# RECENT DATA OF THE MULTI-FREQUENCY MONITORING OF MICROQUASARS

*S.A. Trushkin*

Special Astrophysical Observatory of RAS, Nizhnij Arkhyz, Russia
satr@sao.ru

We discuss results of recent radio observations of the microquasars SS433, GRS1915+105 and Cyg X-3 with the RATAN-600 and RT32 (IAA) radio telescopes.

We have carried out long monitoring programs of daily observations sets for microquasars with the RATAN radio telescope at frequencies of 1, 2.3, 4.8, 7.7, 11, 21.7 and 30 GHz. Flaring events were detected when the fluxes increased by a factor of 2-200. The flaring synchrotron emission indicates the jets formation, coupling with accretion disk activity in the Galactic microquasars and in the active galactic nuclei (AGN). The multi-frequency light curves are compared with the XTE ASM data at 2-12 keV to study correlations during the flares. Indeed in many cases such correlations were detected.

Radio flaring events of SS433, Cyg X-3, LSI+61d303 were often optically thin at $\nu >5$ GHz, and follow to general predictions of the relativistic outflows of mass or fast electrons from binaries. On the other hand, we have often measured the inverted (optically thick) spectra of flaring events in the active states of GRS1915+105, Cyg X-3 and V4641 Sgr with the spectral indices $\alpha >+1$ at $\nu >1$ GHz.

We have detected a clear X-ray/radio association in light curves of GRS 1915+105 during October-November 2005, when it was very active (0.5-3 Crabs at 2-12 keV).

After 18 days of the quenched state ($\sim$10 mJy) Cyg X-3 exhibited the 1Jy- radio flare on 1 Feb 2006. Such a remarkable property – before a flare the radio emission fall down in deep (local) minimum of fluxes – is probably a general feature of the radio/X-ray binaries.

The flare of 1 Feb was also detected with the Nobeyama 45m and NMA telescopes (Tsuboi et al. 2006), and for the first time a flat radio spectrum of the flaring event from Cyg X-3 was directly measured in the quasi-simultaneous observations from 2 to 110 GHz. Then two following flaring events (5 and 17 Jy) were detected later during $\sim$100 days. Their durations were 50 and 30 days respectively. The very fast rising flare, from 1 to 2 Jy during 3 hours, was detected with the RT32 telescope (Trushkin et al. 2006) on 05 June. At last on 25 July we have detected a very powerful flare (15 Jy) from Cyg X-3 again. All these flares happened during a long period (Feb 1 – Aug 1) when X-ray emission was relatively high ($\geq$0.3 crabs), variable and hard.

We studied evolution of the powerful flares from the optically thick state to the optically thin one at the lower frequencies. We have to draw an unexpected conclusion: during the stage of initial rising (ejection stage) the density of thermal electrons is also rising resulting in the higher optical depths at frequencies lower than 1 GHz just near maximum of the flare.

*Acknowledgements.* This research was supported by the Russian Foundation of Basic Research grant N 05-02-17556 and by the Program of the Presidium of Russian Academy of Science.

## References

Tsuboi M. et al. : *ATel*, 2006, #**729**.
Trushkin S.A. et al.: *ATel*, 2006, #**828**.