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Progress Report

STATISTICAL ANALYSIS OF THE AlIII1860 LINE AS A VIRIAL BLACK HOLE MASS ESTIMATOR

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At low redshift (z≤0.8) the black hole mass of active galactic nuclei is estimated using FWHM(Hβ), but as further in redshift we go the options are to follow the Hβ line into the infrared or adopt other broad lines in the UV. Previous work found that the intermediate ionization lines (∼20-40 eV) AlIIIλ1860 and CIII]λ1909 are probably emitted in a virialized region associated with the production of the Hydrogen Balmer line and of singly-ionised iron FeII ($n_e \sim 10^{12}$ cm^{-3}, U∼2 and $N_c \geq 10^{23}$ cm^{-2}), present in type-1 quasars.

Taking the previous results into account, we selected a high S/N (>20) sample from the SDSS DR16 where AlIIIλ1860 and the forbidden line [OII]λ3728 are observed simultaneously (z∼1.2-1.4) and a sample with coverage of Hβ and CIVλ1549 in order to compare them. A sample with coverage of Hβ, AlIII and CIII] supports the usefulness of both AlIIIλ1860 and CIII]λ1909 as surrogate virial broadening estimators in place of Hβ. However, the AlIII profile shows a blueshift with respect to the quasar rest-frame identified by the [OII] line. This could mean that a mixture of two non-resolved components are present in the nuclei of the quasar: a virialized one plus an outflow. The shifts, although present, are fewer and fainter than the ones observed for CIV in sources of comparable luminosity. The implication is that the AlIIIλ1860 and CIII]λ1909 line widths can still be considered as acceptable virial broadening estimators.