

Renormalization-group improved inflationary scalar electrodynamics and SU(5) scenarios

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The possibility to construct inflationary models for the renormalization-group (RG) improved potentials corresponding to scalar electrodynamics and to SU(2) and SU(5) models is investigated. In all cases, the tree-level potential, which corresponds to the cosmological constant in the Einstein frame, is seen to be unsuitable for inflation. Rather than adding the Hilbert-Einstein term to the action, quantum corrections to the potential, coming from the RG equation, are included. The inflationary scenario is analyzed with unstable de Sitter solutions that correspond to positive values of the coupling function, only. We show that, for the finite SU(2) model and SU(2) gauge model, there are no de Sitter solutions suitable for inflation, unless exit from it occurs according to some weird, nonstandard scenarios. Inflation is realized both for scalar electrodynamics and for SU(5) RG-improved potentials, and the corresponding values of the coupling function are seen to be positive. It is shown that, for quite reasonable values of the parameters, the inflationary models obtained both from scalar electrodynamics and from the SU(5) RG-improved potentials are in good agreement with the most recent observational data. Report is based on E. Elizalde, S. D. Odintsov, E. O. Pozdeeva and S. Yu. Vernov, PHYSICAL REVIEW D 90, 084001 (2014)

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