TIME-RESOLVED OPTICAL SPECTROSCOPY AND PHOTOMETRY OF THE PECULIAR POLAR BY CAM(=H0538+608)

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ABSTRACT. Results of simultaneous spectral and photometric observations of the peculiar polar BY Cam in the high state of brightness ($V = 14^m.2 - 15^m.6$) obtained in February 1990 and March 1991 at the 6-m telescope of SAO RAS are presented.

Key words: Stars: Cataclysmic Variables; individual: BY Cam

Variations (from night to night, during an orbital period and a shorter timescale variability of 3–5 min) of the equivalent widths (Wλ), the relative intensities (Rc), the radial velocities (Vr) and the halfwidths (FWHM) of the Balmer (Hβ, Hγ, Hδ) and the Helium (HeII 4686 Å) emission lines and the light curves in the B filter have been investigated.

The equivalent widths and relative intensities of emission lines have revealed a maximum in a phase range of the orbital period 0.3–0.5 (the ephemeris by Mason et al., 1989). The equivalent width of the HeII 4686 emission line was significantly less during all phases of the orbital period in a pulsing state (on March 10) in comparison with a flaring state (on February 25 and March 12) observed in the simultaneous light curves. Halfwidths (FWHM) of the Balmer emission lines in the pulsing state showed a 4–fold increase over the orbital period which was not seen in the flaring state.

The behaviour of the halfwidths of the Balmer and the HeII 4686 lines is strongly different, which is evidence of a geometric separation of the line radiation regions in the system.

Quasi–periodic oscillations (QPO) were detected in the Johnson-B light curves on all dates of our observations. Power spectra of light curves on March 10, 1991 in the pulsing state showed significant QPOs with a period of 3 min. The 30–minutes quasi–periodic oscillations were seen in the flaring state on March 12, 1991 in an orbital phase range 0.7–1.1.

The radial velocity curves based on the measurements of centres of gravity of the emission lines corresponding to the broad components of the lines could not be always approximated by sinusoids. The amplitudes of the radial velocity curves in the pulsing state showed deviations up to 1.6 times on a time scale of 0.1–0.2 of the orbital period (20–40 min) which indicate the fast changes in the accretion geometry. A comparison of the radial velocity measurements of different authors by the phase diagramm method showed a significant temperature–geometric asymmetry of the accretion structure probably caused by the two–pole accretion in the system. Possible reasons for the spectral and photometric variations are discussed.

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Reference

Mason P.A., Liebert J., Schmidt G.D.: 1989, *Ap. J.*, **346**, 941.