EVALUATION OF THE DISK PRESENCE IN AGNs

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The accretion disk emission should be inmost active galaxies. The double-peaked emission lines often used as a strong indication of the disk presence (Chen, Halpern & Filippenko, 1989: Chen & Halpern, 1989; Eracleous & Halpern, 1994). However the optical and UV spectra of double-peaked emitters obtained with HST show a dramatic difference between the double-peaked Balmer and single peaked UV line profiles. The different shape of the optical and UV lines may indicate the existence of two line-emitting regions. The detailed study of the physical conditions along the line profiles for two galaxies 3C 390.3 using optic Hβ and UV - CIV and Lα lines have been done by (Nazarova et al. 2004).

The UV and optical spectra of 3C 390.3 were taken from the AGN Watch database for the period January 1995 – January 1996. However the UV and optical spectra of NGC 5548 were obtained in 1993.The profiles of the CIV, Lα and Hβ lines have been divided into seven parts, the width of each part being equal to 2000 km s^{-1}. The core of the lines is measured between -1000 and +1000 km s^{-1}. Thus, the blue and red wings have a width of $\pm$7000 km s^{-1}. Analysis of the observed CIV/Lα along the line profiles in these galaxies is similar. The CIV/Lα ratio is small at the center $\approx$ 0.5 and grows up to $\approx$ 1 - 1.5 in the wings in both galaxies. However Lα/Hβ line ratios (Fig.1 (top)) change differently along the line profiles in these galaxies. It is low at the center of lines in NGC 5548 similar to many objects (Snedden and Gaskell, 2004) but in 3C 390.3 the Lα/Hβ ratio is higher at the center.

The modelling of the observed line ratios CIV/Lα and Lα/Hβ has been done with the photoionization code CLOUDY (version c9005; Ferland 2004), in its plan parallel version, and assuming solar abundances. The assumed spectral distribution of the central continuum taken from Dumont et al.(1998) for NGC 5548 and from Grandi et al. (1999) for 3C 390.3. The computed line ratios Lα/Hβ for given central luminosity as functions of the distance versus the electron density N_e for both galaxies are shown on Fig.1 (middle). Differing covering factors C are considered for the distributions of clouds. Three functional dependencies on the distance r have been chosen: $C \propto r^{-1}$, C = constant, and $C \propto r$. The CIV/Lα ratio do not showen here because the limited space but of course have been taken into account for estimating the physical conditions along the line profiles. From the comparison of the observed and the computed line ratios which vary across the line profiles we suggest the existing two system of clouds in both galaxies.

3C 390.3

The Lα/Hβ ratio is highest at low velocities and decreases at higher velocities. This could be accomplished with a density going from $\sim 10^{10}$ cm s^{-3} at low velocity (at the line center), up to $\sim 10^{12}$ cm s^{-3} at higher velocity (at the line wings). The CIV/Lα ratio which is low at the centre and higher at the wings may be predicted in two ways:

1. a density of $\sim 10^{7}$ cm^{-3} in the low-velocity core increasing to $\sim 10^{10}$ cm^{-3} in the higher-velocity wings, or

2. a density of $\sim 10^{13}$ cm^{-3} in the low-velocity core decreasing to $\sim 10^{12}$ cm^{-3} in the higher-velocity wings.

Of these two possibilities, the second is ruled out because the critical density of CIII] λ1909 is $\sim 10^{9.5}$ cm^{-3}, and the profile of CIII] is similar to that of CIV. Thus CIV/Lα in 3C 390.3 also implies that the wings have higher density gas. The different density ranges implied by the variation of line ratio with velocity can be reconciled, however, if we have two components, a Low Ionization Line (LIL) zone and a High Ionization Line (HIL) zone.

NGC 5548

From the comparison of the observed and computed CIV/Lα we estimated that the electron densities along the lines may change from $10^{10.5}$cm^{-3} at the wings to $10^{11.5}$cm^{-3} at the center. The observed ratio Lα/Hβ ($\approx$ 7 - 16) is small compare to the computed models accept an extremely high electron densities. Thus,

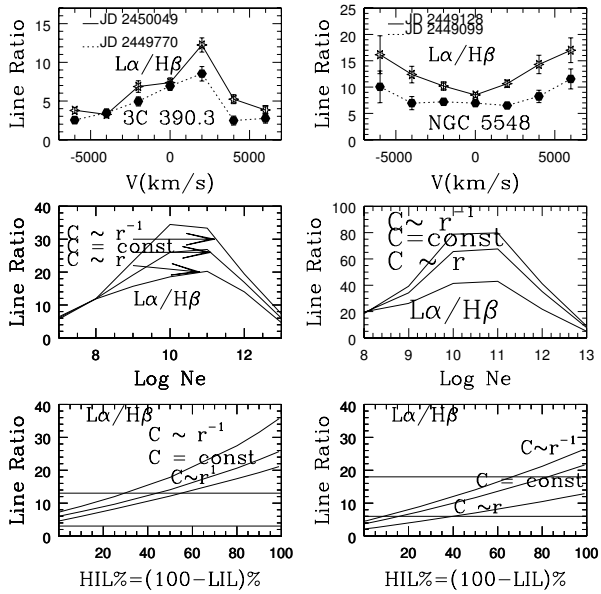

Figure 1:

there is also a contradiction between the electron densities obtained from both ratios. Let accept that the electron density obtained from the ratio of the high ionization lines CIV/Lα corresponds to the HIL zone located above an accretion disk with the electron densities $N_e \approx 10^{10-11} cm^{-3}$ while the LIL zone located in accretion disk has the electron density $N_e \approx 10^{12-13}$ cm^{-3}.

Thus, although 3C 390.3 and NGC 5548 are different, the broad-line regions could be represented by a two-component model. The two components have different locations, densities, and contributions to the line profiles. The contribution of an accretion disk (LIL region) is strong at the wings in 3C 390.3 but in NGC 5548 an accretion disk contribute to the central part of low ionization lines. Fig.1 (bottom) show the contribution of the disk component in both galaxies. The contributions from an accretion disk is less than 40% for in 3C 390.3 and is about 80-90% in NGC5548.

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