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Thermodynamics of f (R) Theories

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This work investigates a toy model for inflation in a class of modified theories of gravity in the metric formalism. Instead of the standard procedure — assuming a non-linear Lagrangian f (R) in the Jordan frame — we start from a simple φ 2 potential in the Einstein frame and investigate the corresponding f (R) in the former picture. Such approach yields plenty of new pieces of information, namely a self-terminating inflationary solution with a linear Lagrangian, a robust criterion for stability of such theories, a dynamical effective potential for the Ricci scalar R, the addition of an ad-hoc Cosmological Constant in the Einstein frame leads to a Thermodynamical interpretation of this physical system, which allows further insight on its (meta)stability and evolution.

Primary author: PERALTA GONZÁLEZ, César Daniel (Universidad de Antioquia)

Presenter: PERALTA GONZÁLEZ, César Daniel (Universidad de Antioquia)

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