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NSV 223: A NEW ECLIPSING BINARY

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The rapid variability of NSV 223 (BV 121 ≡ BD+20°0075 ≡ CSV 005683 ≡ GSC 1193972) was discovered by Strohmeier et al. (1956) and confirmed by Filatov (1957), who reported variations from mag. 10.9 to 11.3 (photographic plates) an a F or G spectrum.

Visual estimates carried out since 1997 by GEOS observers and mainly by J.P. Verrot allowed establishing a very probable eclipsing nature (and 13 times of mimimum light were detected), even though the case of a pulsating star could not be ruled out (Verrot 1999). Therefore, photoelectric measurements were performed at the Jungfraujoch Observatory, on the basis of a collaboration between GEOS and Geneva Observatory. Thirteen BV measurements were collected in December 1998: the practically flat behaviour of the $B-V$ colour index strongly supported the eclipsing nature. The mean value of the $(B-V)_G$ index is −0.35. The latter value can be transformed into the BV system assuming a luminosity class V. Unfortunately, the photometer of the Jungfraujoch Observatory was removed before we could complete the observation of the whole light curve.

New CCD measurements were obtained by one of us (P. Van Cauteren) at his private observatory using a 0.40-m telescope. He collected 1167 measurements in white light during 1998 using a Hisis 24 camera: these images were reduced by using a profile fitting algorithm (MIPS package; Buil et al. 1993). Moreover, he also collected 224 measurements in V light during 1999 using a ST7 camera and the MIRA Aperture Photometry software (AP software is distributed by Axiom Research Inc.). In both cases GSC 1193_523 was used as comparison star. Typically, the standard deviation for the check star (GSC 1193_277) measurements is 0.012 mag. Since NSV 223 is 1.5 mag brighter, its measurements are more precise.

From Fig. 1, it is evident that NSV 223 is a contact eclipsing binary; it ranges from 10.86 to 11.32 in V light, as determined from Geneva photoelectric measurements. The light curve has a quite regular shape and the two maxima have the same height. On the other hand, the minima are slightly different (about 0.02 mag); the noise at Min. II can be ascribed to the poor photometric conditions of one night rather than to a physical variability of the system.

An ephemeris was calculated on the basis of 15 times of minimum light supplied by GEOS visual observers (J.P. Verrot and J. Vandenbroere), of 1 photoelectric time and from the 5 CCD times:

$$\text{Min. I} = \text{HJD } 2450748.896 + 0^{d}.366128 \times E.$$
$$\pm 0.003 \quad \pm 0.000005$$

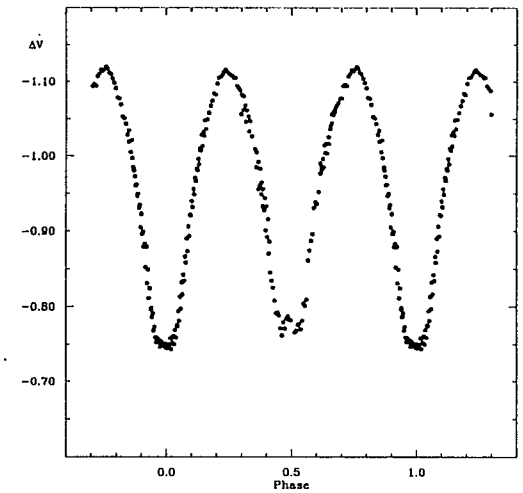

Figure 1. The 224 V CCD measurements of NSV 223 phased with the ephemeris proposed below.

A triple weight was assigned to the CCD and photoelectric minima, which are listed in Table 1 for the sake of completeness.

Table 1: Recent photoelectric and CCD times of minima of NSV 223

Type of min.	HJD	Method	Filter
II	51124.3492	CCD	white light
II	51128.3899	CCD	white light
I	51166.2751	p.e.	V light
II	51467.4273	CCD	V light
I	51468.3428	CCD	V light
I	51469.4389	CCD	V light

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