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Lattice simulations during inflation

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Inflationary models with significant amplification of small-scale scalar and tensor perturbations have attracted considerable attention in the literature due to their interesting observational signatures, such as primordial black holes and gravitational waves. However, the large enhancement of fluctuations often challenges our perturbative understanding of inflation. I will present a numerical study of inflation based on lattice simulations. I will show that including nonlinearities has important consequences for the inflationary dynamics and its predictions. I will mainly focus on a specific model known as axion inflation, where the inflaton is coupled to gauge fields via the Chern-Simons interaction. As a second example, I will consider a single-field model of inflation with a resonant feature in the potential.

Presenter: CARAVANO, Angelo (IAP, Paris)

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