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High-Redshift Quasar Monitoring Campaign: Preliminary Results

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Abstract. We present a monitoring campaign on high-luminosity quasars which will extend the existing reverberation mapping results by two orders of magnitude in luminosity, probing the broad-line region size and black hole mass of luminous AGN at redshift ∼2 – 3.

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The ability to measure black hole (BH) masses and accretion rates in AGN through reverberation mapping becomes crucial at redshifts of cosmological interest ($z > 1$). The empirical relation between the broad-line region (BLR) size and the AGN luminosity has produced reliable BH mass estimates for a large number of AGN at low and intermediate luminosity in the local universe (Kaspi *et al.* 2005; Bentz *et al.* 2009). So far such results cannot be directly applied to high-redshift, high-luminosity sources that contain the most massive BHs, since measuring their BLR size requires an extrapolation by up to two orders of magnitude in luminosity, which may not be reliable.

Here we present a monitoring campaign of ∼50 high-luminosity ($\lambda L_\lambda(5100) \geqslant 10^{46.5}\,\mathrm{erg\,s^{-1}}$) and high-redshift ($z{\sim}2-3$) quasars to extend these results to the high end of the AGN luminosity range. We use optical broad-band imaging to trigger spectroscopic follow up on a time scale of about one year. Given the redshift of the sources we are following, the broad variable UV emission lines fall in the optical window.

Photometric light curves are sampled monthly and inspected in order to detect high-amplitude variations and the structure needed to apply cross-correlation analysis (monotonic continuum and emission-line light curvess do not yield well-defined peaks in cross-correlation analysis). To date we have identified a subsample (∼15 sources) of variable quasars (up to 30% in flux) which are being followed up spectroscopically. Preliminary results suggest correlation between the continuum and the emission lines in some of the objects which show variations. The best example is CTQ953 in which the C IV, C III], and Si IV emission lines seem to respond to continuum changes, though the emission-line light curves have only four epochs at this stage. Cross-correlation analysis is needed to confirm these encouraging results, but better sampled spectroscopic light curves are needed and thus we expect reverberation results in 1–2 more years.

References

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