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Dynamical mass generation for a massless minimal scalar with quartic plus cubic self interaction in de Sitter spacetime

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We consider a massless minimally coupled quantum scalar field with an asymmetric (quartic plus cubic) self interaction,
V (φ) = λφˆ4/4!+βφˆ3/3! in the (3 + 1)-dimensional inflationary de Sitter background. This potential is bounded from below
regardless of the sign of β. The motivation of this study comes from the fact that such a potential may generate negative vacuum expectation value of V(φ) at late time, thereby decreasing the value of cosmological constant which is essential to end the inflation. We investigate this theory via Starobinsky stochastic technique and compare it with the field theoretic results upto O(λˆ2) and O(λβˆ2). We compute the vacuum expectation value of φ, φˆ2, V(φ) and a non-perturbative as well as stochastic computation of the dynamically generated mass. We also estimate the possible shift of the inflationary cosmological constant due to this potential V(φ).

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