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Loop-level contributions of primordial non-Gaussianities and their observational consequences

Abstract :
Primordial non-Gaussianity arising from inflationary models is a unique probe of non-trivial dynamics of the inflaton field and its possible interactions with other fields. However, direct observational constraints on the magnitude of non-Gaussianities are relatively weaker compared to those on scalar and tensor power spectra. In my talk, I shall discuss the indirect constraints one can obtain for non-Gaussianities through their loop-level contributions to the power spectra, using two specific approaches. The first is a quantum field theoretic approach, through which I shall present the impact of loop-level contribution due to the quartic-order action on scalar power in models of inflation involving a brief epoch of ultra slow roll [1]. These models are widely debated in the literature in the context of primordial black hole formation and our result addresses certain crucial issues regarding perturbativity of the model. The second is a classical approach, by which I shall illustrate the imprints of contributions arising from cubic-order action on observables namely, the cosmic microwave background and the scalar-induced secondary gravitational waves [2,3]. Through these results using different approaches and on different observables, I shall try to convince that the non-Gaussian contributions of various orders can seriously affect the structure and amplitude of the power spectra and hence they warrant revising of existing fits of models against data.

References:
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Email

ragavendra@rrimail.rri.res.in

Affiliation

Raman Research Institute

Author: H V, Ragavendra

Presenter: H V, Ragavendra

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