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One-loop power spectrum in ultra slow-roll inflation and implications for primordial black hole dark matter

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A possible way to generate primordial black holes as candidates for the entirety of dark matter is a large power spectrum of inflationary curvature fluctuations. Recently, questions have been raised regarding the validity of perturbation theory in this context. We compute the one-loop power spectrum in ultra-slow roll inflation, including all relevant interactions for such analysis, along with counterterms that absorb the ultra-violet divergences. We compare the one-loop and tree-level contributions to the power spectrum, finding that perturbation theory remains valid in realistic ultra-slow roll models.

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