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Frame-Covariant Formulation of Inflation in Scalar-Curvature Theories

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Inflation has been very successful as a generic explanation of the origin of cosmological anisotropies. However, the development of more sophisticated inflationary models, such as scalar-curvature theories, has led to challenges in extracting predictions for observable quantities. With the aim of obtaining predictions from inflationary models in a concise and straightforward manner, I will present the extension of the potential slow-roll approximation which incorporates scalar-curvature theories and the derivation of new, generalized potential slow-roll parameters. From this, I will demonstrate how to extract predictions for cosmological observables for inflationary models with a wide array of theoretical underpinnings. Furthermore, I will show that frame transformations (conformal transformations and inflaton reparametrizations) leave observable quantities invariant within the extended slow-roll formalism. As a demonstration of its utility, I will apply it to induced gravity inflation, Higgs inflation, and F(R) models. I will thus show that results for observable quantities may be readily obtained to greater accuracy than the usual strategy of approximating the potential after a frame transformation. Finally, I will outline how the Vilkovisky-DeWitt formalism may be applied to scalar-tensor theories in order to extend frame-covariance beyond the tree-level approximation.

Primary author(s) : Prof. PILAFTSIS, Apostolos (University of Manchetser); BURNS, Daniel (University of Manchester); KARAMITSOS, Sotirios (University of Manchester)

Presenter(s) : KARAMITSOS, Sotirios (University of Manchester)

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