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CCD PHOTOMETRY OF THE ECLIPSING BINARY V1193 CYGNI

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The eclipsing binary V1193 Cygni (= S 7895 Cyg = GSC 3949.0797 = FL 3046; $\alpha = 20^{\rm h}21^{\rm m}11\overset{\rm s}{.}48$, $\delta = +59^\circ 36' 3\overset{''}{.}5$, J2000; $V_{\rm max} = 12.7 mag$) was discovered photographically in the field of the star 33 Cygni by Hoffmeister (1963) in Sonneberg. Later Gessner (1966) recognized the W UMa-type and derived the first light elements of low accuracy

$$\text{Pri. Min.} = \text{HJD } 2\,437\,668.228 + 0.674 \times E. \qquad (1)$$

The CCD photometry of V1193 Cyg presented here was carried out during eight nights in August and November 1998 at the R. Szafraniec Observatory, Metzerlen, Switzerland, with the 35-cm Schmidt-Cassegrain telescope and an unfiltered CCD camera (SBIG ST-6). Additional measurements were done during the night of JD 2451361 with the same equipment. The standard error of the measurements varies from 0.01 mag to 0.02 mag. The stars GSC 3949.0039 (V = 11.0 mag) and GSC 3949.0271 (V = 12.1 mag) on the same frame as the variable served as comparison and check star, respectively (Figure 1). It is also remarkable, that V1193 Cyg is superimposed on a faint galaxy ($\sim$ 16 mag), whose nucleus lays slightly west of the variable. This galaxy as well as V1193 Cyg could be also identified with the source IRAS 20201+5926 ($\alpha = 20^{\rm h}21^{\rm m}12\overset{\rm s}{.}8$, $\delta = +59^\circ 36' 19''$, J2000). Altogether 247 frames of this field were obtained and analysed. Table 1 contains three new epochs for minima, N denotes the number of measurements used for the precise determination of minimum time.

Our CCD observations confirm the W UMa-type of this eclipsing binary, but we find a substantially shorter orbital period of about 0.50376 days. This period also fits the minima of Gessner (1966) better, the corresponding new cycle counts are given in Table 1. A recalculation of the light elements using the 8 original times of minimum published by Gessner (1966) and our new epochs gives the following result:

$$\text{Pri. Min.} = \text{HJD } 2\,437\,668.2323 + 0.5037599 \times E. \qquad (2)$$

Our photoelectric light curve was solved independently using a method of treating photometric data described by Mikulášek at al. (1995), which is a weighted LSM iterative

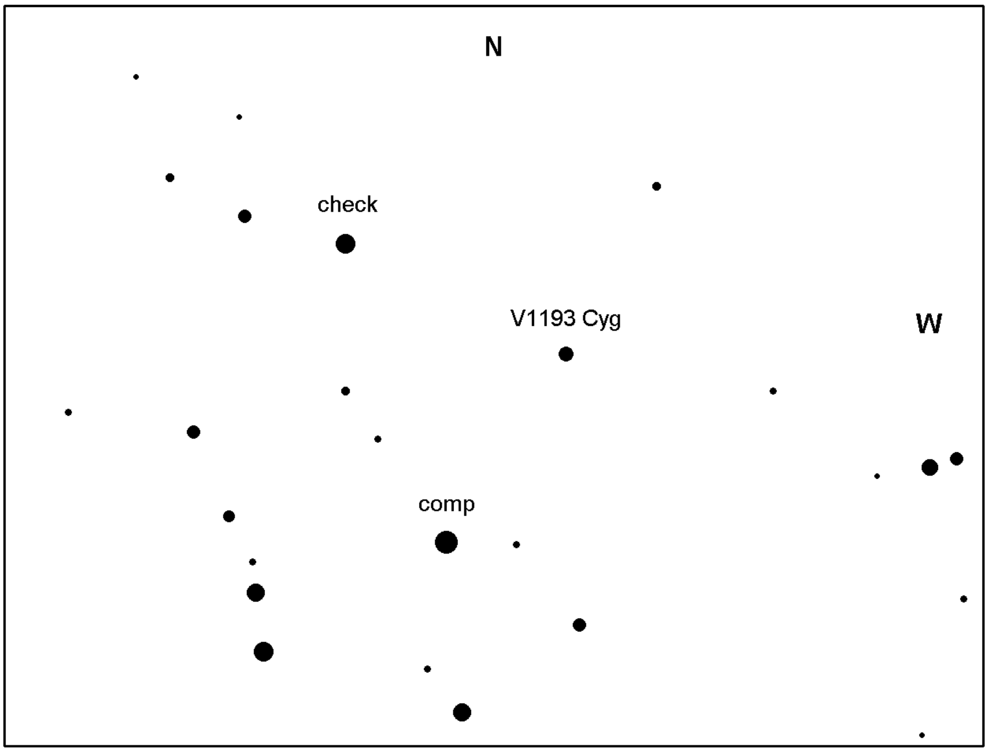

Figure 1. Finding chart of V1193 Cyg with the size of the field 8 × 6 arcmin.

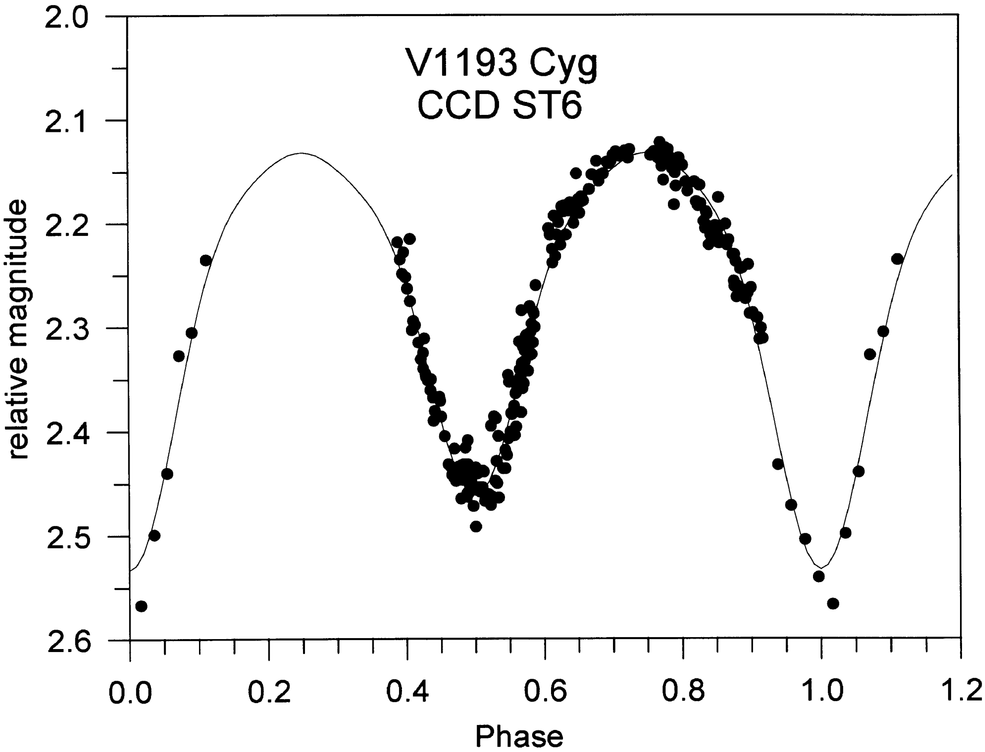

Figure 2. Composite light curve of V1193 Cyg for the period of 0.50376471 days.

Table 1: Times of minimum of V1193 Cyg.

HJD – 2 400 000	Epoch Gessner (1966)	Epoch this paper	
37668.228	0.0	0.0	
37669.224	1.5	2.0	
37898.455	341.5	457.0	
37906.516	353.5	473.0	
37917.585	370.0	495.0	
37944.557	410.0	548.5	
37964.441	439.5	588.0	
38348.316	1009.0	1350.0	
	Error [days]	Epoch	N
51052.3768	0.0003	26568.5	38
51107.2871	0.0005	26677.5	12
51361.4369*	0.0011	27182.0	14

* *published also in BBSAG Bull. No. 120*

procedure. Using this method we derive the current light elements, which could be used in the near future:

$$\begin{array}{rl}\text{Pri. Min.} = \text{HJD } 2\,451\,361.4371 + 0.50376471 \times E. \\ \pm 0.0001 \ \pm 0.00000005\end{array} \quad (3)$$

Figure 2 shows the light curve folded with this period. The light amplitude for the primary minimum according to our measurement is $A_1 = 0.41 \pm 0.03$ mag, for the secondary minimum we find $A_2 = 0.33 \pm 0.01$ mag.

The difference of both derived periods ($\sim 5 \times 10^{-6}$ day) and a number of epochs elapsed since the first observations ($\sim$ 27 000) gives value of 0.135 days, which is smaller than the value of period P or $P/2$. Our newly determined epochs and the cycle count given in Table 1 is correct, which might hints towards the existence of a period change in the time interval between Gessner's data and ours. Further observations of this eclipsing system are necessary in order to establish a better value of the orbital period and/or its probable changes. Also, an investigation on photographic plates could help solve this questions.

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ERRATUM

In the Table of IBVS No. 4612 all spectral types MS should read M5. Therefore M5 spectral type is assigned to XX CMa, TU Car, DL Cen, BS Mon, HW Mon, W Mus, BO Pup, ES Pup, AD Vel, and NSV 5061. The original manuscript was correct. The errors occurred when the OCR software was utilized. With our apologies

THE EDITORS