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Effect of an Attenuated Continuum in the BLR of AGNs

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Abstract.
The possibility of an attenuated continuum for the gas ionization in the BLR is discussed. It is shown that "line ratio" problem for the low ionization lines in NGC 5548 could be successfully solved when the attenuation by the column density $N_h=10^{22}cm^{-2}$ are taken into consideration.

It has become clear in the last years that intrinsic absorption is a common phenomenon in the UV spectra of Seyfert 1 galaxies. High-resolution observation of nearby AGNs show that an absorption systems are made up of a number of narrow components (Crenshaw et al. 1998). The absorption systems determined in an approximately 60(Crenshaw et al. 1999). Besides that, an absorption system is also common in the X-ray spectra of Seyfert galaxies. About 50them show also "warm absorbers" characterized by OVII and OVIII absorption edges with typical X-ray warm absorbers (U=1-10, $N_h=10^{21-23}cm-2$ (Reynolds 1997; George et al. 1998). However, the X-ray spectra used to detect the warm absorbers are of very low resolution, and it is impossible to establish the connection between the components in the UV absorption and ionized edge seen in the X-ray.

Analysis and modeling of the high temporal frequency monitoring of Seyfert galaxy NGC 5548 over the extended period of a few years put into evidence three problems: an "energy budget problem" , a "line ratio problem " and a "line variation problem"(Dumont et al. 1998). However the modeling of the line intensities has been done with an original incident continuum for the broad emission region (BLR). Since the possible presence the warm absorbers and an intrinsic absorption in BLR, especially in the zones produced the low ionization lines (such as hydrogen lines) seems interesting the check if the line ratio problem at least could be reduced by accepting the attenuated continuum in the BLR. That continuum would be provided by the attenuation of the incident continuum (taken from Dumont et al. 1998) by the front parts of clouds and have an effect as a remote photoionized region. The calculation of the line fluxes have been done with the code CLOUDY for the surface fluxes corresponded to a distance from the central source of 20 light days. The region is located at the distance of 20 light days. The surface flux for that region is $UN_e=10^{9.2}$ erg $cm^{-2}s^{-1}$ (see Dumont et al.1998). We calculated the line fluxies with the attenuated continuum passing the column density $N_h=10^{22}$ cm^{-2} for the different electron densities. Fig.1 presents some line ratios for the regions illuminated by the attenuated continua together with their observed values marked by straight lines. The calculated and observed line ratios are close when the electron density is approximatly $N_e=10^9-10^{10}cm^{-3}$.

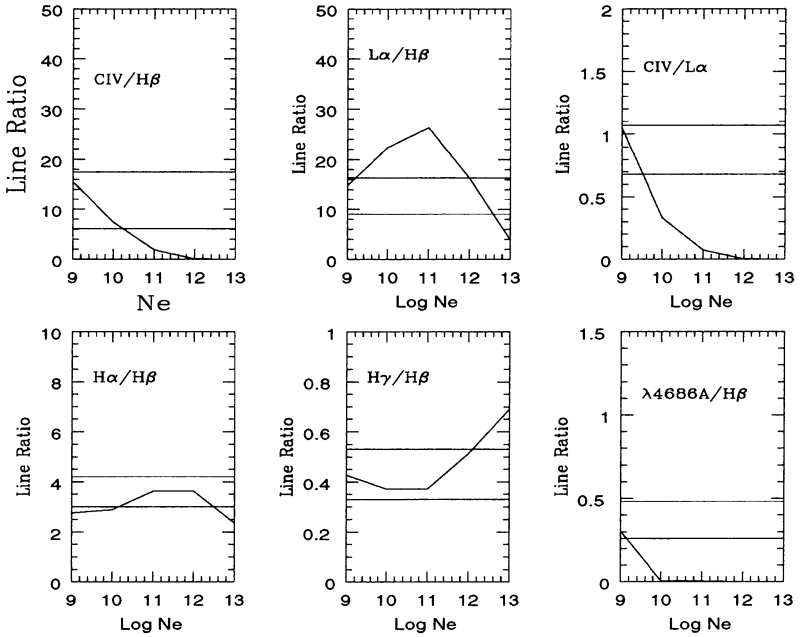

Figure 1. The line ratios emitted from the regions illuminated by an attenuated continua. The suface flux is Log $UN_e = 9.2$ at 0.1 Ryd. The column density for an attenuated continuum is $10^{22}\mathrm{cm}^{-2}$. The two parallel lines show the observed ratios in the intensities.

Thus, it seems possible to find the physical parameters of BLR from the analysis of the line ratios accepting illumination of BLR by the attenuated continuum. It seems obvious that the clue of the problem lies in a detailed study of the line profile where an associated absorptions are a very good probe of the gas in the inner regions of AGNs.

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