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Primordial Non-Gaussianities of inflationary step-like models

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We use Minkowski Functionals (MF) to explore the possible presence of non-Gaussian signatures in the recently released cosmic microwave background (CMB) Planck maps. In particular, we investigate MF outcomes for two sets of simulated CMB maps: one seeded by the ΛCDM concordance model, another seeded by the 'best-fit' CMB angular power spectrum. By 'best-fit' we mean a simulated CMB spectrum seeded by an inflationary model that well reproduce the observed low-ℓ features of the CMB temperature power spectrum. In this way, we obtain the spurious signal introduced by the power spectra with different shapes, signal to be taken into account in the corresponding MF analyses. Interestingly, we investigate the response of the four MF (i.e., \textit{Area, Perimeter, Genus}, and \textit{$N_{clusters}$}) for several sets of simulated maps. Our analysis confirm that, as already reported in the literature, the Perimeter exhibits the best performance. Moreover, our results show that the Perimeter obtained from the Planck maps (2015) is better fitted by the simulated CMB maps seeded by the angular power spectrum with low-ℓ features with respect to the curves obtained from the CMB maps seeded by the ΛCDM model.

Primary author(s) :   Dr NOVAES, Camila (Instituto Nacional de Pesquisas Espaciais - INPE); Dr BENETTI, Micol (University of Rome); Dr BERNUI, Armando (Observatorio Nacional)

Presenter(s) :   Dr BERNUI, Armando (Observatorio Nacional)

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