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General Analytic Solution of a Non-Singular Isotropic Cosmological Model with Inflation and Bounces

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For an isotropic cosmological model with a spatial curvature supported by a self-interacting scalar field minimally coupled to gravity, we construct and analyze a special integrable potential which approximates the potential of the Starobinsky R+R^2 inflationary model in the Einstein frame, and derive the general analytic solution of the corresponding Einstein–Friedmann equations. We demonstrate that there exists a three–dimensional domain in the space of three model parameters describing the general solution for which the model possesses both inflationary stages and bounces and has no singularities.

Primary authors: Prof. SORIN, Alexander (Joint Institute for Nuclear Research (RU)); Prof. STAROBINSKY, Alexei (L. D. Landau Institute for Theoretical Physics, Moscow)

Presenter: Prof. SORIN, Alexander (Joint Institute for Nuclear Research (RU))

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