

# Multi-Fidelity Emulation of Cosmological Simulations for High Dimensional Parameter Inference

*Tuesday, 7 May 2024 09:30 (10 minutes)*

In this talk, I will introduce a multi-fidelity emulation technique, designed to efficiently emulate summary statistics from cosmological simulations for high-dimensional parameter inference. Multi-fidelity emulation allows us to combine cosmological simulations of varying resolutions and volumes, enabling us to efficiently explore the high-dimensional parameter space of cosmological models with a much lower cost, making it possible for future surveys to probe the physics beyond  $\Lambda$ CDM and astrophysics effects. I will present a few applications of multi-fidelity emulators, including 9-dimensional parameter inference using galaxy formation simulations, PRIYA, constraining cosmology with the Lyman-alpha forest. Finally, I will briefly mention how multi-fidelity emulation is used for building an 11-dimensional beyond  $\Lambda$ CDM emulator using expensive high-fidelity N-body simulations.

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