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Non-minimal quartic inflation in classically conformal $U(1)'$ extended standard model

A classically conformal $U(1)'$ extended Standard Model (SM) is a simple and well-motivated extension of the SM, where a new anomaly free $U(1)'$ gauge symmetry is introduced along with a $U(1)'$ Higgs field Φ and three right-handed neutrinos. In this model, the $U(1)'$ gauge symmetry is broken by the Coleman-Weinberg mechanism naturally at the TeV scale, which subsequently triggers the electroweak symmetry breaking. In this context, we consider quartic inflation with non-minimal gravitational coupling, where the $U(1)'$ Higgs field Φ is identified with inflation. Through the Coleman-Weinberg mechanism, the quartic coupling of Φ has a relation with the $U(1)'$ gauge coupling and the Majorana Yukawa couplings of the right-handed neutrinos, and as a result the inflationary predictions correlate with the gauge coupling and the Majorana Yukawa couplings. Combining the constraints from the electroweak vacuum stability, the search result for a $U(1)'$ boson resonance at the LHC Run-2 and the Planck 2015 results, we identify a phenomenologically viable parameter space.

Parallel Session

Cosmology and Gravitational Waves

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