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Machine Learning Powered Inference in Cosmology

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The main goal of cosmology is to perform parameter inference and model selection, from astronomical observations. But, uniquely, it is a field that has to do this limited to a single experiment, the Universe we live in. With compelling existing and upcoming cosmological surveys, we need to leverage state-of-the-art inference techniques to extract as much information as possible from our data.

In this talk, I will begin present Machine Learning based methods to perform inference in cosmology, such as simulation-based inference, and stochastic control sampling approaches. I will show how we can use Machine Learning to perform parameter inference of multimodal posterior distributions on high dimensional spaces. I will finish by showing how these methods are being used to improve our knowledge of the Universe, by presenting the results from the SimBIG analysis on simulation-based inference from large-scale structure data.

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