**PHOTOMETRIC VARIABILITY OF THE SEYFERT GALAXY NGC 4151**

**IN 2016-2023 YEARS**

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Seyfert galaxy is a spiral galaxy with an active nucleus whose spectrum exhibits bright emission lines. The most probable hypothesis explaining the activity of the nuclei interprets it as a result of the accretion of matter onto the supermassive central body. Seyfert galaxies account for ~1% of all observed spiral galaxies.

The Seyfert galaxy NGC 4151 with the coordinates α=12h10m32s δ=+39◦24′24′′ was discovered by William Herschel in 1787. It is located in the direction of Canes Venatici at a distance of 43 million light-years with a redshift of z= 0,0032. This galaxy is considered as one of the Seyfert galaxies closest to the Milky Way. Photometric observations of NGC 4151 began in 1906. The variability of its nucleus in the optical range was discovered in 1967 [Fitch et al. 1967] and was confirmed in 1969 by astronomers of the Sternberg Astronomical Institute [Lyuty et al. 1989]. Optical observations of NGC 4151 are carried out worldwide [see, e.g., Doroshenko et al. 2001; Levine & Rumstay, 2001]. The review by Oknyanskij & Lyuty (2007) contains photometric data obtained for NGC 4151 over 100 years. Later results were published by Artamonov et al. (2013), Oknyanskij et al. (2013). The interest in this object lies in its unpredictability and large amplitude of its variability. The nucleus varies on different time scales, including rapid variations within tens of days, slow variations over several years, and very slow variations over many decades.

We carried out BVRc and Ic observations of the Seyfert galaxy NGC 4151 on the 60 cm telescope of theShAO named after N. Tusi. This telescope is a unique instrument for the photometricobservations.A photometer equipped with a CCD matrix "Apogee Alta U-47" was installed in the Cassegrain focus of the 60-centimeter telescope of Shamakhy Astrophysical Observatory named after N.Tusi, which has an aperture of 1:12.5. The photometer was equipped with a thermoelectrically cooled CCD matrix "FLI 4096x4096". The photometer is designed for fundamental and applied astronomical tasks and uses the relative photometry method. Photometric observations of the active galaxy NGC 4151 in the BVRc and Ic bands were carried out differentially using comparison stars. The obtained photometric data were processed using the MAXIM DL 4 software package, and the resulting material was calibrated. Calibration frames for bias, dark, and flat were obtained for this purpose.

Fig. 2. The light curve of the galaxy NGC 4151 in ShAO. The light curve for the period from June 14, 2016, to March 29, 2023, taken with the 60 cm telescope of the ShAO named after N.Tusi

During photometric observations, a synchronous change in brightness was detected across all filters, with the amplitude of the change from filter B to Ic being smaller than the changes in other filters.

The results of photometric variability of the Seyfert galaxy NGC 4151 from 2016 to 2023 are presented. The results of the observations showthat the brightness changes occur synchronously in all BVRc and Ic filters. There are both increases and decreases in brightness across all filters: ∆B: 0.187 mag (brightened), 0.879 mag (weaker), 0.202 mag (brighter); ∆V: 0.057 mag (weaker), 0.695 mag (brighter), 0.394 mag (weaker), 0.609 mag (brighter), 0.206 mag (weaker), 0.609 mag (brightened), 0.312 mag (weaker); ∆Rc: 0.261 mag (weaker), 0.17 mag (brighter), 0.128 mag (weaker), 0.847 mag (brightened), 0.144 mag (weaker), 0.287 mag (brighter) ∆Ic: 0.104 mag (weaker), 0.523 mag (brighter), 0.183 mag (weaker), 0.372 mag (brighter), 0.204 mag (weaker), 0.432 mag (brighter), 0.112 mag (weaker), 0.537 mag (brighter), 0.429 mag (weaker), and 0.287 mag (brightened). There is avariability of a chaotic nature. It is assumed that the observed variability is due to achange in the rate of accretion of matter to the supermassive black hole.

**References**

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