



Contribution ID: 76

Type: **not specified**

Small scale signatures of non-trivial inflationary and post-inflationary dynamics

Tuesday 31 August 2021 15:00 (1h 20m)

The primordial scalar power spectrum is well constrained over large scales, essentially by the observations of the anisotropies in the cosmic microwave background. However, the current bounds on the scalar power spectrum over small scales are considerably weaker. During the last few years, there has been an interest in examining scenarios which generate enhanced scalar power on small scales and lead to significant production of primordial black holes as well as induce secondary gravitational waves (GWs) of possibly detectable amplitudes. In this talk, I shall first outline some of the inflationary scenarios we have examined in this context. Thereafter, I shall describe the scalar bispectrum arising in such scenarios in single field models of inflation and discuss the corresponding imprints on the spectral density of secondary GWs. I shall then illustrate the difficulty in generating enhanced power on small scales from squeezed initial states. Lastly, I shall highlight the manner in which non-trivial post-inflationary dynamics can leave telltale imprints on the spectral density of primary GWs at small scales.

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