

Quantum Nature of Primordial Gravitational Waves in Hořava-Lifshitz Gravity

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Hořava-Lifshitz (HL) gravity generates scale-invariant primordial density fluctuations and gravitational waves (PGWs) without requiring inflation. We investigate the quantum nature of PGWs within HL gravity. While inflationary models suggest the non-classicality (squeezed coherent state) of PGWs might be detectable via Hanbury Brown-Twiss (HBT) interferometry, we explore this possibility in the HL framework. We demonstrate that scale-invariant PGWs are produced during both the radiation-dominated and matter-dominated eras of the Universe within HL cosmology. Furthermore, we show that the frequency range exhibiting detectable quantum signatures for these HL-generated PGWs significantly exceeds that predicted by standard inflationary models. This extended range potentially enhances prospects for observing the quantum nature of gravity through future interferometric observations of PGWs.

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