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Discovery and Investigation into the Type-2 High-redshift QSO Population

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Understanding how supermassive black holes and their host galaxies co-evolve in the universe is an unsolved problem. In a classical "unified" model for active galactic nuclei (AGN), observers can detect unobscured (Type-1) AGNs, with broad emission lines and continuum, or obscured (Type-2) AGNs, with only narrow emission lines. Type-2 AGNs have been readily identified at low redshift (z<1). However, only handfuls of bonafide Type-2 QSOs are known at redshifts z~2 with bolometric luminosities that are comparable to the typical luminosity of Type-1 QSOs. The lack of luminous Type-2 QSOs at high redshift constitutes an unsolved problem. We select high-redshift Type-2 candidates using the optical survey (SDSS, Legacy Survey) and mid-infrared survey (WISE) . The basic selection is requiring the targets bright and well-detected in WISE but non-detection in optical. We selected more than 300 new Type-2 candidates and conducted the spectroscopic confirmation. We have got GEMINI/GNIRS spectra for 24 candidates and Keck/LRIS spectra for 35 candidates. We have identified 19 new z > 2 Type-2 AGNs. Many quasars are confirmed through Lya-nebula and sometimes this is the only convincing feature we see. The photometry evolution with redshift and the SED fitting of these objects help us better understand the property of high-z Type-2 AGN. We also quantify the radio properties of these quasars by matching them to LOFAR, FIRST, and NVSS and are exploring how radio measurements might inform future selection algorithms. This project will guide us on how to find high-z Type-2 ANG and understand the obscured fraction at high-z.

Primary authors: WANG, Ben (Leiden University); Prof. HENNAWI, Joseph (Leiden University)

Presenter: WANG, Ben (Leiden University)

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