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1-loop contributions to the inflationary power spectrum

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With the prospect of future detection of gravitational waves in the next decade and the growing interest in the cosmology of primordial black holes, it is high time to study the dynamics of relevant models of inflation in depth. Typically the models of inflation that can lead to large spectrum of induced gravitational waves and abundant primordial black holes required to reach a large amplitude of the scalar perturbations at small scales. Despite reaching such large amplitudes for the scalar perturbations, in general only the tree-level power spectrum is considered to analyse a particular model of inflation while determining the abundance of primordial black holes and the spectrum of induced gravitational waves. However, there can be large loop-level contributions to the primordial power spectrum in such models. In this work, we have studied the 1-loop contributions to the curvature power spectrum using Green's function method for generic forms of the Lagrangian in single-field and multi-field inflation scenarios. We present our results for specific examples of inflation models. We inspect the phenomenological implications in certain cases where the 1-loop power spectrum has a reasonably large contribution to the full inflationary power spectrum.

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