

Radio Recombination Lines from the High-redshift ISM

The interstellar medium (ISM) is a key factor in the evolution of galaxies over cosmic time. Radio recombination lines (RRLs) at low frequencies (< 5 GHz, in extragalactic sources) can provide unprecedented views of the diffuse ISM, such as diffuse ionized gas and the cold diffuse clouds of cold HI and CO-dark gas. Since low-frequency RRLs are stimulated transitions, they are observable intrinsic to and in intervening systems of bright radio sources out to redshifts of $z \sim 4$. However, RRLs have alluded detection outside of the local universe, until recently. Thanks to new radio telescopes and instrumentation, we are making the first detections of RRLs at high redshift ($z \sim 1$) and establishing that high redshift studies are feasible. In particular, I will present new data from the MeerKAT Absorption Line Survey in which we detect hydrogen RRLs from ionized gas in an absorption line system at $z=0.89$ towards the radio quasar PKS 1830-211.