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BD+14°5016 - A NEW EW ECLIPSING BINARY

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Name of the object:
BD +14°5016 = GSC 01720-00658 = SAO 108714

Equatorial coordinates:	**Equinox:**
R.A.= $23^h36^m55^s.367$ **DEC.**= $15°48'06''.43$	2000

Observatory and telescope:
Piwnice Observatory, 135mm semi-automatic CCD camera

Detector:	SBIG ST-7 CCD Camera

Filter(s):	SBIG CFW-8 V, B

Date(s) of the observation(s):
2002.09.13 – 2002.11.07

Comparison star(s):	GSC 01720-00595, GSC 01720-00518, GSC 01720-00735

Transformed to a standard system:	No

Availability of the data:
Upon request

Type of variability:	EW

Table 1. Times of minima

Min. HJD	Error	Type	Filter	$O-C$ [day]
2452534.2999	0.0014	II	V	−0.0010
2452534.6031	0.0008	I	V	−0.0016
2452552.7715	0.0013	II	V	+0.0008
2452553.073	0.003	I	V	−0.0024
2452582.706	0.002	II	V	+0.0014
2452583.007	0.002	I	V	−0.0014
2452583.3386	0.0032	II	B	−0.0028
2452583.6441	0.0011	I	B	−0.0018

Remarks:

BD +14°5016 was found to be variable during the Semi-Automatic Variability Search program at the Piwnice Observatory. The presented photometric data were collected in both B and V filters, during 16 moonless nights between September and November 2002. 334 individual measurements of brightness were made, 275 in V band and 59 in B. The shape of the phased light curve, presented in Figure 1, indicates variability of the W UMa type.

According to SIMBAD, BD +14°5016 is a V=$9\overset{\mathrm{m}}{.}50$ magnitude star of F2 spectral type, with $B-V$=$0\overset{\mathrm{m}}{.}31$. Our observations show that at the maximum light the star reaches V=$9\overset{\mathrm{m}}{.}28$ and B=$9\overset{\mathrm{m}}{.}63$. The primary and secondary minima have an amplitude of ΔV_1=$0\overset{\mathrm{m}}{.}47$ and ΔV_2=$0\overset{\mathrm{m}}{.}41$ respectively. The observed amplitudes in B are identical. No noticeable colour variation with phase was detected. The phase-averaged $(B-V)$=$0\overset{\mathrm{m}}{.}35$. (Note that our B, V magnitudes are not transformed to the standard system.) The maximum following the second minimum is $0\overset{\mathrm{m}}{.}04$ fainter in both bands suggesting presence of a spot placed on the surface of one of the components.

Differential aperture photometry and astrometric reduction of the CCD frames were applied. The coordinates and magnitudes of comparison stars were taken from TYCHO-2 Catalogue (Høg et al. 2000). The V and B magnitudes were calculated from the following formulae:

$$V = V_t - 0.090(B_t - V_t), \tag{1}$$

$$B = V + 0.850(B_t - V_t). \tag{2}$$

The period was found with the ANOVA method of Schwarzenberg-Czerny (1996). The times of both minima were computed from the presented light-curve with the Kwee-van Woerden method (Kwee, van Woerden 1956). A preliminary ephemeris for the primary minimum is:

$$\begin{aligned} \text{Min. I} = \text{HJD } 2452558.1703 + 0\overset{\mathrm{d}}{.}636889 \times E. \\ \pm 0.0003 \pm 0.000004 \end{aligned} \tag{3}$$

The shape of the phased light curve (Fig. 1) clearly shows that the secondary minimum is located at phase ϕ=0.52. This fact is confirmed by large $O-C$ values calculated from equation (3) for the observed secondary minima. Therefore the following ephemeris for the secondary minimum has been obtained:

$$\begin{aligned} \text{Min. II} = \text{HJD } 2452557.8658 + 0\overset{\mathrm{d}}{.}636889 \times E. \\ \pm 0.0006 \pm 0.000004 \end{aligned} \tag{4}$$

To estimate accuracy of calculated minima the collected data were divided in three sessions and for each session individual times of minima were determined by the digital tracing paper method. The $O-C$ values, presented in Table 1, were calculated for primary and secondary minima from equation (3) and (4) respectively.

Acknowledgements:

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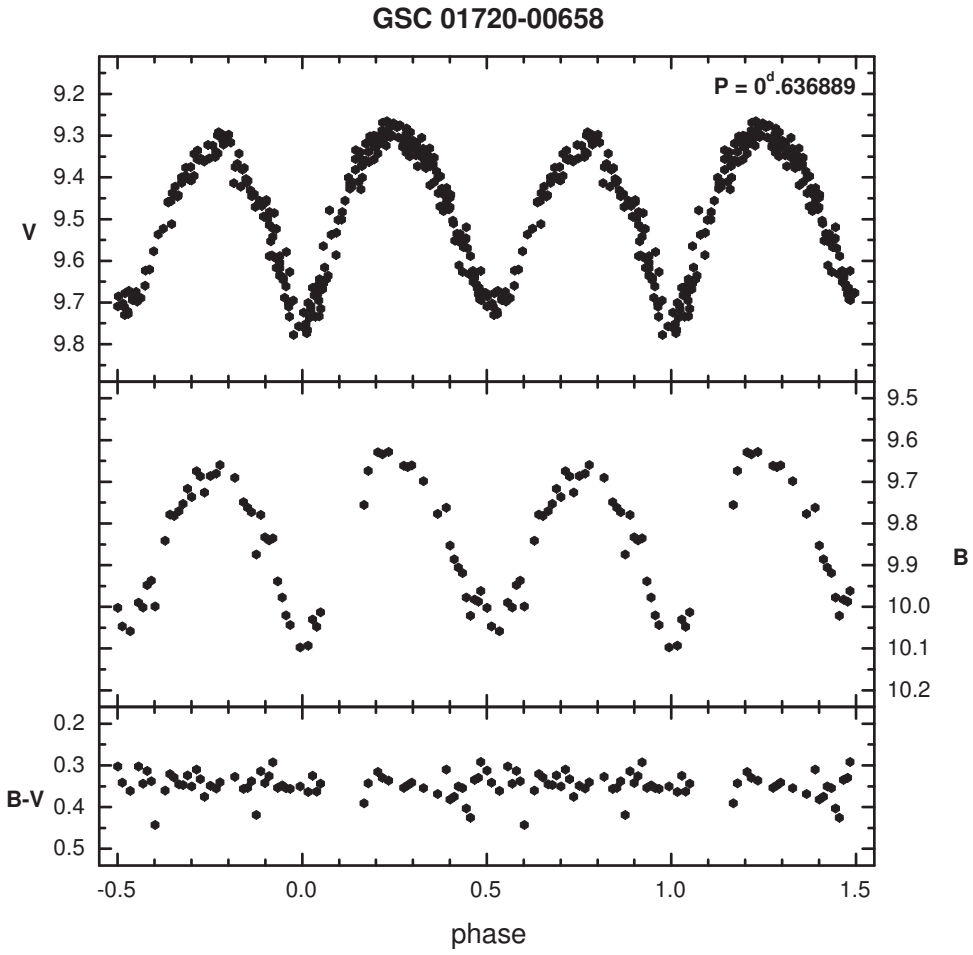

Figure 1. V, B and colour curves obtained for GSC 01720-00658

References:

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