

LONG-TERM OPTICAL SPECTRAL MONITORING OF AGN: THE PROPERTIES OF BLR GAS

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Now, it is wide accepted that the nuclear activity of active galactic nuclei (AGNs) is due to accretion of the gas onto a supermassive black hole. The huge amount of energy released in the center of AGNs occurs very close to the central black hole ($r < 0.1\text{pc}$), where the broad emission lines are emitted, in the so called the Broad Line Region (BLR). The BLR is very compact and cannot be resolved by direct observations with big telescopes. Therefore, the BLR can be investigated by indirect methods, as e.g. using variability of broad lines and continuum. The broad line fluxes are changing in response to the continuum variability with time-lag since (the effect of light traveling) that gives the opportunity to investigate the physical and kinematical properties the BLR (so called reverberation method). Consequently, a long period spectro-photometric monitoring of AGNs is one of the main methods to study of the properties of the BLR gas using broad emission lines.

In this lecture we will describe the history of spectral observations of AGN in SAO RAS by method spectral and photometric monitoring and results obtained in cooperation with colleagues from other observatories. In 1996 at SAO a long-term monitoring program was launched for 10 AGNs, including mostly Seyfert galaxies, type Sy1-Sy 1.5 and QSOs. Spectral monitoring was carried with 1 m Zeiss and 6 m telescopes SAO RAS. Since 1998 monitoring campaign started with the two 2.1 m telescopes from Mexico (INAOE's 2.1 m telescope of the Guillermo Haro Observatory at Cananea, Sonora, and the 2.1 m telescope of the Observatorio Astronómico Nacional at San Pedro Martir, Baja California). Additionally,

since 2009 we used the archived observations obtained at the Calar Alto Observatory telescopes. During nearly 20 years of monitoring we obtained long series of spectra for 10 AGNs with duty cycle (frequency) about 1-2 times a month. At present, we have analyzed ~50% of the spectral data. We have investigated the variability of broad emission lines and continuum flux and profile variations of these lines during a long period and obtained some constrains for the geometrical and dynamical structure and physics of the BLR. Here we present some of the most interesting results of our spectral monitoring for five Seyfert galaxies.