

# Bayesian Optimization with Noise-Free Observations: Improved Regret Bounds via Random Exploration

*Hwanwoo Kim*

University of Chicago

hwkim@uchicago.edu

Special session:

This talk focuses on Bayesian optimization algorithms with noise-free observations. We introduce new Bayesian optimization algorithms rooted in scattered data approximation relying on a random exploration step to ensure that the fill-distance of query points decays at a near-optimal rate. Our algorithms retain the ease of implementation of the classical GP-UCB algorithm and satisfy cumulative regret bounds that nearly match those conjectured in [1], hence solving a COLT open problem. Furthermore, the new algorithms outperform GP-UCB and other popular Bayesian optimization strategies in several examples

- [1] Sattar Vakili. Open problem: Regret bounds for noise-free kernel-based bandits. In Conference on Learning Theory, pages 5624–5629. PMLR, 2022.