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## The Stochastic Relaxion

*Friday, June 2, 2023 9:40 AM (20 minutes)*

Light scalar fields, such as axions, can play an important role in cosmology. In this talk I will discuss the mechanism of cosmological relaxation of the electroweak scale, which provides a dynamical solution to the Higgs mass hierarchy problem. In the simplest model, the Higgs mass is scanned during inflation by a light field, the relaxion, whose slow-roll dynamics selects a naturally small Higgs vev. We revisit the original proposal and investigate the mechanism in a regime where the relaxion is subject to large fluctuations during inflation, including the “quantum-beats-classical” regime. The stochastic dynamics of the field is described by means of the Fokker-Planck formalism. We derive a new stopping condition for the relaxion taking into account the transitions between the local minima of its potential. We investigate the consequences both for the QCD relaxion and the strong CP problem, as well as for non-QCD models. We identify a new region of the parameter space where the stochastic misalignment of the relaxion from its local minimum due to fluctuations can naturally explain the observed dark matter density in the universe.

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