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Clustering of PBHs in the stochastic-δN formalism

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Primordial black holes may form in the early universe from the collapse of rare, enhanced curvature perturbations. In the presence of such large perturbations, quantum diffusion cannot be neglected. Remarkably, it can be incorporated through the stochastic-δN formalism, which can be used to reconstruct the statistics of the curvature perturbation when non negligible quantum diffusion is at play. A general result of this procedure is the presence of heavy exponential tails in the probability density function of cosmological inhomogeneities, which largely affect predictions for PBHs.

I will present how the stochastic-δN formalism can be extended to arbitrary coarse graining and to multiple point statistics. In particular, the latter will be used to derive the two-point statistics of high threshold perturbations, which is needed to derive their spatial correlation. This formalism can be used to investigate whether quantum diffusion affects the spatial distribution of primordial black holes, inducing small-scale clustering at formation. I will present this analysis in single toy models and compare our findings with results obtained by assuming that primordial black holes arise from gaussian perturbations.

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