Contribution ID: **4** Type: **not specified**

ABC in cosmology: Likelihood-free inference without the inverse covariance matrix

Friday, September 20, 2019 2:15 PM (1 hour)

In traditional likelihood-based parameter inference methods, the inverse of the data covariance matrix has to be computed. In cosmology, the covariance is often estimated from expensive numerical simulations. Limits on the allowed biases on parameter constraints from the inversion of the noisy, high-dimensional covariance matrix sets strong requirements on the necessary number of simulations, which has to be much larger than the data dimension. For a realistic setting of typical cosmological data, this number can be in the thousands, making the use of time-consuming N-body simulations prohibitive.

In this talk I propose to use Approximate Bayesian Computation (ABC) as a likelihood-free inference method to obtain constraints on cosmological parameters. Model simulations of the data vector are obtained quickly by drawing from an analytical multi-variate distribution, requiring only a covariance matrix but not its inverse. Using toy models, I show that the number of simulations can be much smaller than the data dimension. I present first results from applying ABC to weak gravitational lensing, which is one of the main cosmological probes to explore dark energy and the dark-matter distribution in the universe.

Presenter: Dr KILBINGER, Martin (CEA Saclay)