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Non-local R^2-like inflation, Gravitational Waves and Non-Gaussianities

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The emergence of R^2 (Starobinsky) inflation from the semi-classical modification of gravity due to matter quantum fields clearly points out the importance of fundamental physics and the first principles in the construction of successful cosmological models. Along with the observational success, R^2 gravity is also an important step beyond general relativity (GR) towards quantum gravity. Furthermore, several approaches of quantum gravity to date are strongly indicating the presence of non-locality at small time and length scales. In this regard, ultraviolet (UV) completion of R^2 inflation has been recently studied in a string theory-inspired ghost-free analytic non-local gravity. We discuss the promising theoretical predictions of non-local R^2-like inflation with respect to the key observables such as tensor-to-scalar ratio, tensor tilt which tell us about the spectrum of primordial gravitational waves, and scalar Non-Gaussianities which tell us about the three-point correlations in the CMB fluctuations. Any signature of non-local physics in the early Universe will significantly improve our understanding of fundamental physics at UV energy scales and quantum gravity.

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