

**Dixièmes Journées Franco-Chiliennes d’Optimisation**  
**INSA Rouen Normandie, Rouen, France**  
**8-11 July 2025**

**GLOBAL OPTIMIZATION WITH HAMILTON-JACOBI PDES**

MICHAEL HERTY, YUYANG HUANG, **DANTE KALISE**, AND NIKOLAS KANTAS

We introduce a novel approach to global optimization via continuous-time dynamic programming and Hamilton-Jacobi-Bellman (HJB) PDEs. For non-convex, non-smooth objective functions, we reformulate a global optimization problem as an infinite horizon, optimal asymptotic stabilization control problem. The solution to the associated HJB PDE provides a value function which corresponds to a (quasi)convexification of the original objective. Using the gradient of the value function, we obtain a feedback law driving any initial guess towards the global optimizer without requiring derivatives of the original objective. We then demonstrate that this HJB control law can be integrated into other global frameworks, such as consensus-based optimization, to improve its performance and robustness.

REFERENCES

- [1] Y. Huang, M. Herty, D. Kalise, N. Kantas: *Fast and robust consensus-based optimization via optimal feedback control*, arXiv:2411.03051, 2024.

DEPARTMENT OF MATHEMATICS, IMPERIAL COLLEGE LONDON, UNITED KINGDOM, EMAIL: [d.kalise-balza@imperial.ac.uk](mailto:d.kalise-balza@imperial.ac.uk).