Contribution ID: **27** Type: **not specified**

Stochastic effects and Primordial magnetogenesis

Thursday, 9 May 2024 11:45 (45 minutes)

In this talk, I delve into the intricacies of primordial magnetogenesis during inflation, incorporating a thorough consideration of the dynamics of stochastic noises associated with electromagnetic perturbations. By deriving the Langevin and Fokker-Planck equations governing the evolution of electromagnetic fields, I achieve analytical solutions. Our investigation reveals that, although the backreactions of the electric field energy density have the potential to prematurely disrupt inflation, certain regions of parameter space exhibit an unconventional mean-reverting process in the stochastic dynamics, altering the typical decaying behavior of magnetic fields. Consequently, magnetic fields can reach an equilibrium state with amplitudes significantly larger than those obtained without accounting for stochastic noises. I will demonstrate that, under controlled backreactions of electric field perturbations, magnetic fields with a present amplitude of ~10ˆ(-13) Gauss and a correlation length of Mpc can be generated.

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