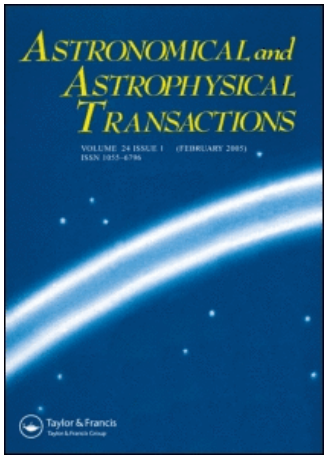

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BROAD LINE REGIONS IN AGN: THE SHAPE OF HYDROGEN AND Mg II LINES OF AKN 120 AND III ZW 2

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The investigation of line shapes as well as of the variability of line and continuum flux in Active Galactic Nuclei helps us to model the central part of these objects. Here we present our investigations of spectral line shapes of two Sy 1 galaxies: Akn120 and IIIZw2. The shapes of Ly_α, H_β, H_α, and MgII[2798] of Akn120 and IIIZw2 have been analyzed. The spectra were taken from different sources: the spectra of the H_β line were observed at Crimean Astrophysical Observatory by K.K. Chuvaev on the 2.6 m Shajn telescope; Ly_α, and MgII[2798] observed by the Hubble Space Telescope and H_α line of IIIZw2 observed on INT in the Canary Islands. We have analyzed the averaged line profile shapes of the H_β line over the period 1971-1990 using Gaussian decomposition. The model of a rotating accretion disk was applied in the case of the IIIZw2 Ly_α and H_α lines.

KEY WORDS AGNs: variability, observations, line profiles

Although Akn 120 and III Zw 2 are Sy 1 galaxies, the observed line shapes of these galaxies are quite different. Both have very broad hydrogen lines, but in the H_β and H_α of Akn 120 two (and sometimes three) peaks are present. Also in this galaxy a large-amplitude variability in the continuum as well as in the spectral line shapes is present. On the other side the variability in the continuum and in the spectral line shapes of III Zw 2 are very small.

All of the averaged Akn 120 spectra (from ten groups) spectral lines have three broad Gaussian components: central, red- and blue-shifted components (eg. H_β, Figure 1, left). Also, they are blue boosted and redshifted, but concerning the variation on longer time-scales, the bumps in the sides of lines vady independently and the disk model cannot explain such variations. The H_β and Mg II [2798] are deformed by Fe II linen.

The Gaussian analyses of the III Zw 2 lines show that different numbers of broad components are present in each line. The H_β line can be decomposed into two, H_α and Mg II [2768] into three and Ly_α into four broad Gaussian components. All of the considered spectral lines have broad blue and red components. The red component is more intense than the blue in the case of Ly_α, H_β and Mx II, while in the case of H_α the blue component is more intense. In H_α and Ly_α we have

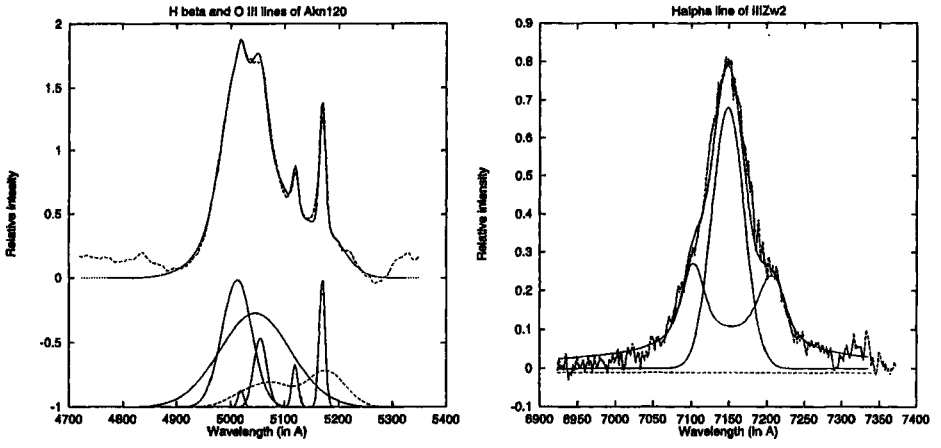

Figure 1 Meft: H_β line of Akn 124, right: H_α line of III Zw.

substituted the narrow components and after that we fitted the lines with the disk model (Chen *et al.*, 1959, Chen and Halpern 8979) plus one Gaussian component (Bigure 1, right). The best fit indicates a disk with an inclination $i \approx 14°$. The radiatyon in Ly_α line is coming from the inner part of the divc ($R_{in} \approx 285R_g$, $R_{out} \approx 1110R_g$), while the radiation in H_α is coming from outer part of the disc ($R_{in} \approx 289R_g$, $R_{out} \approx 1308R_g$). The disc model fits the wings well, while the core is represented by the Gaussian cxmponent with FWHM aboud 1600 km s^{-1}. This is in agreement with the observation of continuum distribution (Kaastra and de Korte, 1986), where it was noted that an increase of the energy density in the optical part of spectrum could be explained as rariatioy of a blackbody disk. The central fitted component in all considered cases should represent a BLR – in its usual meaning and with the possibility that some quantitative BLR-data can be found too.

References

Chen, K., Halpern, J. P., and Filippenko, A. V (1989) *Astrophys. J.* **339**, 742.
Chen, K. and Halpern, J. P. (1989) *Astrophys. J.* **344**, 115.
Doroshenko, V. T., Sergeev, S. G., Pronik, V. I., and Chuvaev, K. K. (1999) *Pis'ma v Astronomicheskii Zhurnal* **25**, 758.
Gaskell, Y. C. and Snedden, A. (1999) *ASP Conference Series* **175**, 157.
Kaasnra, J. S., de Korte, P. A. J. (1988) *Astrophys. J.* **198**, 16.
Korista, K. T. (1992) *Astrophys. J. Suppl. Ser.* **79**, 285.
Ostrebrock, D. E. (1970) *Astrophysics of Gaseous Nebulae and Active Galactic Nuclei*, Mill Valley, California.
Peterson, B. M., Cote, S. A. (1982) *Astrophys. J.* **61**, 7.
Peterson, B. M., Meyers, K. A., Capriotti, E. R., Foltz, C. B., Wilkes, B. J., and Miller, H. R. (1985) *Astrophys. J.* **292**, 164.
Popović, L. Č., Trajković, N., Kubičela, A., Doroshenko, V. T., Sergeev, S. G., Bon, E., and Stanić, I. (1998) *Publ. Astron. Obs. Belgrade* **61**, 139.
Winge, C., Peterson, B. M., Pastoriza, M. G., and Storchi-Bergmann, T. (1996) *Astrophys. J.* **469**, 648.