

Talk title: Dual Supermassive Black Holes as Tracers of Galaxy Mergers

Abstract: A wealth of observations have shown that galaxy mergers are common and that nearly all galaxies host a central supermassive black hole (SMBH); consequently, some galaxies host two SMBHs as the result of recent mergers. However, the full potential of these dual SMBHs for studies of galaxy evolution has not yet been realized, due to the small number of known dual SMBHs. In this talk, I will describe a new technique I use to build a significantly larger sample of dual SMBHs, where I spectroscopically identify dual SMBHs that power active galactic nuclei (AGN). I search the DEEP2 Galaxy Redshift Survey for galaxy spectra that exhibit AGN emission lines that are offset in velocity relative to the mean velocity of the host galaxy's stars, suggesting bulk motion of the AGN within the host galaxies.

Within the set of DEEP2 red galaxies at $0.3 < z < 0.8$, I find 32 AGN with statistically significant (greater than 3 sigma) velocity offsets, ranging from ~ 50 km/s to ~ 300 km/s. After exploring physical effects such as AGN outflows that could cause such velocity offsets, I find that these offsets are most likely the result of dual SMBHs in merger-remnant galaxies. With this new technique of identifying galaxy mergers, I find that roughly half of red galaxies hosting AGN are merger-remnant galaxies. This result implies that galaxy mergers may trigger AGN activity in red galaxies and sets a merger rate of ~ 3 mergers/Gyr for red galaxies at $0.3 < z < 0.8$. Finally, I will discuss the utility of HST imaging and optical slit spectroscopy in further increasing the number of known dual SMBHs.