

X10a Black Hole Mass Measurements of Intermediate-luminosity Quasars at $z > 6$

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We present our black hole mass estimates for 21 quasars at $6.07 \leq z \leq 6.90$ based on infrared spectroscopy with JWST/NIRSpec and Subaru/MOIRCS. The targets with absolute UV magnitudes of $-26 < M_{1450} < -22$ were drawn from an extensive search for $z > 6$ intermediate-luminous quasars based on the Hyper Suprime-Cam (HSC) Subaru Strategic Program. This sample bridges the luminosity gap between the SDSS-class luminous quasars and faint broad-line AGNs detected by JWST. Our 12 JWST targets demonstrate that this sample is suitable for studying host stellar emission via rest-optical imaging observations, and for probing the build-up of the co-evolutionary growth of SMBHs and their hosts.

From our MOIRCS Ks -band spectroscopy for 9 HSC quasars, we detected broad MgII $\lambda 2798$ emission lines with underlying continua from 8 targets, with the remaining one being a candidate low-BAL quasar. Broad Balmer emission lines ($H\alpha$ and $H\beta$) were detected in the NIRSpec G395M medium-resolution spectroscopy with the 12 JWST targets. Combining with our previous works, we construct a sample of 27 HSC quasars with single-epoch BH mass estimates to find that they span a wide range of $7.2 \leq \log M_{\text{BH}}/M_{\odot} \leq 9.4$ and accrete at the sub-Eddington mode ($L_{\text{bol}}/L_{\text{Edd}} \sim 0.2 - 0.3$). This trend is in contrast to more luminous quasars powered by Eddington-limit accretion, yet consistent with a $z \sim 4$ study at comparable luminosities.