Contribution ID: **18** Type: **not specified**

A Renormalizable Model for Inflation and Dark Matter

Wednesday 9 June 2021 11:20 (20 minutes)

We present a renormalizable framework to embed inflation and dark matter (DM) by extending the standard model (SM) with one gauge singlet real scalar field ϕ and one gauge singlet fermonic field χ. In our setup, the real scalar field acts as inflaton, and its potential is the most general renormalizable polynomial up to quartic term, which becomes flat due to the existence of a (near) inflection-point. The inflationary predictions agree with the latest CMB experiments very well. We also analyze reheating by considering the Higgs production via inflaton decay. In our scenario DM χ particles can be produced via decay of inflaton, freeze-in mechanism or gravitational scattering of inflaton/SM plasma depending on the model parameter considered.

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Session Classification: MOCa