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Progress report

THE LINE PARAMETERS AND RATIOS AS A PHYSICAL PROBE OF THE LINE EMITTING REGIONS IN AGN

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Here we discuss the physics conditions in the emission line regions (ELR) of active galactic nuclei (AGN), with the special emphasize on the unresolved problems, e.g. the stratification of the Broad Line Region (BLR) or the failure of the photoionization theory to explain the strong observed optical Fe II emission. We use here different line fluxes in order to probe the physics of the ELR, such as the hydrogen Balmer lines (Hα to Hε), the helium lines from two subsequent ionization levels (He II λ4686 and He I λ5876) and the strongest Fe II lines in the wavelength interval $\lambda\lambda 4400-5400$ Å.

In order to estimate the physical conditions (such as the temperature and hydrogen density) of the BLR we use the Balmer and helium line ratios obtained in two ways: (i) using the photoionization code CLOUDY, a spectral synthesis code designed to simulate conditions within a plasma and model the resulting spectrum, and (ii) extracting a sample of AGN from the Sloan Digital Sky Survey (SDSS) database. We investigate these line ratios in order to find conditions in the BLR where so-called Boltzmann-plot (BP) method is applicable. For these special cases, we found correlations between average temperature, hydrogen density and He II/He I line ratio.

Moreover, we present an investigation of the optical Fe II emission in AGN, for which we have used a selected sample of 111 AGN from the SDSS database. The strongest Fe II lines are identified and classified into four groups according to the lower level of the transition: ^{4}F, ^{6}S, ^{4}G and ^{2}D1. We found that kinematical parameters of the Fe II lines suggest the origin of the Fe II lines in an intermediate line region (ILR), i.e. that the Fe II emission is mostly emitted from a region probably located between the NLR and BLR.