Contribution ID: **93** Type: **not specified**

Towards a first principles treatment of warm inflation

Thursday 26 September 2019 14:45 (15 minutes)

"Warm Inflation"is an alternative to the standard inflationary paradigm in cosmology. It is characterized by a quasi-equilibrium between the dissipation due to particle production and the dilution due to the Hubble expansion, which keeps a thermal bath of radiation at a constant high temperature during inflation. We derive a quantum kinetic equation of motion for a slowly-rolling scalar field coupled to a thermal bath from first principles to address the question whether Warm Inflation can be realized consistently in the framework of quantum field theory. We employ the Schwinger-Keldysh formalism to systematically study thermal and quantum corrections to the effective potential that drives the dynamics of the field as well as to the dissipation coefficient that slows down its motion. While the effective potential is shown to have an expected parametric dependence, we show that the main contribution to the dissipation coefficient decreases with the temperature, which contradicts what is assumed in most phenomenological studies of Warm Inflation.

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Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics