Corrections of the spectra with de sitter background in Krein space

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Abstract
Gravitational waves are the last unconfirmed prediction of the general relativity. These waves are tiny fluctuations in world frame that dissipate energy throughout space. The gravitational waves spectra of fluctuations can be originated from the non-linear effects during different cosmic evolution periods, especially from initially non-linear and excited vacuum state in the very early universe. Based on this fact, in this paper introducing "excited-de Sitter vacuum" as a fundamental mode, the obtained power spectrum has been investigated. Corrected spectra obtained from Hilbert and Krein spaces are compared. The renormalization approach presented in this work, preserves the curved space-time symmetry and stimulates us to use excited de Sitter mode. Also, the corrections obtained from the non-linear mode includes the second-order corrections and in the linear limit accords with the results from conventional methods.

Keywords: power spectrum, de sitter background, inflation, Krein space

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