

Title

MeerKAT follow-up of the large-scale overdense structures containing the most extremely concentrated Quasars at the Cosmic Noon

Abstract

Both theoretical simulations and observations suggest that the galaxy overdensities at high redshift are extended structures (tens to hundreds of comoving Mpc), which are frequently associated with extreme sources, such as luminous quasars (QSOs), QSO groups, bright radio galaxies, and Ly-alpha blobs, as they trace the formation of massive stars and/or black holes. Therefore, the radio continuum emission, originating from these two processes, is a key observable tool to study galaxy overdensities and their associated large-scale structures (LSSs) at high redshift. We propose high-sensitivity MeerKAT L-band continuum observations for the galaxy LSSs, which have been identified by combining the coherently strong Ly-alpha absorption systems and Ly-alpha emitters (LAEs) within $\sim 100cMpc$, at $z=2.2$. More interestingly, there is an extreme QSO overdensity at the similar redshift in the centre of this field, making it a unique target for studying the growth of galaxy LSSs and their correlations with QSO overdensities. The high-sensitivity and large field of view of MeerKAT observations enable us to 1) identify the radio members of the overdense galaxy structures; 2) completely map the geometry and morphology of galaxy LSSs; 3) investigate the correlations between galaxy and QSO overdensities; 4) examine the environmental dependence of galaxy properties at $z\sim 2$.