Multicolour photometry of the novae V339 Del and V2659 Cyg.

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Abstract. The $UBVR_CI_C$ photometry of the classical novae V339 Del and V2659 Cyg is presented. The U data of V339 Del were used to find its possible orbital period of $0^d.1314$. The rate od decline in V band $t_{2,V} = 65^d$ for nova V2659 Cyg was used to determine its basic parameters.

Observations. Our multicolour $UBVR_CI_C$ CCD and photoelectric photometry of the classical novae V339 Del (outburst in August 2013) and V2659 Cyg (outburst in March 2014) were obtained by 0.18 - 1.25m telescopes at the observatories in Stará Lesná (Slovakia), Nauchnyj and Mt. Koshka (Crimea). Low dispersion spectroscopy of both novae was obtained by the 0.5m telescope with objective prism in Nauchnyj.

Classical nova V339 Delphini – fast nova. Multicolour photometry of V339 Del is presented in Fig. 1 (left). The data obtained in the first month after the outburst were used by Chochol et al. (2014) to determine the basic parameters of the nova. We used all our U data, after the declining trend removal, to determine the ephemeris for brightness minima of the nova: $Min = JD2456589.324 + 0.13140(5) \times E$, exactly half of the period detected earlier by Chochol et al. (2014). The phase light curve corresponding to this ephemeris is shown in Fig. 1 (right). The light variations are probably caused by the orbital motion in a binary system and irradiation of the secondary component by a hot white dwarf.

Classical nova V2659 Cygni – slow nova. Multicolour photometry of V2659 Cyg, presented in Fig. 2, shows a large variability. We found the rate of decline of V2659 Cyg from its V light curve as $t_{2,V} = 65$ days, so it is a slow nova. We estimated the absolute magnitude of the nova at maximum using the MMRD relations published by Downes & Duerbeck (2000) as $MV_{max} = -6.70 \pm 0.04$. Novae in maximum have intrinsic colour index $B - V = 0.25 \pm 0.05$, so $MB_{max} = -6.45 \pm 0.09$. This value and relation of Livio (1992) provide the mass of the white dwarf in V2659 Cyg as $M_{wd} = 0.65 \pm 0.02 M_\odot$. The interstellar extinction $E(B - V)$ can be found from comparison of the intrinsic and observed colour indices in maximum as 0.92, relation of van den Bergh & Younger (1987) using the colour index two magnitudes below maximum as 0.85 and from equivalent width of interstellar Na I a K I lines as 0.68 (Tomov et al. 2014) and 0.63 (Raj et al. 2014). The mean value of $E(B - V) = 0.77 \pm 0.06$, so the distance to the nova is d = 5.5 ± 0.3 kpc.

Low dispersion spectra of the novae, taken in July 2014, are presented in Fig. 3.

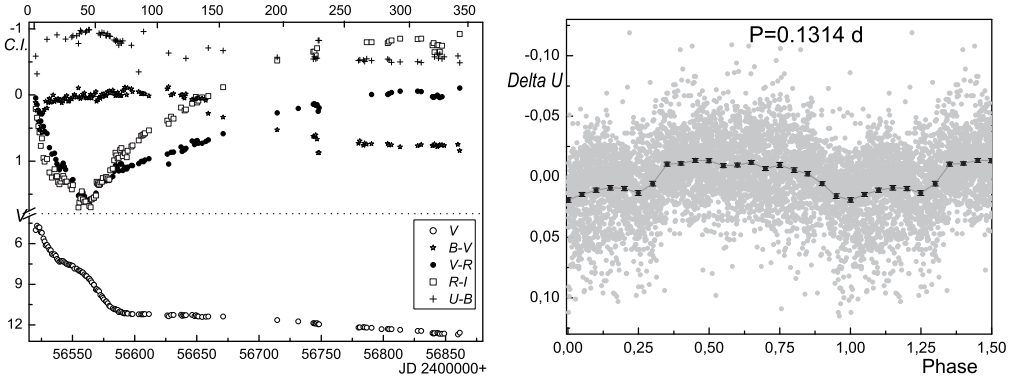

Figure 1. Multicolour photometry of V339 Del in 2013-14 (left). The ΔU phase light curve folded with ephemeris $Min = JD2456589.324 + 0.13140(5) \times E$ (right).

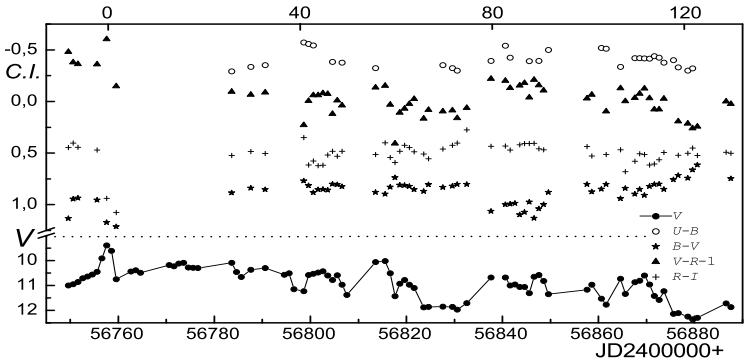

Figure 2. Multicolour photometry of V2659 Cyg during its outburst in 2014.

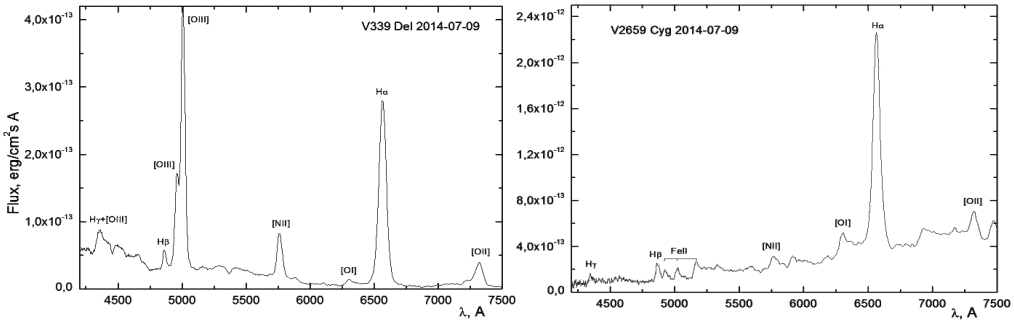

Figure 3. Low dispersion spectra of the novae, taken in July 2014.

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