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Absence of propagating gravitational-wave polarisations in degenerate f(R) models

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In the context of $f(R)$ gravity, as well as other extended theories of gravity, the correct counting of globally well-defined linear dynamical modes (i.e. gravitational-wave polarisations) has recently drawn a vivid interest. In this talk, we present a consistent approach shedding light on such issues for both so-called degenerate and non-degenerate $f(R)$ models embedded in Minkowski and de Sitter backgrounds. We find that the linearised spectrum of degenerate models on these backgrounds is empty, lacking both the graviton and scalaron modes which appear in generic non-degenerate models. Our work generalises previous results in the literature applicable only to the specific (degenerate) model $f(R) = \alpha R^2$; in fact, we find that the same pathologies discovered therein emerge for all choices of $f(R)$ belonging to the wide class of degenerate models.

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