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# NEAR-IR SPECTROSCOPY OF HIGH REDSHIFT QUASARS

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**Quasars are among the most luminous objects in the Universe, and allow us to study the ISM in their host galaxies at very high redshift, up to $z > 6$ (Fan et al. 2001, 2003, 2004). The spectra of high redshift quasars contain important information about the enrichment history of the gas and, therefore, provide constraints on the star formation history in their host galaxies (Hamann & Ferland 1999). We have investigated the metallicity of the Broad Line Region (BLR) in a sample of quasars, at $4 < z < 6.4$, by using a new diagnostic tool involving the line ratio of Si IV1398+O IV1402 to C IV1549 (Nagao et al. 2006).**

We observed a sample of 24 high redshift quasars by means of near-IR spectra covering the main UV rest-frame emission lines. Observations were obtained with NICS at the Telescopio Nazionale Galileo (TNG) and with FORS2+ISAAC at ESO-VLT. All observations were obtained in low resolution modes, which are adequate to detect and investigate the continuum and broad emission lines typical of quasars.

The quasar spectra were fitted with a model consisting of a power-law for the continuum, $F_\lambda \propto \lambda^\alpha$, and gaussians to model the emission lines. Note that the Si IV+O IV are unresolved and are fitted with a single gaussian. Ly$\alpha$ was not included in the fitting since it is not used for the estimation of the metal abundances. The (Si IV+O IV)/C IV ratio as a function of redshift, for the objects in our sample, does not show any evidence for evolution.

In Figure 1 we show the average of the (Si IV+O IV)/C IV ratio in two redshift bins ($4 < z < 5.5$ and $5.5 < z < 6.4$), together with the (Si IV+O IV)/C IV ratios obtained by Nagao et al. (2006) from SDSS composite optical spectra at $z < 4.5$. The line ratio for high $z$ appears consistent with those at redshift between 2 and 4, indicating little evolution in the abundances, and hence, metallicities, of quasars enviroments. This result is made clear in Figure 2, which shows the spectra of the quasars in our sample averaged within 2 redshift bins, and where the relative intensities of (Si IV+O IV) and C IV appear unchanged in the two redshift bins. Our results indicates the metallicity and the chemical composition of the gas in the BLR do not evolve significantly over the whole redshift range $2 < z < 6.4$.

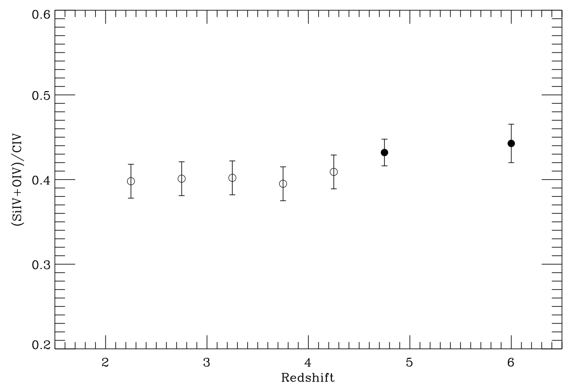


Fig. 1. (Si IV+O IV)/C IV ratio averaged in two high redshift bins (filled dots) and compared with the results of Nagao et al. (2006) at $z < 4.5$ (empty dots).

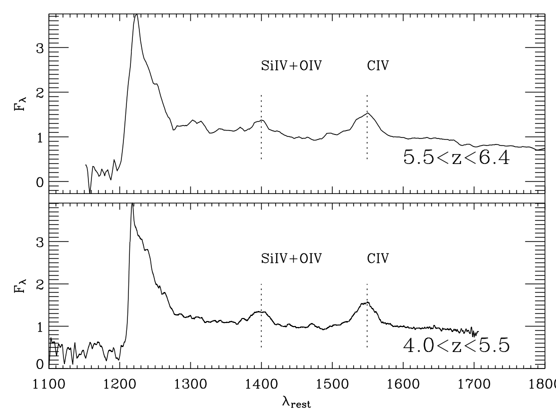


Fig. 2. Averaged spectra of the quasar within the two high redshift bins (individual spectra were normalized to continuum at 1500Å before averaging).

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