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Spectral Monitoring of NGC 4151 and 3C 390.3 at the 6-m Telescope

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1. Observations

Since 1986, we have carried out spectral monitoring of several Seyfert galaxies with the 6-m telescope of SAO RAS to study the structure and kinematics of the broad-line regions (BLR). Here we present the observational results for NGC 4151 and 3C 390.3.

In 1986–96, about 150 spectra of the NGC 4151 nucleus were obtained with SP124+TV scanner and 24 spectra with a long-slit (UAGS+CCD) or a multi-pupil field spectrograph (MPFS + CCD). About 20 spectra of 3C 390.3 were obtained in 1995–96 with the UAGS + CCD and with MPFS + CCD. More detailed information about observations, data processing and results will appear in Shapovalova et al. (1996).

2. Results for NGC 4151

1. The observed integrated fluxes of the broad component of Hβ range over a factor of 8 between minimum (spring 1987) and maximum (spring 1995).

2. During 1986–91, the red wing of Hβ was weaker than the blue wing. The red and blue wings were of comparable strength in 1993–95, and in 1996 the red wing was stronger than the blue one.

3. On average, the line and continuum fluxes increased by factors of 5–6 from 1986 to 1996. In some years the intensities of the broad component and continuum varied during several days by a factor of 1.5–2, and on a time scales of 1–3 months by factors of 1.5–3.

4. The integrated fluxes in the blue and red wings of Hβ varied in phase without any time lag. Quasi-simultaneous flux variations in the wings of Hα and Hβ were reported by by Maoz et al. (1991) based on observations during 1987–88, and our data confirm this result on a time scale of 10 years.

5. The integrated flux ratios in the blue and red wings of Hβ for each year lead us to suspect a periodicity of 2–3 years (1986–92) in the flux variations

of the blue and red wings, and a periodicity of an attenuating amplitude in 1994–95.

3. Results for 3C 390.3

1. The flux density in the continuum (I_{cont}) increased compared to 1974–88 (Veilleux & Zheng 1991). I_{cont} was a factor of two higher in 1996 February than during the 1975 maximum and six times higher than the minimum value of 1980. The integrated Hβ flux F_{total}(Hβ) showed the same behavior, but with lower-amplitude variations.

2. The I_{cont} and F_{total}(Hβ) variations were not in phase, probably on account of light travel-time delays.

3. The flux intensities in the Hβ wings (F_{blue} and F_{red}) of increased in 1995–96, as did F_{broad}(Hβ), with F_{blue} was always larger than than F_{red}. The flux ratios in the blue and red wings are close to the values obtained by Veilleux & Zheng (1991) in 1975–85, and follow well the periodic ($\sim$ 10 years) sinusoidal dependence for the flux ratios in the blue and red wings of Hβ.

4. The fluxes in the wings vary quasi-simultaneously.

The continuum and Hβ broad-component fluxes presented in Table 1 (the wavelength integration limits and flux units are as in Veilleux & Zheng 1991).

Table 1. Measured Fluxes for 3C 390.3.

Julian Date	I_{cont}	F_{total}(Hβ)	F_{broad}(Hβ)	F_{blue}	F_{red}
2449833.4	1.26	1.34	1.08	4.08	2.55
2449864.4	1.39	1.59	1.33	4.39	2.96
2450039.2	2.49	1.49	1.04	4.39	3.12
2450051.1	2.67	1.81	1.37	4.95	3.54
2450052.1	2.72	1.92	1.46	5.48	3.57
2450126.6	2.93	2.09	1.68	6.24	3.99
2450162.6	2.48	2.14	1.75	5.83	4.30

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