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Period changes of the eclipsing dwarf nova OY Carinae

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Abstract. Southern hemisphere cataclysmic variable OY Carinae is an eclipsing SU UMa–type dwarf nova. With the orbital period about 91 min it belongs to the dwarf novae below the period gap. Three new eclipses were measured at the La Silla observatory in Chile using the Danish 1.54-m telescope from November 2012 to March 2013.

We constructed an observed-minus-calculated diagram using new and published mid–eclipse times. At the $O - C$ diagram there are clearly visible sinusoidal variations of the orbital period similar to many other cataclysmic variables.

Key words: binaries: close – binaries: eclipsing – stars: dwarf novae

1. Observations and data analysis

OY Carinae is a southern hemisphere SU UMa–type dwarf nova with orbital period $P_{\rm orb} = 1.51$ h and eclipses deep around 1.7 mag in quiescence. OY Car was observed from November 2012 to March 2013. The measurements were obtained remotely at the La Silla Observatory in Chile at the Danish 1.54-m telescope using the CCD camera with an R filter.

For the period analysis were used three new mid–eclipse times and 125 minima obtained from literature (Schoembs, Hartmann 1983; Schoembs *et al.*, 1987; Nicholson, 2009; Greenhill *et al.*, 2006 and references therein).

2. Period analysis and discussion

Several period studies of OY Car were presented in the past. Vogt *et al.* (1981), Cook (1985), Wood *et al.* (1989) derived a linear or a quadratic ephemeris. Lastly, Greenhill *et al.* (2006) derived both quadratic and sinusoidal ephemeris and noted that the sinusoidal ephemeris represents the changes of the orbital period better. A linear least–square fit of 128 collected mid–eclipse times reveals an ephemeris

$$\text{Min.} = \text{BJD}\,2443993.55405(3) + 0.063109126(4) \times E\,. \qquad (1)$$

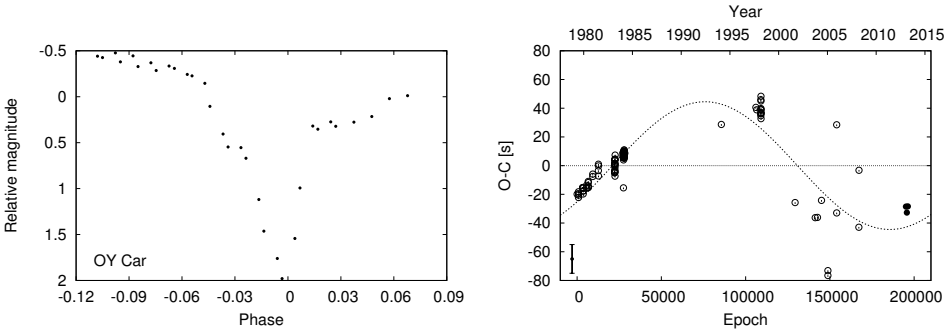

Figure 1. *Left:* A phase–folded eclipse light curve obtained on 17 January 2013 at the La Silla Observatory in Chile. *Right:* An $O-C$ diagram for OY Car with respect to the linear ephemeris (1). New mid–eclipse times are depicted by full circles and those obtained from literature are denoted by open circles. A visible cyclical variation is displayed by an approximate sinusoidal function.

The $O-C$ diagram is constructed according to this linear ephemeris and is displayed in Fig. 1. On the $O-C$ diagram there are clearly visible 30–40 year sinusoidal variations of the orbital period.

The cyclical variations of the orbital period similar to the variation of OY Car occur in many other well–observed cataclysmic systems: T Aur, HT Cas, AC Cnc, EX Dra, U Gem, Z Cha, V2051 Oph, IP Peg, V4140 Sgr, RW Tri.

The most probable explanation for the observed cyclical variations is a quasi-periodic solar-cycle-type magnetic activity in the secondary star, which was proposed by Applegate (1992).

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