

Evo-MCTS: Gravitational-Wave Algorithm Search and Lessons for AI-Assisted Physics

Sunday, 25 October 2026 14:00 (20)

This talk presents Evo-MCTS (arXiv:2508.03661), a framework combining large language models, Monte Carlo tree search, and evolutionary optimization for automated algorithm discovery, using gravitational-wave signal searches as a case study. Through analyses of search trajectories and subsequent audits, we examine how benchmark design influences optimization and how independent validation and physical consistency checks can distinguish improvements in evaluation metrics from genuine scientific advances. Building on these findings, we explore the potential of large language models in theoretical physics, including the search for exact black-hole solutions through symbolic computation and formal verification in Lean, and discuss broader opportunities and challenges for AI-assisted scientific research.

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