

Classical features of polynomial higher-derivative gravities

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Local gravitational theories with more than four derivatives have remarkable quantum properties. Namely, they are super-renormalizable and may be unitary in the Lee-Wick sense, if the massive poles of the propagator are complex. It is important, therefore, to explore also the IR limit of these theories and identify possible observable signatures of the higher derivatives. In this talk we present recent results in this direction. Specifically, we discuss the effect that those higher-order terms can have on the Newtonian potential and related singularities. The result is that any polynomial model with at least six derivatives in both spin-2 and spin-0 sectors has regular curvature invariants in the weak-field limit. Under this same condition the collapse of spherical null shells is also regular. We also discuss the viability of a gravitational seesaw-like mechanism, which could be a mean of avoiding the Planck suppression of the higher derivatives' effects.

Primary author: GIACCHINI, Breno (Centro Brasileiro de Pesquisas Físicas)

Presenter: GIACCHINI, Breno (Centro Brasileiro de Pesquisas Físicas)