
Impact of UV fluctuations on large-scale structure clustering

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Abstract

Spatial fluctuations in ultraviolet backgrounds can subtly modulate the distribution of extragalactic sources, a potential signal and systematic for large-scale structure surveys. While this modulation has been shown to be significant for 3D Lyman-alpha forest surveys, its relevance for other large-scale structure probes has not been explored, despite being the only astrophysical process that likely can affect clustering measurements on greater than megaparsec scales. We estimate that background fluctuations have a fractional effect on the power spectrum at scales of 0.01/Mpc at a level of: 0.03-0.3 (21cm IM at $z=1-3$), 0.001-0.1 (H α and Ly α IM), and ~ 0.01 (galaxy clustering at $z=1$). Compared to the sizes of imprints of cosmological benchmark parameters, we find that ionizing background could result in a bias on the squeezed triangle non-Gaussianity parameter f_{NL} that can be larger than unity for power spectrum measurements with a SPHEREx-like galaxy survey.

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