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Consistency of loop quantum cosmology with the cosmic microwave background bispectrum

Primordial non-Gaussianity has set strong constraints on models of the early universe. Studies have shown that Loop Quantum Cosmology (LQC), which is an attempt to extend inflationary scenario to planck scales, leads to a strongly scale dependent and oscillatory non-Gaussianity. In particular, the non-Gaussianity function $f_{\rm NL}(k_1,\, k_2,\, k_3)$ generated in LQC, though similar to that generated during slow roll inflation at small scales, is highly scale dependent and oscillatory at long wavelengths. In this work, we investigate the imprints of such a primordial bispectrum in the bispectrum of Cosmic Microwave Background (CMB). Inspired by earlier works, we propose an analytical template for the primordial bispectrum in LQC. We write the template as a sum of strongly scale dependent and oscillatory part, which captures the contribution due to the bounce, and a part which captures the scale invariant behaviour similar to that of slow roll. We then compute the reduced bispectra of temperature and electric polarisation and their three-point cross-correlations corresponding to these two parts. We show that the contribution from the bounce to the reduced bispectrum is negligible compared to that from the scale independent part. Thus, we conclude that the CMB bispectra generated in LQC will be similar to that generated in slow roll inflation. We conclude with a discussion of our results and its implications to LQC.

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