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Classical and stochastic δN formalisms

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The non-Gaussian tail of the PDF of primordial scalar perturbations is a key element to determine the abundance of primordial black holes. These primordial non-Gaussianities arise, at least partly, from the non-linear, super-horizon dynamics of inflationary perturbations. Such non-linear evolution is usually addressed through the stochastic δN formalism. This formalism is based on the deterministic δN formalism, which captures the non-linear relation between curvature and inflaton perturbations, and is then supplemented with the stochastic formalism of inflation, which accounts for the backreaction of quantum fluctuations into large-scale inflaton dynamics. In our work, we reconsider the underlying assumptions and implications of this calculation using both numerical and analytical methods, assessing the validity of several approximations commonly used in the literature.

Based on work in progress with Guillermo Ballesteros, Thomas Konstandin, Mathias Pierre and Julian Rey.

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