

Placing a Compact, Red AGN at $z=7.27$ in Perspective - A First Measurement of AGN-Galaxy Clustering at Cosmic Dawn

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“Deep spectroscopic JWST observations have recently unveiled an emerging population of faint $z>5$ active galactic nuclei (AGN) with supermassive black hole (SMBH) masses of 10^6 - 10^8 solar masses. Their often compact, red appearance in JWST/NIRCam imaging earned them the nick name “little red dots” and is likely due to large amounts of intrinsic dust-reddening. First estimates of their number densities exceed the expectations from extrapolating the quasar luminosity function by factors of 100, possibly constituting as much as 10% of the total galaxy population. While the detection of these “infant” growing SMBHs has begun to reshape our view of the early universe and SMBH evolution, how exactly they fit into the larger picture of cosmic structure formation is unclear.

I will present the discovery of a new faint AGN at $z=7.27$, classified by broad-line components ($\text{FWHM} > 2000$ km/s) to the H β and H γ emission lines in our NIRSpec/PRISM spectroscopy. The spectral shape is significantly affected by dust-reddening, producing JWST colors typical for these “little red dots”. We estimate a SMBH mass of $\sim 10^8$ solar masses with an Eddington ratio between 15%-30%, depending on the assumed reddening correction.

Our NIRSpec MSA observations have further revealed 8 associated galaxies to the AGN within a 2500 km/s window in the Hubble flow. Based on this sample, I will present an AGN-galaxy clustering measurement at $z>7$, placing this new AGN population in context with structure formation for the first time.”

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