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Parametric amplification of chiral gravitational waves in single field inflation

The next generation detectors will verify, or at least constraint high energy phenomena, predicted by the vast variety of inflationary scenarios. If a circularly polarized gravitational wave signal is detected, would point to the existence of parity breaking physics [1]. Here we consider, possible realizations of the effective field theory of scalar-tensor gravity [2], which could offer a rich phenomenology. We introduce modifications to gravity which, at leading order, change the dispersion relation of gravitons. The action is extended to include derivatively coupled interactions, where time-diffeomorphism invariance and parity are broken. The higher-curvature couplings are expressed in terms of relative parameters scaled by negative powers of a small speed of sound. This pushes their values into the "UV sensitive" regime where the energy scales supressing these corrections are well below the reduced Planck mass, leading to parametrically large chiral tensor fluctuations. We show that the inclusion of additional higher-derivative operators helps to cure instabilities that are otherwise unavoidable in Chern-Simons gravity [3]. Finally, we discuss the effect of a disformal transformation on our system.

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