The Sky-Averaged 21-cm Background as a Probe of Faint Galaxies at High Redshifts

Since its modern conception nearly 20 years ago, the redshifted 21-cm background has promised to revolutionize our understanding of structure formation in the early Universe, starting even before the formation of the first stars and extending through the late stages of cosmic reionization. Just in the last year or two, limits from power spectrum experiments have entered plausible regions of parameter space, with experiments targeting the sky-averaged ("global") signal seemingly not far behind. Despite steady and clearly complementary progress in the high-z galaxies community, there have been few efforts to model the galaxy luminosity function and the 21-cm background within a common framework, leaving 21-cm predictions poorly calibrated and the prospects for overcoming degeneracies in models unclear. In this talk, I will describe a new model for the global 21-cm signal calibrated to recent measurements of the luminosity function, as well as the CMB optical depth, $z\sim8$ 21-cm power spectrum, and X-ray luminosity star formation rate relation, and show that it leads to qualitatively different predictions than those that were used to guide the design of the first generation of experiments. I will discuss how our models might inform ongoing observing campaigns and how an initial detection would provide important constraints on the efficiency of star formation, escape fraction, and X-ray emissions of faint galaxies at high redshift.

Thanks!
Jordan