

Theoretical systematics in Large-Scale Structure Surveys

Tuesday, 7 May 2024 14:30 (10 minutes)

Large-Scale Structure (LSS) surveys have emerged as a promising avenue to probe the physics of cosmic inflation. Our limited quantitative understanding of the non-linear physics of structure formation poses modelling challenges when interpreting LSS data. In this talk I will give an overview of previous work that investigates some theoretical systematic effects in the context of large-scale galaxy surveys –especially those that seek to constrain local primordial non-Gaussianity. I will begin with describing our work on the gravitational effects of free-streaming light relics that are relativistic at late times (like massless neutrinos). The free-streaming of light relics non-trivially affects the coupling between large and small scales in structure formation and brings about a relative suppression in the galaxy bias at the largest scales –making it a potentially important systematic for any large-scale galaxy survey. I will then proceed to describe our work analysing the impact of free-streaming neutrinos and ionising radiation fluctuations in the late universe as post-inflationary phenomena that can bias a measurement of local primordial non-Gaussianity using observations of galaxy clustering. Accurate modelling of the effects of ionising radiation and free-streaming light relics is important in the context of future surveys like SPHEREx and MegaMapper that seek to robustly constrain local primordial non-Gaussianity as a distinguishing feature of some multi-field inflationary models. Towards the end, I will also present recent work on prospects for measuring local primordial non-Gaussianity parameters beyond f_{NL} using galaxy power spectra measurements by the SPHEREx all-sky survey.

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