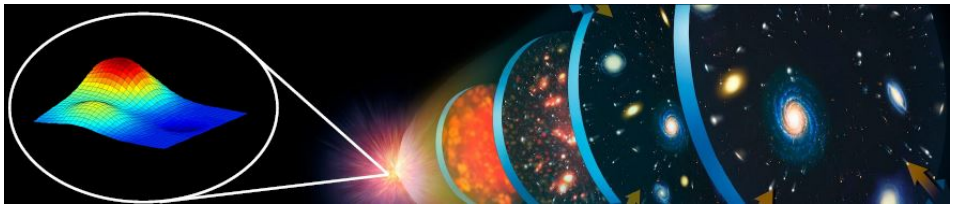

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Yoann Launay, Stochastic inflation beyond the lamppost with general and numerical relativity

vendredi 27 juin 2025 10:30 (30 minutes)

The absence of general non-perturbative methods in quantum field theory on curved spacetimes has highlighted the importance of numerical studies in classical regimes. This work presents an overview of our recent advances in solving the equations of general relativity (GR) for inhomogeneous inflation, driven by vacuum quantum fluctuations.
A key contribution of this work is the transition from a cosmological framework—such as knowledge of curvature perturbations on comoving hypersurfaces—to a numerical relativity (NR) framework. This transition introduces a consistent method for incorporating perturbative initial conditions that satisfy GR constraints. Moreover, it naturally defines a coarse-graining procedure for an inflating spacetime, enabling the construction of a stochastic model for inflation in full GR. We explain the subtlety between an initial input of perturbations and stochastic sources, which relates to the concept of quantum diffusion.
Finally, our latest results are presented and include non-perturbative phenomena arising from perturbative sources, highlighting the potential of NR to probe these regimes.