

An Effective Field Theory of 21 cm Radiation with Redshift Space Distortions

With the prospect of detecting the cosmological 21 cm signal from the epoch of reionization just over the horizon, methods for extracting maximal cosmological information from this signal are increasingly timely. I will discuss recent work to further develop the effective field theory (EFT) for the 21 cm brightness temperature field during the epoch of reionization, incorporating renormalized bias and a treatment of redshift space distortions. To validate our theoretical treatment, we fit the predicted EFT Fourier-space shapes to the Thesan suite of hydrodynamical simulations of reionization at the field level. We find that the resulting power spectra agree at the level of a few percent over the wavenumber range $k < 0.8$ h/Mpc and neutral fraction $x_{\text{HI}} > 0.4$ that is imminently measurable by the Hydrogen Epoch of Reionization Array (HERA).

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