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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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