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The UV spectral properties of radio loud and radio quiet QSOs: The ratio of NV/Lyα and CIV1550/Lyα

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Abstract. We present a study on properties of ultraviolet spectra of a low red-shifted (with red-shift <0.4) sample of radio-loud and radio-quite active galactic nuclei (AGNs). The sample of galaxies was observed with the Hubble Space Telescope. We measured the ratios CIV1550/Lyα and NV/Lyα in order to see the similarities and differences in the UV emitting line region of radio-loud and radio-quite AGNs.

Key words. quasars – UV emission lines –broad emission lines

1. Introduction

The radiation of Active Galactic Nuclei (AGNs) is produced over a wide range of distances from the central continuum source and under a wide range of physical and kinematic conditions. Different mechanisms of the radiation are present in different regions of these objects and one of the question is a connection between different emission regions. E.g. the connection between different line emitting regions (the regions that emit high ionized - mainly in the UV- and low ionized line - in the optical range, see Popović 2005, this issue) as well as the connection between the radio emission and these line emitting regions. The aim of this work is to investigate physical connection between the UV line and radio emitting regions. In this paper we present the preliminary results of our study on properties of ultraviolet (UV) emission line spectra of the low red-shifted ($z < 0.4$) sample of 12 radio-loud (RL) and radio-quite (RQ) quasars (QSOs). We measured the ratios CIV1550/Lyα and NV/Lyα lines in order to see the similarities and differences in the UV emitting line region of RL and RQ QSOs.

2. Data and reduction

The sample of galaxies was taken from the Hubble Space Telescope (HST) database. The spectra were observed with two different spectrograph: the Faint Object Spectrograph (FOS) and Space Telescope Imaging Spectrograph (STIS).

The STARLINK DIPSO software package Howarth et al. (2003) was used to analyze the spectra. First, we reduced the level of local continuum, by subtracting the N order polyno-

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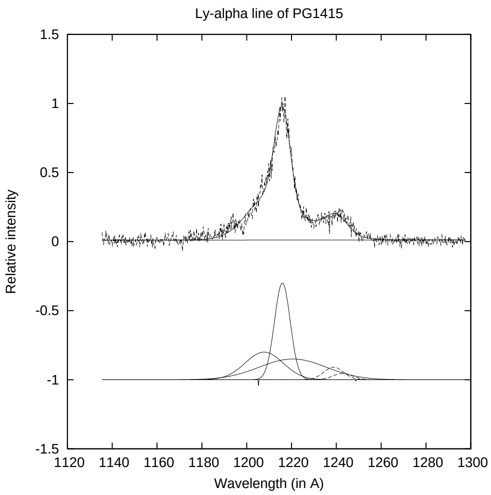

Fig. 1. Decomposition of the Lyα line of PG 1415. The dots represent the observation and the solid line is the best fit. The Gaussian components are shown at the bottom. The dashed lines at bottom represent the NV lines.

mial, fitted through the dots taken to be on the local continuum in the Lyα and CIV line region (~ 300 Å around the Lyα and CIV lines). In some objects the strong absorption in the Lyα and CIV line was detected and subtracted.

For measuring the NV/Lyα flux ratio we have used the multi-Gaussian fit method. First, we fitted the Lyα line with a sum of Gaussian components using a χ^2 minimization routine to obtain the best fit parameters. The fitting procedure has been described and discussed in more details in Popović et al. (2003, 2004), and as an example of the best fit of Lyα and NV lines is presented in Fig.1. After that we find the flux of NV and Lyα as a sum of corresponding Gaussians.

3. Results

From our measurements we have found that the average flux ratios of the NV, Ly_α and CIV lines are the following: (i) for radio-quite galaxies, the ratio of $NV/Ly_\alpha = 0.16 \pm 0.05$ and $CIV/Ly_\alpha = 0.47 \pm 0.07$ (ii) for radio-loud galaxies, the ratio of $NV/Ly_\alpha = 0.097 \pm 0.02$ and $CIV/Ly_\alpha = 0.5 \pm 0.1$ (the error-bars of the CIV/Ly_α ratio are about 10%.)

The flux ratio of NV/Lyα is in interval between ~ 0.1 and 0.2 in both objects that is in agreement with previous measurements given by Loar (1994, 1995). RQ QSOs tend to have a greater NV/Lyα flux ratio than RL QSOs. On the other hand, the flux ratio of CIV1550/Lyα is around 0.5 and is not different in RQ and RL QSOs.

In the future work we are going to measure the mentioned flux ratios for an extensive sample of AGNs (Sy 1, Sy 2, and QSOs).

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