

THE NOVA-LIKES AC CNC, RW TRI, UX UMA AND THE NOVA DQ HER: COMMON AND DIFFERENT PROPERTIES

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Abstract. An analysis of the main photometric properties of the nova-like variables AC Cnc, RW Tri and UX UMa, and Nova Her 1934 (DQ Her) is presented. The analysis is based on simultaneous high-speed *UBVRI* photometry, covering several dozens of orbital cycles evenly distributed over 14 years (1982 ... 1995) for DQ Her, and over 11 years (1985 ... 1995) for the other three stars. All data have been obtained with the 1.25 m telescope at the Crimean Astrophysical Observatory.

1. Discussion

According to our analysis of the photometric data for AC Cnc, RW Tri and UX UMa [1] an essential distinction between the accretion discs of AC Cnc and RW Tri on the one hand, and of UX UMa on the other, may exist. The possibility of a difference between the secondary components of these three systems should also not be excluded.

These three nova-like stars have not undergone a nova explosion, unlike DQ Her. However the latter shares many common properties with them. The main common trait is the existence of *UBVRI* brightness variability on time-scales of days, with amplitudes of less than 2 mag, when an increase in brightness is accompanied by a decrease of the colour indices ($U - B$), ($B - V$), ($V - R$) and ($V - I$) and vice versa.

In Fig. 1 (left) we present the time dependence of the uneclipsed light, \mathcal{L} , of DQ Her in the B -band (in *UVRI* the light curves are similar). For every night, the value of \mathcal{L} was calculated by averaging several dozen 'uneclipsed' data points. The errors in \mathcal{L} are negligible compared to the physical brightness changes (due to flickering etc.). The light variation on time-scales of years, as well as the change in ($O - C$) on this time-scale, may be caused by activity of the red dwarf, secondary star.

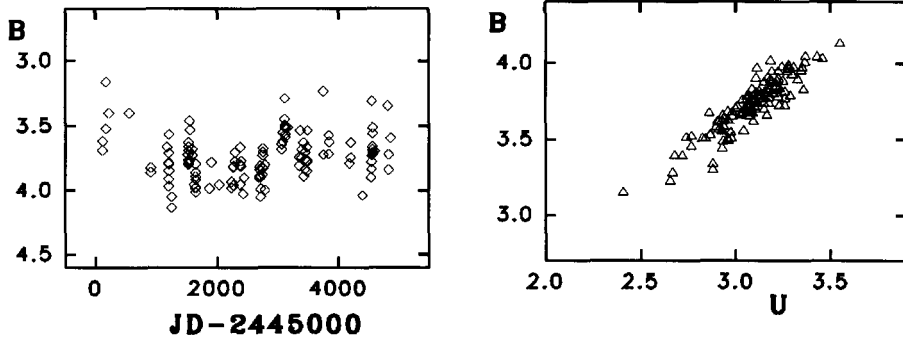


Figure 1. Left: unclipsed B -magnitude of DQ Her. Right: unclipsed U - versus B -magnitude for DQ Her. Magnitudes are differential with respect to a comparison star having $U = 11.08$ mag, $B = 11.07$ mag. Observations were obtained during 1982 ... 1995.

The $UBVRI$ brightness of AC Cnc, RW Tri and UX UMa was found to change with a period of about 11, 5 and 2 d, respectively [1]. The analysis of the existence of any periodic $UBVRI$ variability in DQ Her we intend to make in the future.

For AC Cnc, RW Tri and UX UMa the values of $UBVRI$ brightness and colour indices ($U - B$), ($B - V$), ($V - R$), ($V - I$) almost uniformly fill the interval between the maximum and minimum limits corresponding to the most active and quiescent states [1]. The same situation holds in the case of DQ Her (Fig. 1 right) with the exception of 1982 July 19, when the value of \mathcal{L} is separated from the remainder by about 0.3 mag (averaged $UBVRI$).

In DQ Her, AC Cnc and RW Tri the $UBVRI$ light variability is caused by a change in the light of the eclipsed source – the accretion disc around the white dwarf and the part of the secondary facing them. The variations in the emission (averaged $UBVRI$) are no more than a factor of two, whereas in dwarf novae in outbursts it is of a factor of 10...100. So this variation may be due to the effect of the precession of the accretion disc, for example. On the other hand in UX UMa there is a variation of the unclipsed source – the outer areas of the accretion disc and part of the secondary star facing away from it.

References

1. Dmitrienko, E. S., 1995, *Astronomy Letters*, **21**, 171