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Constraining higher-order primordial non-Gaussianity from power spectra and bispectra of imaging survey

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Detection of primordial non-Gaussianity (PNG) is recognized as a powerful probe of cosmic inflation, and it can give an important clue for the generation mechanism of primordial density fluctuations. In this talk, we specifically consider the local-type PNG and discuss how well one can tightly constrain the higher-order non-Gaussianity parameters (gNL and tauNL) as well as the leading order (fNL). While the recent CMB measurement by Planck puts a tight constraint on fNL, the constraints on gNL and tauNL are still weak. It is however known that the local-type PNG induces a strong scale-dependent behavior in the galaxy/halo clustering, and this can provide a way to put a more stringent constraint on PNG. Here, we examine the statistical power of this effect by combining both power spectra and bispectra of photometric/imaging galaxy surveys. Fisher matrix analysis reveals that the combination of power spectra and bispectra can break the degeneracy between non-Gaussianity parameters (fNL, gNL and tauNL) and this will give simultaneous constraints on those three parameters. As a result, upcoming surveys like the Large Synoptic Survey Telescope have the potential to improve the constraints on PNG much tighter than those obtained from the CMB measurements, giving us an opportunity to test the single-field consistency relation, $\tau_{NL} \geq (36/25)f_{NL}^2$.

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