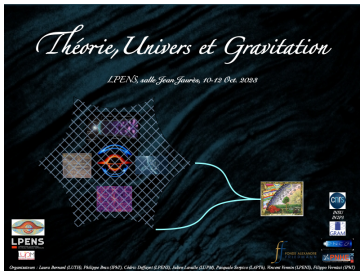

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Lucas Pinol (LPENS): Borel resummation of secular divergences in stochastic inflation

jeudi 12 octobre 2023 10:00 (20 minutes)

We make use of Borel resummation to extract the exact time dependence from the divergent series found in the context of stochastic inflation.

Correlation functions of self-interacting scalar fields in de Sitter spacetime are known to develop secular IR divergences via loops, and the first terms of the divergent series have been consistently computed both with standard techniques for curved spacetime quantum field theory and within the framework of stochastic inflation. Impressively, the stochastic formalism enables one to compute the time series analytically at an arbitrary order, thus outperforming other methods. However, the time series is divergent, while we also know the asymptotic result to be finite.

We show that Borel resummation can be used to interpret the divergent series and to correctly infer the time evolution of the correlation functions in the transition regime. In practice, we adopt a method called Borel–Padé resummation where we approximate the Borel transformation by a Padé approximant. Beyond formal applications with test scalar fields and de Sitter spacetime, the stochastic formalism can be applied to active scalar fields during inflation, enabling one to derive non-perturbative results relevant, e.g., for primordial black hole formation.

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