Probing the Brightest QSOs though the Spatial Distribution of Galaxies and (Fluorescent) Lya Emitters

QSOs are ubiquitous in the high-redshift universe, but the most luminous QSOs ($L \sim 10^{14} \text{L}_{\odot}$) are extremely rare even at the peak redshifts of black hole growth, $2 < z < 3$. Mr. Trainor will present detailed probes of such hyperluminous QSOs and their environments at these redshifts using deep surveys of 1558 continuum-selected galaxies (LBGs; $R < 25.5$) and 890 Lya-emitters (LAEs; $NB_{\text{Lya}} < 26.5$) selected to lie in the neighborhoods (or foreground/background) of the QSOs. Using clustering statistics, we derive the halo masses of the QSOs and LBGs and place their central black holes on the $M_{\text{DM}}$-$M_{\text{BH}}$ relationship, finding a large discrepancy compared to the estimates at low redshift. Using the sample of LAEs, we present evidence for a fluorescent contribution to their Lya emission, and we constrain the lifetime and opening angle of QSO emission via the 3D distribution of fluorescent Lya emitters. Finally, Mr. Trainor will discuss prospects for further study of the QSOs and the Lya-emitting gas and galaxies via NIR spectroscopy and applications to future Lya surveys.