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On the consistency relations describing the three-point functions involving tensors

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The detection of the imprints of the primordial tensor perturbations by BICEP2 and its indication of a rather high tensor-to-scalar ratio, if confirmed, can open up a new window for understanding the tensor perturbations, not only at the level of the power spectrum, but also in the realm of non-Gaussianities. In this work, we consider the consistency relations associated with the three-point cross-correlations involving scalars and tensors as well as the tensor bi-spectrum in inflationary models driven by a single, canonical, scalar field. Characterizing the cross-correlations in terms of the dimensionless non-Gaussianity parameters that we had introduced earlier, we express the consistency relations governing the cross-correlations as relations between these non-Gaussianity parameters and the scalar or tensor spectral indices, in a fashion similar to that of the purely scalar case. We also discuss the corresponding relation for the non-Gaussianity parameter used to describe the tensor bi-spectrum. We analytically and numerically establish these consistency relations explicitly in a variety of inflationary models, including those that permit deviations from slow roll and lead to features in the scalar power spectrum.

Primary author: Mr VIJAYAKUMAR, Sreenath (Indian Institute of Technology Madras)

Co-author: Prof. LAKSHMANAN, Sriramkumar (Indian Institute of Technology Madras)

Presenter: Mr VIJAYAKUMAR, Sreenath (Indian Institute of Technology Madras)

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