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An enhanced CMB power spectrum from quantum gravity

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We evaluate the modifications to the CMB anisotropy spectrum that result from a semiclassical expansion of the Wheeler–DeWitt equation for a real scalar field coupled to gravity in a spatially flat FLRW universe. Recently, such an investigation has led to the prediction that the power at large scales is suppressed. We make here a more general analysis and show that there is an ambiguity in the choice of solution to the equations describing the quantum gravitational effects. Whereas one of the two solutions describes a suppression of power, the other one decribes an enhancement. We investigate possible criteria for an appropriate choice of solution. We also derive general formulae for arbitrary values of the complex parameter in the general solution of the nonlinear differential equations for the JWKB wave function.

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