

Dependence of equivalent width of quasar emission lines on UV spectral index, quasar luminosity and BH mass

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The spectral energy distribution (SED) of quasars in UV-optical range is characterised by the Big Blue Bump with a peak around 1000–1300 Å, broad emission lines, broad absorption lines (in ~15% of objects) and the flux decrement redward of 1215 Å caused by absorption in the intergalactic medium. Quasar UV-optical SEDs are remarkably similar from one object to another, the main differences are in spectral index α_λ and equivalent width of emission lines. Continuum and emission lines are believed to originate from the hot accretion disc and circumnuclear fast moving clumps, correspondingly. The proximity of these regions is considered to be the most promising explanation of the Baldwin effect: the inverse correlation of equivalent width of some emission lines with the monochromatic luminosities at UV region. On the other hand, the physical explanation of the difference in spectral indices and their dependence on quasar parameters are still not clear.

We present the analysis of quasar emission lines properties within the wavelength range 1215–1450 Å and their dependence on quasar luminosity and spectral index. For this purpose a set of composite spectra is compiled from subsamples of SDSS DR7 medium resolution quasar spectra with similar α_λ at this wavelength range and similar monochromatic luminosities at 1450 Å (l_{1450}). We consider the α_λ range of $-2.3 \dots -0.7$, the $\log(l_{1450})$ range of $42.2 \dots 43.4$, and emission features around Ly α +N V+Si II, O I+Si II, C II and Si IV+O IV.

It is found a dependence of the emission line equivalent width on spectral index (correlation or anti correlation) for several lines, mostly for those lines for which the Baldwin effect (the decreasing of equivalent width with increasing of luminosity) was detected.

Also we calculated virial mass of the central supermassive black hole for composite spectra and 3535 individual quasar (using the C IV emission line) and explored dependence on quasar luminosity and spectral index. It is found, that quasar luminosity increases with increase of black hole's mass. But on the other hand, virial mass of the black hole doesn't depend on spectral index.

Affiliation

Department of Physics "E. Pancini", University Federico II in Naples

Author: TORBANIUK, Olena (Univ. "Federico II", Napoli)

Presenter: TORBANIUK, Olena (Univ. "Federico II", Napoli)

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