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**THE ECLIPSING CATAclySMIC VARIABLES PHL 1445
AND GALEX J003535.7+462353**

WILS, PATRICK¹; KRAJCI, TOM²; HAMBSCH, FRANZ-JOSEF^{1,3}; MUYLLAERT, EDDY¹

¹ Vereniging Voor Sterrenkunde, Belgium; e-mail: patrickwils@yahoo.com

² Astrokolkhoz, New Mexico, USA

³ Bundesdeutsche Arbeitsgemeinschaft für Veränderliche Sterne e.V. Germany

Eclipsing cataclysmic variables (CVs) are important because through detailed modeling of the eclipses it is possible to deduce the physical properties of the system. This paper reports the discovery of two new eclipsing CVs: PHL 1445 and GALEX J003535.7+462353.

PHL 1445 (= PB 9151) is listed in the Palomar-Haro-Luyten catalogue as a faint blue object (Haro & Luyten, 1962). A spectrum (6dFGS g0242429-114646) taken by the 6dF Galaxy Survey (Jones et al., 2004 and 2009) showed it to be a cataclysmic variable (Wils, 2009). Because of the split emission lines and a number of anomalously faint points in the light curve of the Catalina Real-time Transient Survey (CRTS; Drake et al., 2009), it was suspected to be an eclipsing variable as well. Follow-up observations at the Astrokolkhoz Observatory with a C14 Schmidt-Cassegrain and an unfiltered CCD camera, showed this indeed to be the case. As shown in Fig. 1, the light curve shows deep eclipses lasting about 6 minutes, with an amplitude of more than two magnitudes. In addition the period is very short, 76.3 minutes, near the minimum orbital period for CVs (Gänsicke et al., 2009). Such a short orbital period is usually observed in WZ Sagittae type dwarf novae like GW Lib (orbital period 76.8 minutes) and SDSS J074531.91+453829.5 (76.0 minutes), with rare large amplitude outbursts. Only SDSS J150722.30+523039.8 has a shorter orbital period among the eclipsing CVs (Savoury et al., 2011).

Table 1 lists the observed times of eclipses. From these, the following eclipse ephemeris was derived:

$$HJDMin = 2455202.5579(1) + 0^d05298466(8) \times E \quad (1)$$

Since not many deeply eclipsing CVs are known at this orbital period, high speed photometry of the eclipses, such as done by Southworth and Copperwheat (2011) and Savoury et al. (2011) would certainly be of value for this object.

GALEX J003535.7+462353 was discovered as a variable source by the GALEX satellite (Martin et al., 2005) on 30 August 2008. Although the object is too faint itself, both the Northern Sky Variability Survey (NSVS; Woźniak et al., 2004) and SuperWASP (Butters et al., 2010) observed the combined magnitude of GALEX J003535.7+462353 and GSC 3249-1603, which lies some 18'' to the West. Both surveys show a number of brightenings in the combined light curve, lasting several days, with an amplitude of up to 0.2 magnitudes from the normal combined magnitude of 12.9, indicating the possible

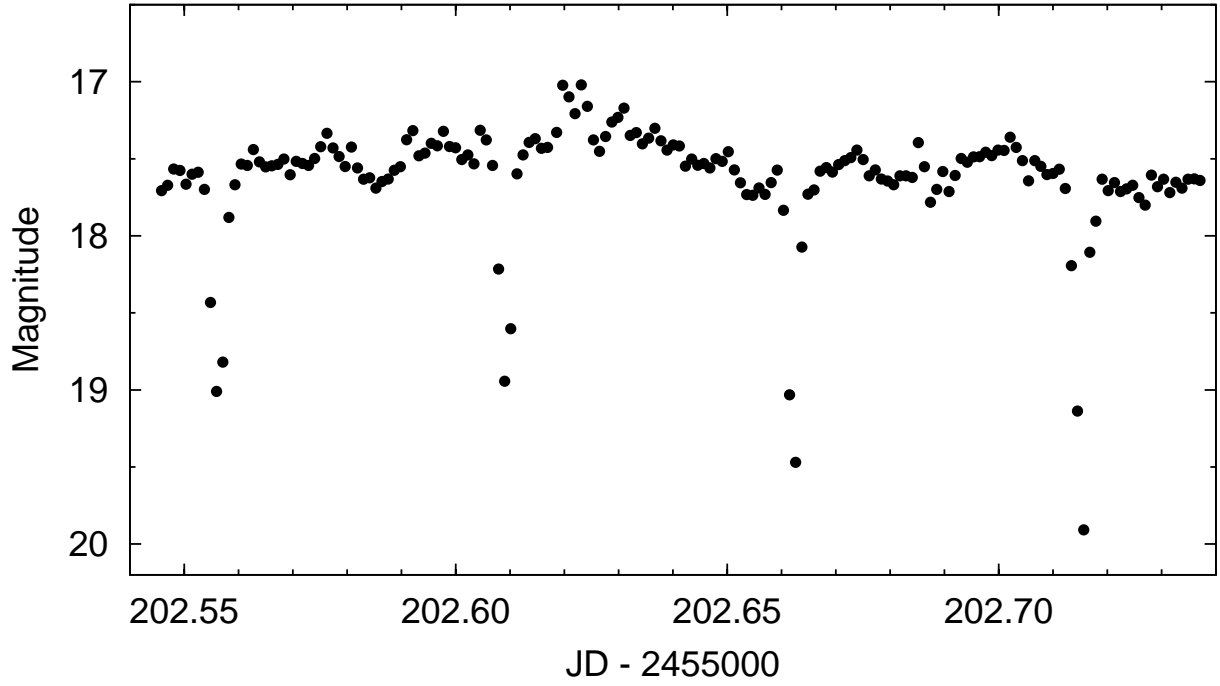


Figure 1. Light curve of PHL 1445 showing four eclipses.

Table 1: Observed times of eclipse for PHL 1445 and GALEX J003535.7+462353. The times are given as HJD - 2450000 (UTC based). The uncertainty on the times is about 0.0001 days for PHL 1445 and 0.0005 days for GALEX J003535.7+462353 for the minima obtained from our data, and 0.001 days for the minima obtained from SuperWASP data.

PHL 1445	GALEX J003535.7+462353	
	SuperWASP	This paper
5202.5579	4330.553	5477.5621
5202.6108	4331.589	5478.4228
5202.6640	4332.622	5478.5954
5202.7169	4333.655	5479.4560
5241.6075	4334.688	5479.6284
5242.6144	4335.551	5480.6625
	4360.703	5481.3519
	4407.388	5481.5239
	4408.424	5482.3856
		5483.4192
		5486.6920
		5495.3052
		5495.6516
		5576.6190
		5577.6526
		5579.7207

variability of GALEX J003535.7+462353 rising to about magnitude 14.5, from its normal magnitude of around 16.5. These may be an indication of a dwarf nova outburst with a fairly small amplitude. In addition, during these bright phases SuperWASP showed short periodic dimmings back to the normal combined magnitude with a period of around 0.1723 days. The likely cause of these periodic fadings are eclipses of the variable.

GALEX J003535.7+462353 was therefore followed extensively by the authors. The eclipses with a duration of about 30 minutes, could be easily confirmed. At quiescence the eclipse depth is about 2 magnitudes in V , but varying slightly. In a timespan of three months one definite outburst was observed, lasting about a week (see Fig. 2), and possibly a few shorter outbursts. At the end of the observing season, the object was entering another outburst. The rise to outburst seems to be more gradual, like in some other dwarf novae with a short outburst cycle and relatively small amplitude (often classified as Z Cam type variables). During the long outburst, the eclipses could also be observed with a similar amplitude as during quiescence. Fig. 3 shows eclipses observed during quiescence, during a rise to outburst and one during outburst.

From the list of observed times of eclipse in Table 1, together with the times of minimum that could be derived from the SuperWASP data, the following eclipse ephemeris was deduced:

$$\text{HJD Min} = 2455477.5615(4) + 0^{\text{d}}.17227503(11) \times E \quad (2)$$

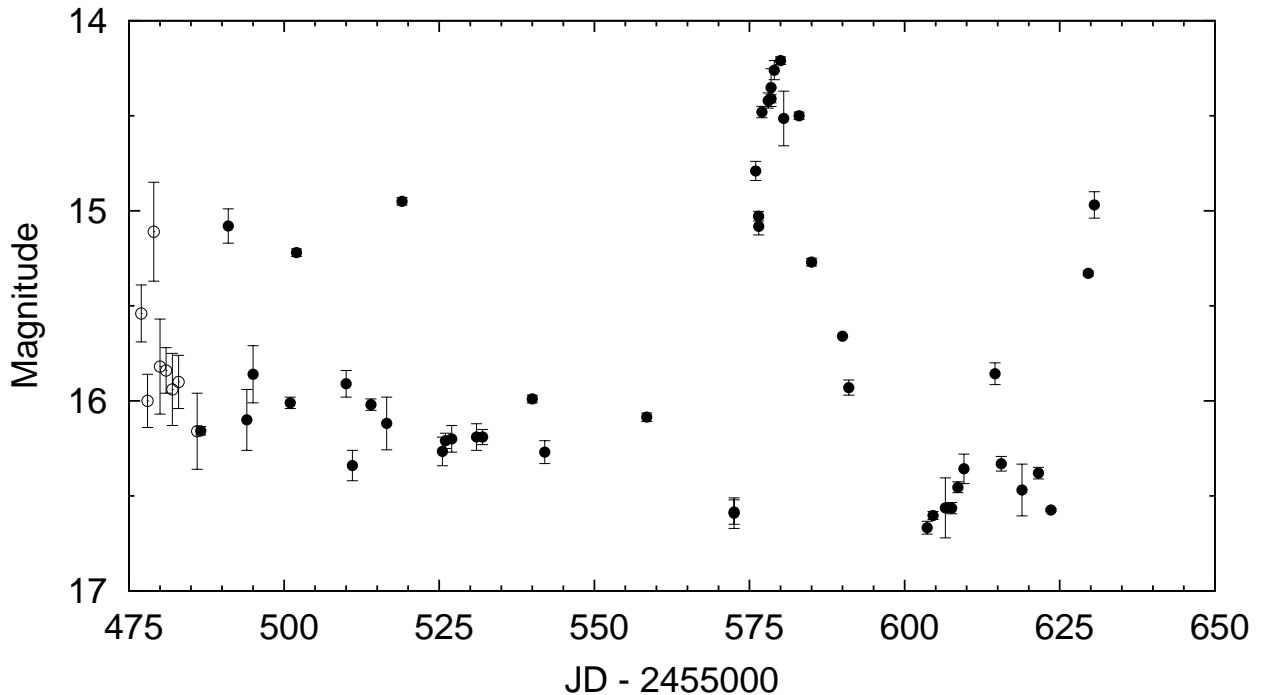


Figure 2. Light curve of GALEX J003535.7+462353 composed of daily means of observations outside of eclipse. Open circles represent V magnitudes, filled circles unfiltered magnitudes.

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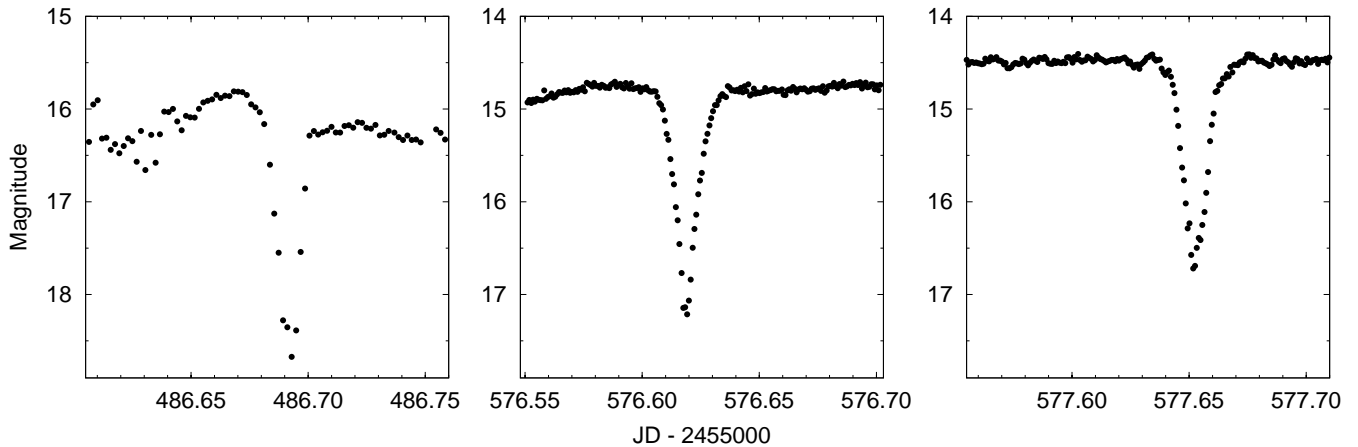


Figure 3. Eclipses of GALEX J003535.7+462353 observed in quiescence (left), rising to outburst (middle) and in outburst (right).

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