FAST X-RAY AND IR VARIABILITY OF A 0535 + 262

(Letter to the Editor)

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Abstract. X-ray bursts of the source A 0535 + 262 with a characteristic time-scale \( \sim 5 \) min have been discovered using the observational data of the Soviet 'Astron' satellite obtained on 7 April, 1983. Similar temporal variations were observed in the IR range on 26 September, 1981, 26–27 October and 16–17 December, 1983. The presence of such bursts gives evidence of strong inhomogeneity in the electron shell around the optical component and an accreting flow of matter in the vicinity of the neutron star. The parameters of the inhomogeneities are estimated.

The transient X-ray source A 0535 + 26 has been identified with the Be star HDE 245770 (Bradt et al., 1979). The commonly accepted parameters of that binary can be found, e.g., in Giovannelli et al. (1982). The system is a typical representative of a specific class of X-ray binary sources, whose optical components are Be stars. While Be stars have as a rule extended electron shells, accretion in such systems takes place under extraordinary, particular physical conditions, essentially differing from those in classical X-ray binaries (Rappaport and van den Heuvel, 1981).

Coordinated detailed A 0535 + 26 observations have been lately made in different energetic ranges (Giovannelli et al., 1982, 1984; Hayakawa et al., 1984). One of the major goals of this campaign is a determination of the character of variability of the radiation. The observation of fast variability with a characteristic time-scale \( \sim 1–100 \) min is of particular interest. It should be born in mind that the neutron star, being a component of the system, has a period \( \approx 104 \) s (Bradt et al., 1979).

Gnedin et al. (1983) suspected regular variations of IR brightness with a period 104 s. They also observed IR variations of the source with a characteristic time-scale \( \sim 10 \) min (Figure 1). These time-scales of variability are not typical for classical single Be stars.
The variations of IR brightness of A 0535 + 26 during the time-scale of several minutes on 26 September, 1981.

In the present note we compare the variability with a time-scale of $\sim$ several minutes in X-ray and IR emissions of the A 0535 + 26 system.

X-ray observations of A 0535 + 26 were made on 7 April, 1983, with the SKR-O2M X-ray spectrometer installed on-board the 'Astron' Soviet station. The SKR-O2M spectrometer is capable of measuring the total counting rate from 2 to 25 keV, the general surface of all its counters with regard to collimator transmission is 1780 cm$^2$ and its field of view $3^\circ \times 3^\circ$ FWHM (Golinskaya et al., 1984).

The observation was performed in the mode of the pointing of the spectrometer's optical axis onto the source in question for two hours from 12$^h$42$^m$ to 14$^h$42$^m$ UT. After the measurement session the background was measured. To do that the X-ray telescope was removed from the source position under study by 7$^\circ$.

Figure 2 gives the SKR-O2M spectrometer's registration of a signal during an observing session of A 0535 + 26 as averaged over 2.5 min. The background was measured from 14$^h$54$^m$ to 15$^h$04$^m$ UT. The signal registration is absent from 14$^h$42$^m$ to 14$^h$54$^m$ due to reorganisation of the station. After the measurements of the background the instruments were calibrated by the radioactive sources Fe-55 embedded into the collimators.

Fig. 2. The A 0535 + 26 source counting rate in the integral channel (2–25 keV) during the session on 7 April, 1983.