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Emulating the Universe: overcoming computational roadblocks with Gaussian processes

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Whether it's calibrating our analytical predictions on small scales, or devising all new probes beyond standard two-point functions, the road to precision cosmology is paved with numerical simulations. The breadth of the parameter space we must simulate, and the associated computational cost, however, present a serious challenge. Fortunately, emulators based on Gaussian processes and neural networks provide a way forward, allowing for numerical models to be constructed through training machine learning algorithms on a tractable number of mocks. In this talk, I will present cosmological constraints derived from new statistics made possible by a simulation-based emulator model, and argue that this new approach presents a practical and environmentally-conscious path towards accurate cosmological inference.

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