GSC 00008-00901 – NEW DISCOVERED ECLIPSING BINARY

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Abstract: Discovery of new eclipsing binary GSC 00008-00901 is reported. It is the most probably W UMa type binary with period 0.28948±11 days. The shapes of the light curves indicate presence of one or more spots on the surface of the components.

1   Observations and detection

During our observations of eclipsing binary DV Psc, we found that GSC 00008-00901 (US-NOA 0900-00052264) (α_{2000}=00^{h}13'22.707"; δ_{2000}=+05°40'09.42") exibits some brightness variations with relatively large amplitude.

This field was observed during 5 nights from Sep. 4. to Oct. 27. 2005 at G1 pavilon at Stará Lesná Observatory belonging to Astronomical Institute of the Slovak Academy of Sciences. Observations were performed with 50cm Newton telescope equipped with the SBIG ST-10 MXE CCD camera. Observation were carried out with standard V and R Johnson filters. The journal of CCD observations of the field of DV Psc is listed in Table 1. We give there: date and time interval of observations, used filters and exposure times as well as a number of CCD images used for detection and analysis. Figure 1. depicted observed field with marked stars.

The CCD images were reduced in the usual way (bias and dark subtraction, flat-field correction) in software package SPHOTOM developed by autor. The photometric part of this package is based on the latest version of SExtrator program (Bertin & Arnouts, 1996), which perform aperture photometry of all detected stars on the CCD frames. In the next step a cross-identification of objects on CCD frames is carried out and light curves of stars are created with respect to selected comparison stars. In our reduction, we have used GSC 00008-00743 and GSC 00008-00949 as comparison and check star, respectively. The comparison star was found to be stable within ~0.003 mag in filter V during all our observations. Beacause of small field of view of used instrument, no atmospheric extinction correction has been applied.

Table 1: Journal of observations of the field of DV Psc, where GSC 00008-00901 was detected.

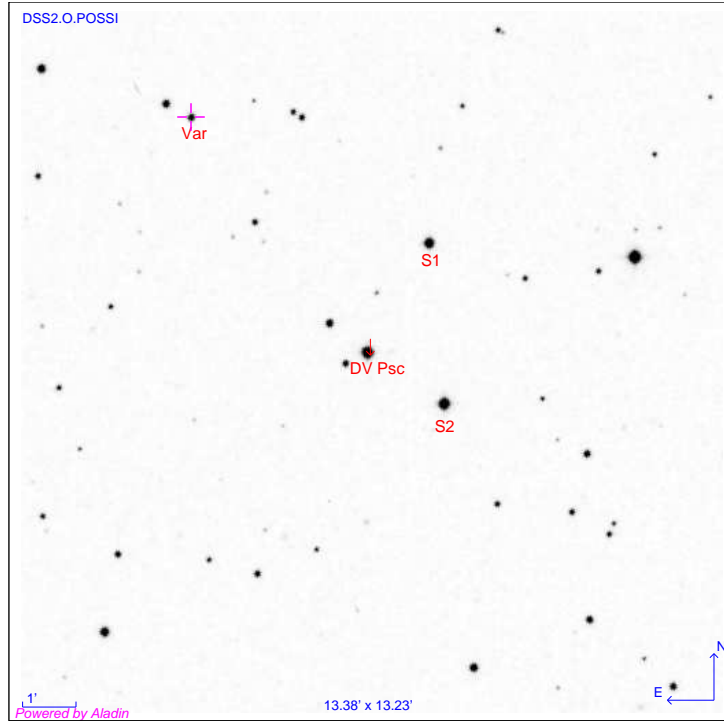| Date	Interval [UT]	Filter	Exp. time [s]	n
Sept. 04. 2005	23:04:24 - 02:59:08	V	20	104
		R	7	112
Sept. 23. 2005	19:36:51 - 21:56:52	V	15	65
		R	10	64
Sept. 26. 2005	20:31:14 - 01:06:55	V	20	117
		R	10	117
Oct. 04. 2005	18:28:01 - 01:15:32	V	20	178
		R	10	178
Oct. 27. 2005	19:14:18 - 23:29:50	V	20	107
		R	7	111

Figure 1: The field of DV Psc with marked stars: S1 = GSC 00008-00743, S2 = GSC 00008-00949 and Var = GSC 00008-00901.

The light curves of all detected stars are routinely tested for variability. Detection method implemented in SPHOTOM package is based on combination of variability index (Welch & Stetson, 1993) and χ^2 method (Saha & Hoessel, 1990) together with period determination with PDM method (Stellingwerf, 1978).

The variability test revealed one new variable star GSC 00008-00901 not mentioned before. Detailed inspection of the light curves showed that new variable is most probably W UMa type contact binary. During detection we found period of the star 0.289437(29) days.

2   Minima times and ephemeris

Our observations enabled us to determine 4 minima times of GSC 00008-00901. The times of minima were determined separately for the both filters using Kwee & van Woerden (1956) method and than weighted average minima times were determined, as listed in Tab. 2. For computation of minima times we have used only data in phase interval ±0.05 around the minimum. This approach minimize the influence of the possible minima asymmetries.

Period analysis of the light curve during discovery process found period 0.289437(29) days. Brief inspection of the light curve obtained at Oct. 4. showed that observed minimum is secondary. It allow us together with period to estimate minima types as listed in Tab. 2.

Listed minima times were used to improve period and provide linear ephemeris:

$$\text{Min I} = 2453648.2642 + 0.289485 \times E$$
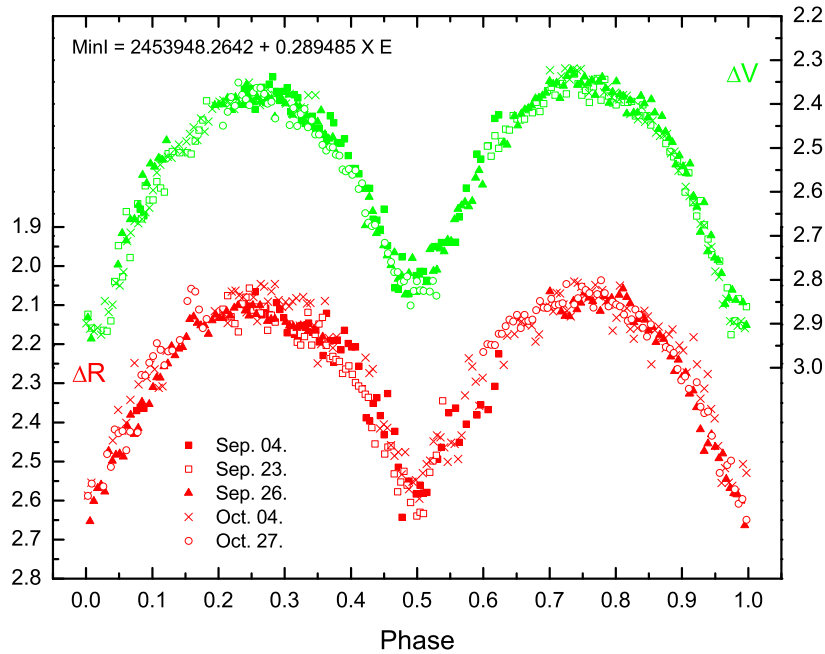$$\phantom{\text{Min I} = 245364}{\pm 3} {\pm 11}$$

(1)

Figure 2: V and R differential light curves of GSC 00008-00901 phased with ephemeris (1).

Table 2: Weigted average VR times of the primary (I) and secondary (II) minima of GSC 00008-00901. The standard errors of the minima are given in parentheses.

HJD	Type	Filter
2400000+		
53618.59354(24)	II	VR
53640.44907(10)	I	VR
53648.40640(17)	II	VR
53971.42783(16)	I	VR

V and R differential light curves of GSC 00008-00901 phased with ephemeris (1) are shown in Figure 2.

3   Conclusion

GSC 00008-00901 is the most probably W UMa type binary. The amplitude of light variations is ∼0.6 mag in V filter and ∼ 0.55 mag in filter R. A brief inspection of V and R light curves shows that primary and secondary minima in V filter have not the same depth, whereas R observations indicate almost the same brightness in minima. The asymmetry of the light curves in maxima at phase 0.25 and 0.75 indicate presence of one or more spots on the surface of the components, what deserve deeper analysis.

This interesting object is located near often observed eclipsing binary DV Psc. So it is possible that many observers have CCD images in their archives, where GSC 00008-00901 is also presented. Author will be very grateful to everybody, who could provide light curves or minima times of this star.

References

Bertin, E., Arnouts, S., 1996, *A&AS*, **117**, 393   1996A&AS..117..393B

Kwee, K. K., van Woerden, H., 1956, *BAN*, **12**, 327   1956BAN....12..327K

Saha, A., Hoessel, J.G., 1990, *AJ*, **99**, 97   1990AJ.....99...97S

Stellingwerf, R. F., 1978, *ApJ*, **224**, 953   1978ApJ...224..953S

Welch, D.L., Stetson, P. B., 1993, *AJ*, **105**, 1813   1993AJ...105.1813W