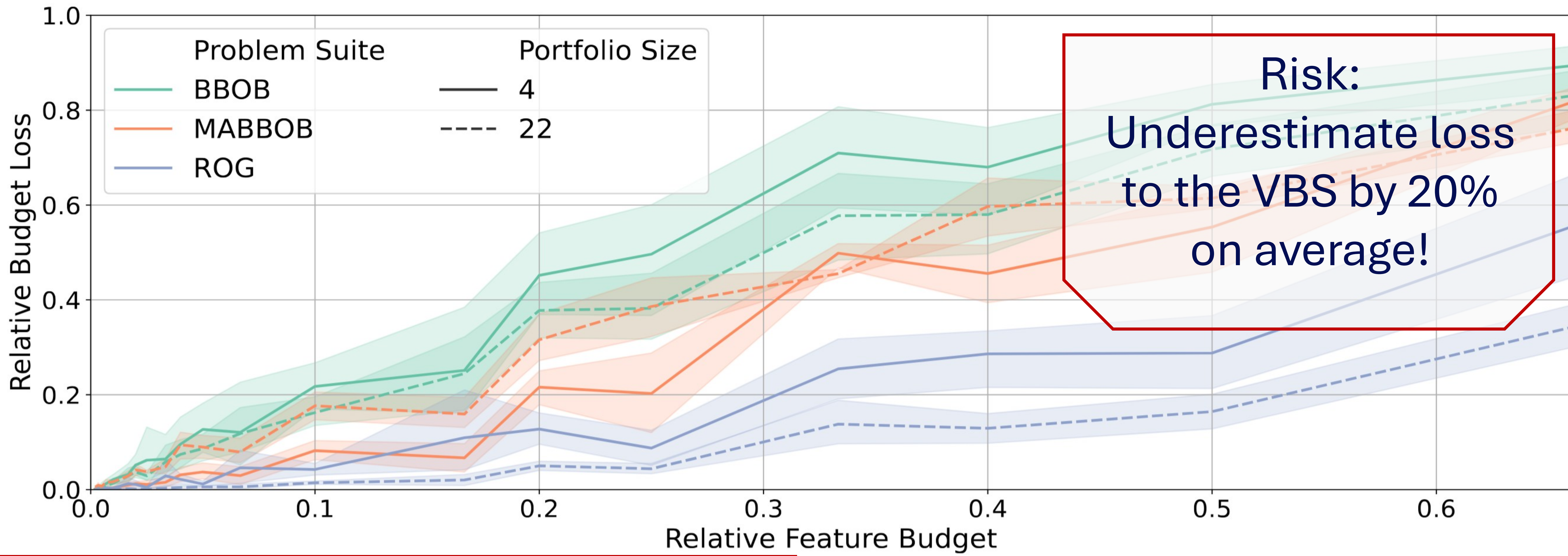


Properly account for feature computation in algorithm selection for black-box optimization!



Summary

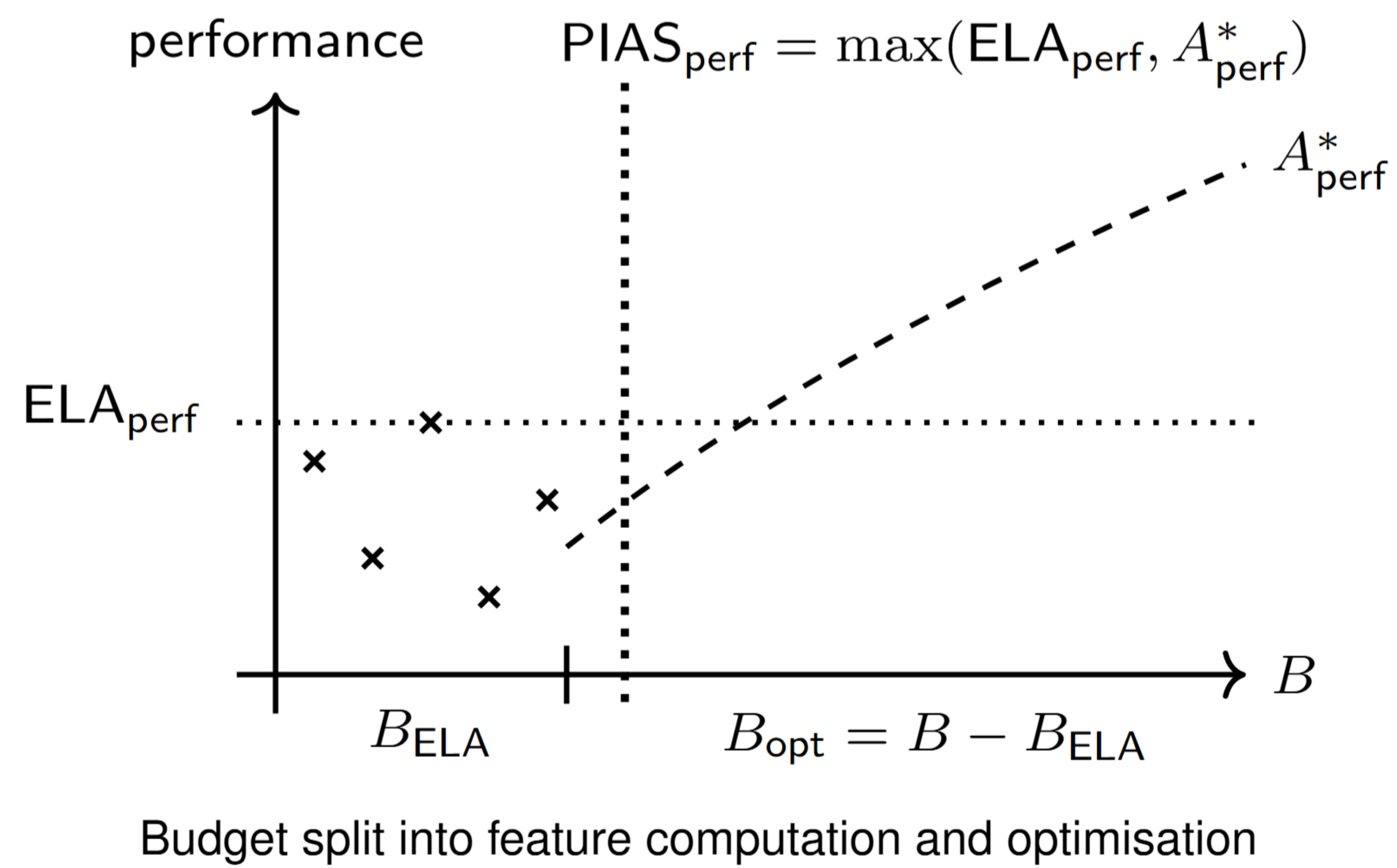
Black-Box Optimization: **Features are not free!**
Their cost depends on the **allocated budget**

Setup:

- **1000+ PIAS scenarios:** varying problems, algorithms, budgets and feature costs
- **Fixed-budget viewpoint:** Select for maximum quality
- **Varying feature computation budget:** relative to total optimization budget

Results:

- **Feature computation cost** should not be ignored in BBO
- PIAS is still beneficial in many cases, but **not always**



Normalized Loss



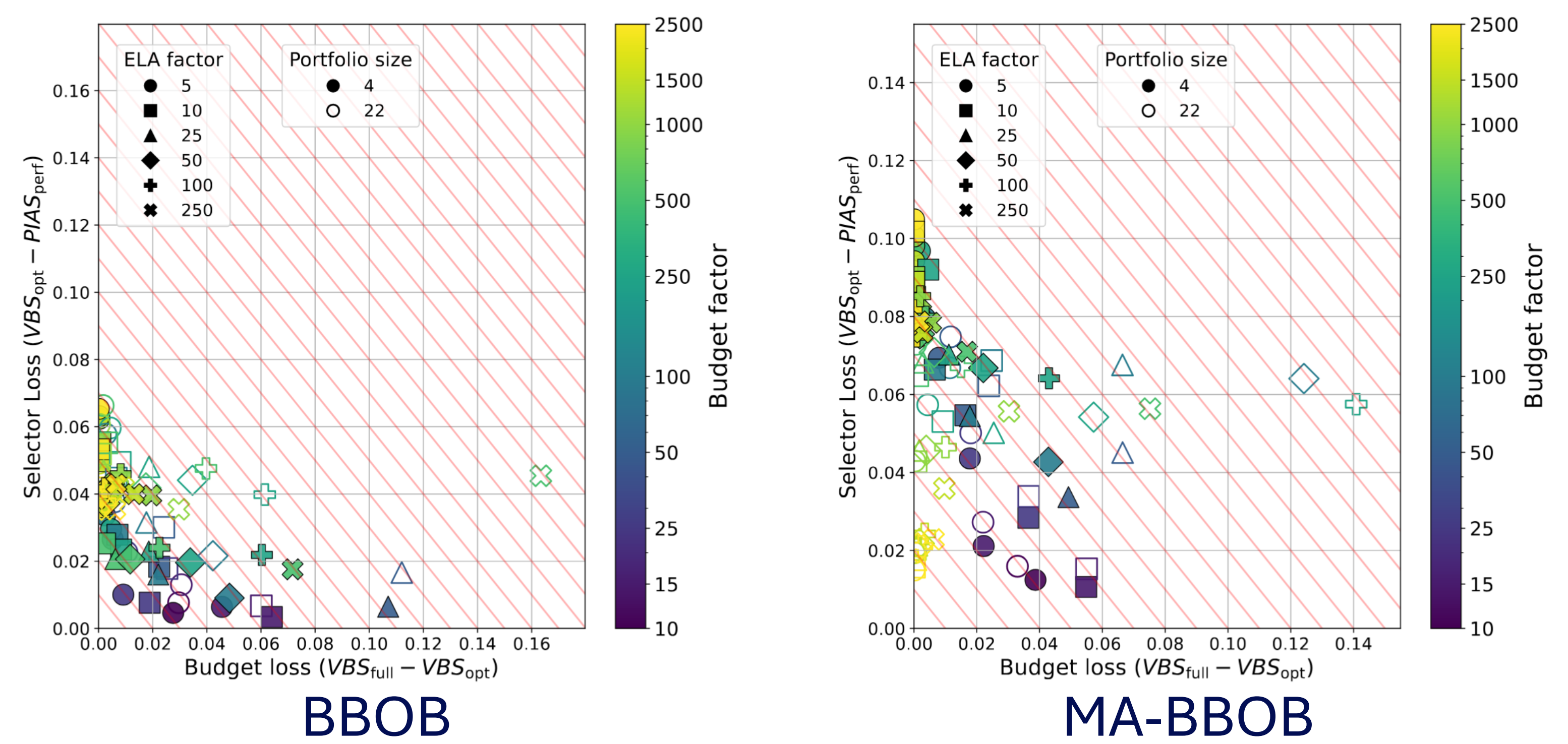
Relative performance to full budget SBS and VBS

Experimental Details

- **Problems:** BBOB, MA-BBOB, RandOptGen
- **Dimensionalities:** $d \in \{2, 5, 10, 20\}$
- **Full budgets:** 10d to 2500d
- **ELA budgets:** 5d to 250d
- **Algorithms:** Portfolios of size 4 and 22 (Nevergrad algorithms)

Loss Decomposition

- **Budget loss:** Caused by spending budget on features
- **Selector loss:** From selected alg being worse than VBS



Next Steps

- **Improve understanding** of when AS is worthwhile
- Work towards **more flexible PIAS**, e.g. with dynamic feature budgets

On the Influence of Feature Computation Budget on
Per-Instance Algorithm Selection for Black-Box Optimization

Koen van der Blom and Diederick Vermetten



<https://arxiv.org/abs/2605.04954>