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N. I. Merkulova^a; L. P. Metik^a; I. I. Pronik^a

^a Crimean Astrophysical Observatory, Ukraine

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INTRANIGHT VARIABILITY OF NGC 1275 NUCLEUS IN OPTICS

N. I. MERKULOVA, L. P. METIK, and I. I. PRONIK

Crimean Astrophysical Observatory, Ukraine

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Intranight variability of NGC 1275 nucleus in optics was investigated using the photoelectric observations in 1982–1994. Analysis of these data shows that a process of mixed shot-noise and flicker-noise operated in the nucleus.

KEY WORDS NGC 1275, Seyfert galaxies, active nuclei, optical variability

I. S. Shklovski (1965) forecasted, that there is “a quasar” in the nucleus of NGC 1275 galaxy, variability of which was detected at λ 3.8 cm by Dent (1966). This source belongs to BL Lacertae objects by strong variability of its flux in all domains of the spectrum.

We have investigated the variability of this nucleus in optics using two sets of photoelectric observations obtained by us with the 1.25-m telescope of Crimean Astrophysical Observatory. The duration of the observations in each night was up to 8.7 hours. 379 measurements of the nucleus brightness were obtained during 35 nights of observations with the diaphragm 10'' from 12.XI.1982 to 23.X.1987 using the entrance slit of the spectrometer $\Delta\lambda = 80\text{\AA}$, centered at λ 5200 \AA . 820 measurements of the nucleus brightness in each of the UBVRI bands were simultaneously obtained using a photometer – polarimeter with the diaphragm 20'' during 37 nights of the observations from 22.XII.1989 to 29.XII.1994. The error of one flux measurement was (1–4)%. Each of the 6 independent series of observations was investigated separately.

Indications of the intranight variability were ratios of standard deviations (SD) of the variable flux, calculated for each night of the observations, to the errors of the observations (σ) and the parameters of structure functions (SF). We suppose that there were real intranight flux variations if $SD \geq 3\sigma$. There were 8% of such nights in 1982–1987 and twice as many in 1989–1994. Figure 1 shows SFs obtained for three of the observational sets. SFs for all six series of the observations for time lags $\Delta t \leq 8$ hours can be presented by slope $\log(SF) \sim b \log \Delta t$, where $0.23 \leq b \leq 0.58$. These data permit one to conclude, that during 1982–1994 in the nucleus of NGC 1275 galaxy a process operated, causing the variations of its flux in

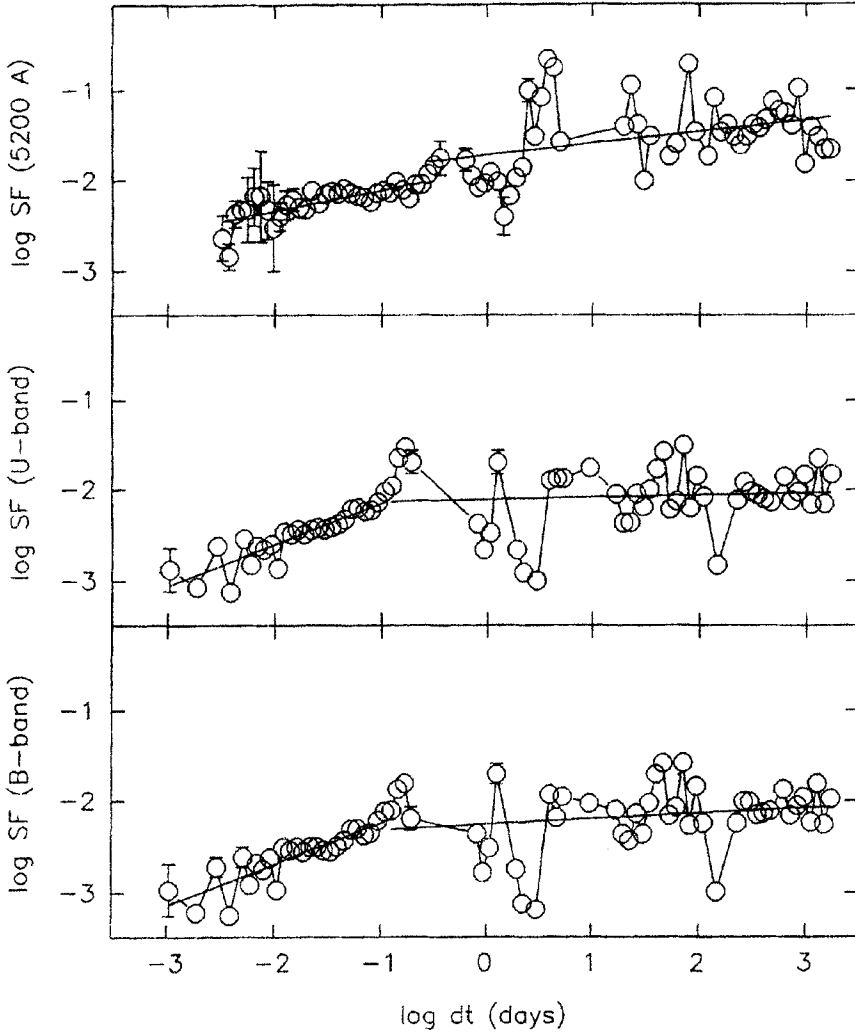


Figure 1 Structure functions of flux variability of NGC 1275 nucleus according to the data by Merkulova *et al.* (1987, 1988, 1992) and Merkulova, Metik (1995), obtained at λ 5200Å and in photometrical bands U and B. Straight lines are regressions, calculated separately for intranight and longer time lags. Bars – errors of SFs.

optics on the time scale of several hours. It has character of mixed shot-noise and flicker-noise.

The intranight variability of NGC 1275 nucleus can be caused by accretion onto a black hole. Schwarzschild's radius of a black hole in the nucleus of NGC 1275 was calculated by Edelson and Malkan (1986) to be equal to about one light minute. Nesterov *et al.* (1995) proposed model of a synchrotron jet for this source, instability of which can also be responsible for the microvariability of the source.

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