VARIABILITY OF NGC4151 DURING 2008-2013

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ABSTRACT. We present the historical light curve of NGC 4151 for 1906 – 2013 and the detailed light curve for 2008 - 2013 the light curve of NGC 4151 for 2008 – 2013 (our photoelectrical and CCD data obtained at 2 observatories during last 6 years). See details in our paper Oknyanskij et al. (2012). NGC 4151 has been in high state during 2009-2012 and relatively at low in 2008 and 2013. So one circle of slow component about 6 years was observed during 2008-2013. Also we see one fast flash in 2013 with duration time about 150 days. Applying Fourier (CLEAN) algorithm to the data from 1906 till 2013 (smoothed with step 100 days), we find a periodic component P~16 years in the 107-year light curve. 30 years ago, nearly the same "period" was first revealed just from Odessa photometric data. There are also found another significant components about 1.5P, 2P. These circles probably correspond to some accretion dynamic time.

Key words: AGN, optical variability, historical light curve

NGC4151 is one of the most popular and well studied AGNs, it is most bright and high variable object, which is very often used as an example object: typical Sy1, typical Sy1.5, typical object changing classification type between Sy1 and Sy1.9.

NGC 4151 – is one of the several Seyfert galaxies which were firstly discovered at 1967 as variable in optical region (Fitch et al., 1967). Shortly after that (at 1968) the photoelectric UBV monitoring of NGC 4151 object was started at Crimean Laboratory of Sternberg Astronomical Institute (Lyuty, 1977). See more references and details about photometrical history for the object at out pervious publication Oknyanskij at al. (2012)

At the present work we continue the optical monitoring of NGC 4151. Our new data include the photoelectric UBV measurements (with the same telescope and equipment) for 2013.

The historical light curve for 1906-2013 years is presented at Fig. 1. It is clear seen that after minimum at 1984 the type of variability is not the same as it was before: the amplitude of the fast variations become smaller relative to the slow ones. The light curve with our new data for 2008-2013 years is shown at Fig. 2. At the light curves (Fig. 1 and 2) we can see different variable

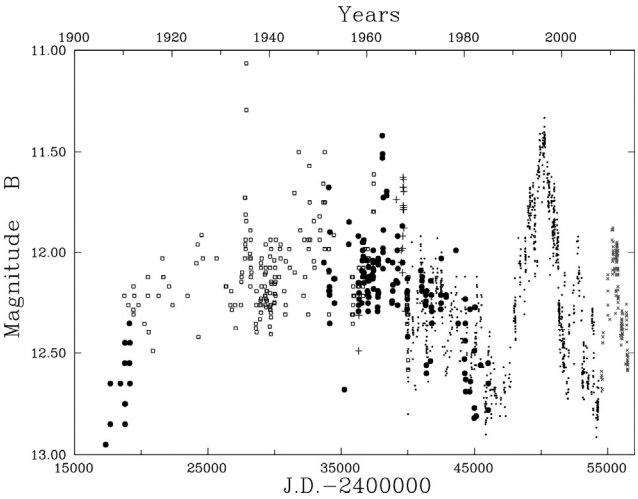

Figure 1: The historical light curve of NGC 4151. Filed circles – our photographic data, open circles – Pacholszyk et. al. (1983), pluses - photoelectric data obtained before 1968, dots – Crimean photoelectric monitoring, x – our photoelectric and CCD data for 2008-2013. The errors are of the order of 0.2 mag for Pachalcsyk's data, 0.1 mag or better for our photographic points, and ~ 0,02 mag for out photoelectric and CCD data.

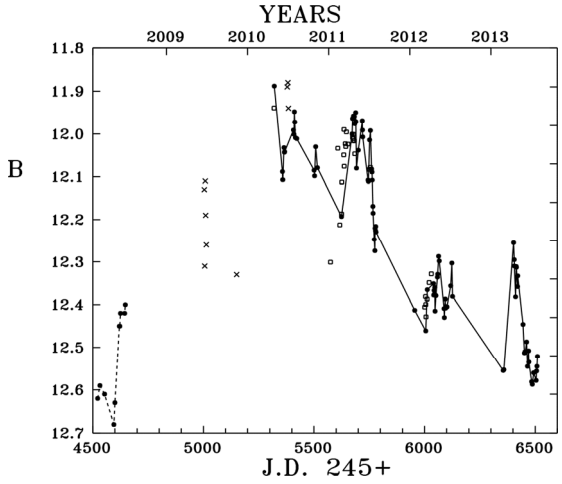

Figure 2: The light curve of NGC 4151 at 2008-2013, including new, unpublished before data for 2013: filed circles – photoelectric data, x – Maidanak CCD observations, boxes – Crimean CCD data.

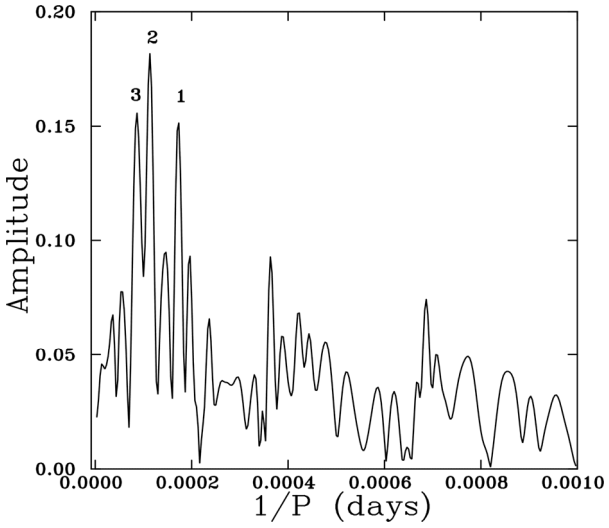

Figure 3: Power spectra obtained by the CLEAN method. There are several significant maxima: **1** P~16 years, **2** ~ 1.5P, **3** ~ 2P

components: 1 – fast variations with a characteristic timescale of tens of days, 2 – slow variations with a characteristic timescale of several years, 3 – very slow component with a characteristic timescale of tens of years.

NGC 4151 has been in high state during 2009-2012 and relatively at low in 2008 and 2013. So one circle of slow component about 6 years was observed during 2008-2013. Also we see one fast flash in 2013 with duration time about 150 days.

Applying Fourier (CLEAN) algorithm (Roberts et al., 1987) to the data from 1906 till 2013 (smoothed by a step equal to 100 days), we find a periodic component P~16 years in the 107-year light curve. 30 years ago, nearly the same "period" was first revealed just from Odessa photometric data. There are also seen (Fig. 3) another significant components about 1.5P, 2P. These circles probably correspond to some accretion dynamic times.

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