

The future of cosmological inference

vendredi 13 juin 2025 10:40 (20 minutes)

In this talk I will introduce a new paradigm for cosmological inference, enabled by recent advances in machine learning and its underlying technology. By combining emulation, differentiable and probabilistic programming, scalable gradient-based sampling, and decoupled Bayesian model selection, this framework scales to extremely high-dimensional parameter spaces and enables complete Bayesian analyses—encompassing both parameter estimation and model selection—in a fraction of the time required by conventional approaches. I will demonstrate its application to various Stage IV cosmological survey configurations, tackling parameter spaces of approximately 150 dimensions that are inaccessible to standard techniques. I will also show how this framework can be used to test competing gravity theories and present Stage IV forecasts on interacting dark energy models. Finally, I will illustrate how a simulation-based inference analysis of Euclid cosmic shear data could definitively confirm or refute the recent DESI results pointing to dynamical dark energy.

Orateur: SPURIO MANCINI, Alessio (Royal Holloway - University of London)

Classification de Session: COLOURS Workshop