

Uncovering the Type-2 QSO Population at High Redshift Using Keck, Gemini and Euclid

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Tracing the buildup of supermassive black hole (SMBH) mass across cosmic time requires a full census of the active SMBH population, including obscured type-2 quasars. Active galactic nuclei unification predicts similar number counts of type-1 and type-2 quasars. The JWST discovery of LRDs indicates the obscured fraction may be much higher than we expected. However, to date only dozens of type-2 quasars have been spectroscopically confirmed at $z > 2$, constituting a major unsolved problem for SMBH demographics. We select high-redshift Type-2 candidates using the optical survey (SDSS, Legacy Survey) and mid-infrared survey (WISE) data. We have selected more than 300 new Type-2 candidates using our selection and conducted the spectroscopic confirmation. We have got GEMINI/GNIRS spectra for 24 candidates and Keck/LRIS spectra for 43 candidates. 31 new $z > 2$ Type-2 AGNs are successfully identified and they are the most IR-luminous Type-2 AGNs at high- z . Many quasars are confirmed through their Ly α -nebula and sometimes the Ly α -nebula is the only convincing feature we see from the 2-D spectra. Some targets show very similar spectra to LRDs and the stacked SEDs have similar rest-UV light which can be explained by the scatter light, like LRDs. We also fit the hot dust torus template to LRDs and find that the LRDs can have hot dust. The LRDs with hot dust could be high- z Type-2 QSOs and we are using Euclid to find more Type-2 QSOs at $z > 4$. The composite photometry made by this project will also guide us on how to find high- z Type-2 AGN and better understand the obscured fraction, true nature of LRDs at high- z using Euclid and JWST.

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