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Characterising the Dwarf Nova Population of the Catalina Real-time Transient Survey

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Abstract. Results of a high-speed photometric study of dwarf novæ in the Catalina Real-time Transient Survey are given. A population of faint dwarf novæ near the orbital period minimum is detected. At the shortest periods there is a correlation between orbital period and outburst interval.

Keywords. dwarf novæ, Catalina Real-time Transient Survey, orbital period minimum

Over the past decade the Astronomy Department at the University of Cape Town has carried out high-speed optical photometry of faint southern-hemisphere cataclysmic variables (Woudt & Warner 2010), using candidates taken largely from the Sloan Digital Sky Survey (SDSS). From late 2009 the survey has used CVs from the Catalina Real-time Transient Survey (CRTS: Drake *et al.* 2009), which extends to fainter magnitudes than the SDSS and identifies objects that vary by more than 2 mag in their (approximately) 7-year light curves.

We have observed 56 of these stars, most of which are newly recognised CVs, using the 40-in and 74-in reflectors at the Sutherland site of the South African Astronomical Observatory, equipped with the UCT CCD photometer (O'Donoghue 1995). This has led to the measurement of orbital periods (P_{orb}) for 19 systems with magnitudes $\lesssim 20.5$, almost all of which are near the minimum orbital period, i.e., 80–90 mins. This is in line with the result obtained by (Gänsicke *et al.* 2009), based on SDSS systems, that the high space density of short period CVs predicted from population synthesis models can be found as faint CVs. Supplementing our P_{orb}s with others for CRTS CVs available in the literature, we find the distributions shown in Fig. 1

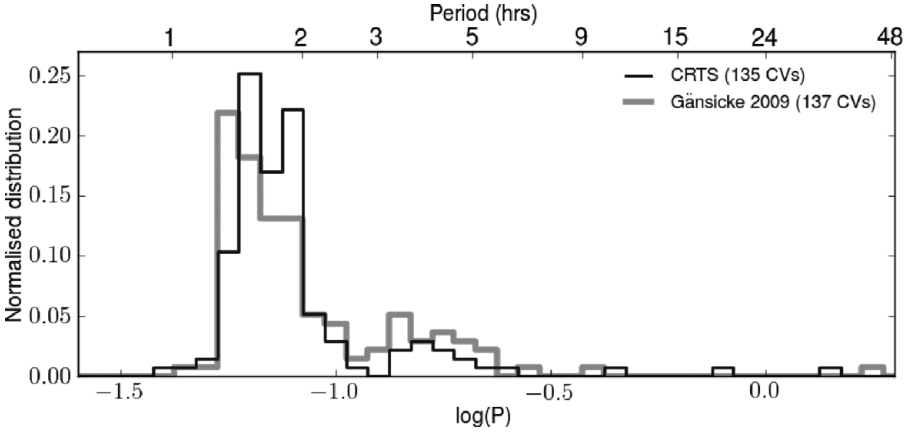

Figure 1. P_{orb} distributions from the SDSS (Gänsicke *et al.* 2009) and CRTS surveys.

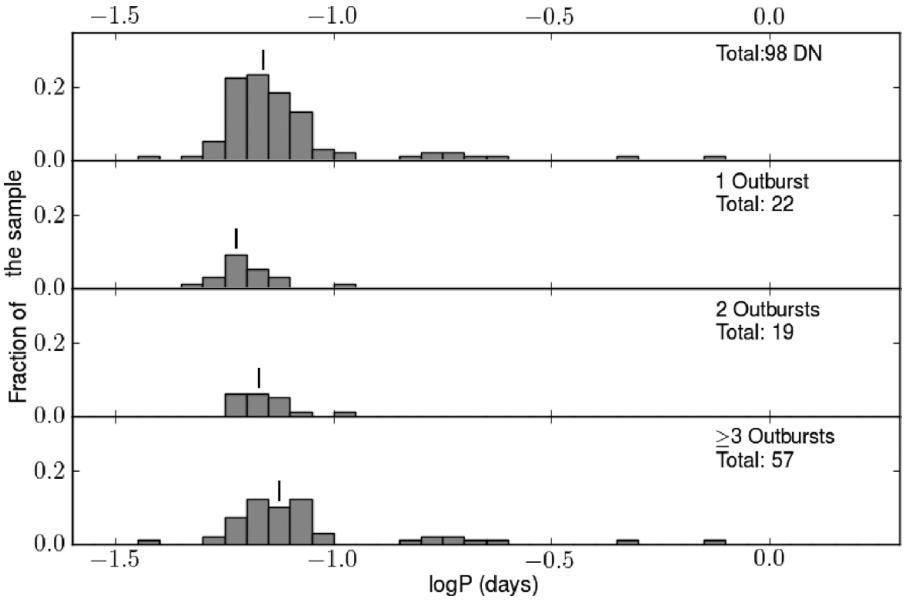

Figure 2. P_{orb} distributions of the CRTS stars according to outburst class. The vertical bars indicate the median values for each class and are given respectively by 1.66 h, 1.43 h, 1.62 h and 1.80 h.

Evolutionary models also predict that most CVs should have evolved past the minimum P_{orb} back towards longer values (post-bounce CVs), with lower mass transfer rates and rarer dwarf nova outbursts. We have classified the CRTS long-term light curves according to whether one, two, or more outbursts were detected; the P_{orb} histograms for the three types are shown in Fig. 2.

There is a clear correlation with P_{orb} in the sense that the least frequent outbursts occur among the dwarf novæ at the shortest orbital periods. Some of these may be post-bounce CVs.

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