

GSC 3627 1580 : AN ECLIPSING BINARY IN And

1. Introduction

GSC 3627 1580 And (23h 10 12 ; +47° 34 14 ; 2000) has been measured by Tycho and listed in the Annex B of the Tycho catalogue as possible variable. It was in the first list of Tycho suspected periodic variable stars communicated by Sandrine Piquard to GEOS. The period was of 0.9380 day and the light curves were published with the type EA in her thesis (Piquard, 2001) (see Fig. 1). It is the only star of her list for which the variability and period could be confirmed by visual observations.

The spectrum of GSC 3627 1580 is A5 and its mean Tycho magnitudes are 9.513 BT and 9.029 VT.

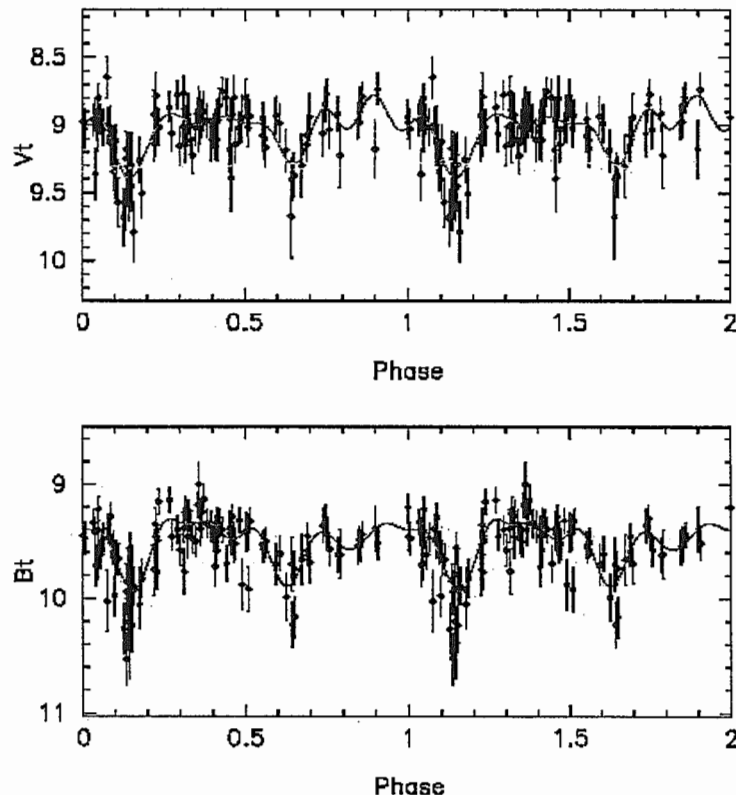


Fig. 1 : Tycho measurements of GSC 3627 1580 fitted with a period of 0.9380 day

2. Visual estimates

Jean-Claude Misson (MIS), an experienced GEOS observer, made 64 estimates of GSC 3627 1580 between October 1999 to February 2000. All the PDM and Fourier searches on his estimates are showing at the first places periods very near the 0.9380 day of the Tycho photometry, between 0.9359 and 0.9387 day.

The visual light curve of GSC 3627 1580 had the shape of an EA or an EB eclipsing binary and we could determine 4 instants of minimum with the estimates of MIS (see Table 1).

At the GEOS meeting (OHP Observatory, April 29 – May 1 2000), GSC 3627 1580 entered the priority program of the group. Jacqueline Vandenbroere (VBR) began to observe it, mainly when eclipses were predicted. She have gathered 501 estimates and she could determine 9 new instants of minimum (see Table 1). Mario Checcucci (CHC) made 164 estimates of it, performing nearly always a few observations in the beginning of the night. His work gave still 7 other instants of minimum (see Table 1).

The visual estimates of GSC 3627 1580 are not very accurate because the comparison stars fit for use in the field are relatively far away and because they are all somewhat bluer than the variable.

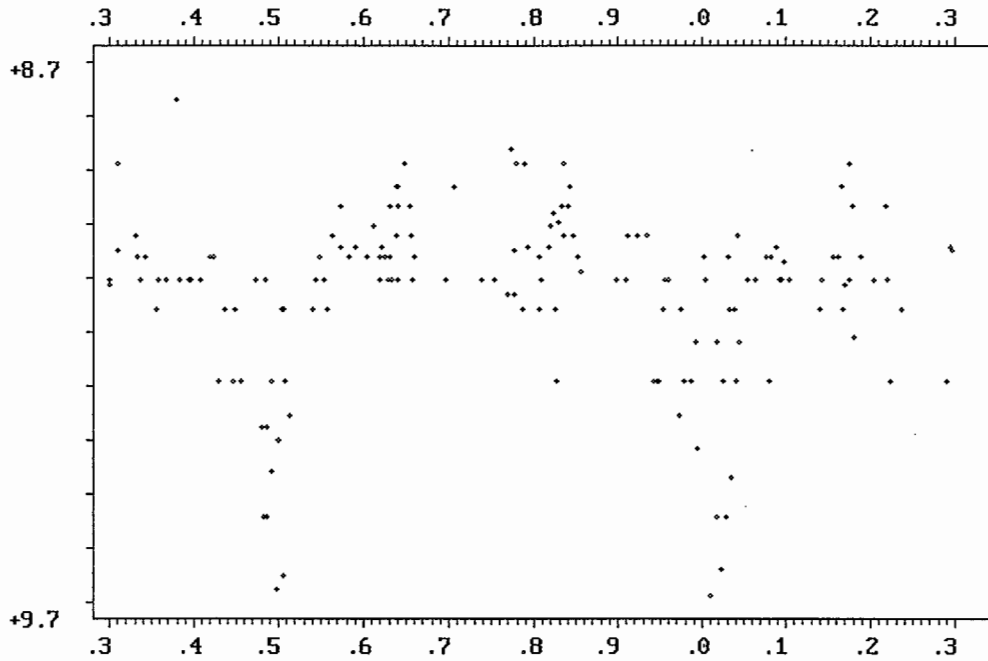


Fig. 2 : Fitted light curve of the 164 estimates of CHC with ephemeris (1)

3. Rotse CCD photometry

The Rotse-1 project is well known to most amateurs. Different from other observers, Anton Paschke (APS) has not succeeded to receive any answer to his emails asking for CCD images. He has just heard from others that the images are large (8 MB) and would be difficult to handle for him.

As more, he enjoyed the news that all the Rotse images are processed and the measurements are available as a databank on the Internet. There are many stars where this (and ASAS data in the South) may substantially improve our knowledge. One of the stars is of course GSC 3627 1580 And.

Unfortunately, this bright star is somehow disadvantaged also in Rotse. There are only 43 measurements available (while other stars have 400). In spite of that, the measurements form a lightcurve and confirm the period found by visual observers in GEOS (see Fig. 3).

4. Elements of period

No eclipse is detectable between two minima separated by 0.938 day in the available data and, with the double period, the depth of the minima are very similar. We have chosen that last possibility to calculate the elements of the period of GSC 3627 1580.

We made a linear regression with the CCD and the visual instants of minimum and obtained the following formula :

$$\text{HJD } 2\ 451\ 457.658 (\pm 0.01) + 1.875\ 803 (\pm 0.00003) E \quad (1)$$

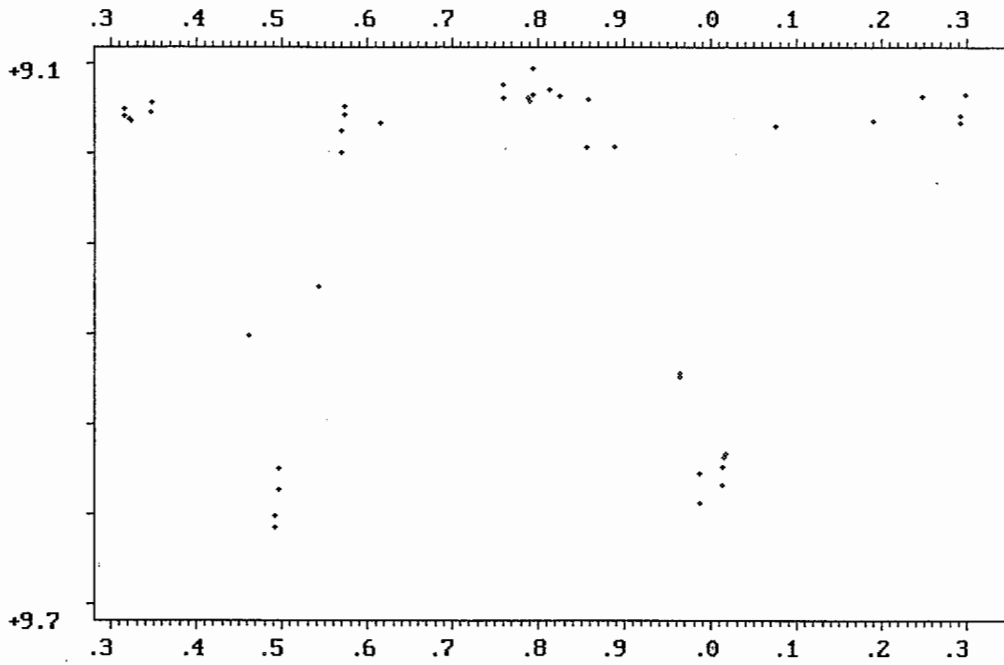


Fig. 3 : Fitted light curve of the 43 CCD measurements of Rotse with ephemeris (1)

OBSERVERS	MODE	HJD (2400000+)	E (1)	O-C (1)
ROT	CCD	51459.528	1	-0.006
MIS	vis	51459.528	1	-0.006
MIS	vis	51489.500	17	-0.046
MIS	vis	51490.536	17.5	+0.052
MIS	vis	51568.329	59	-0.001
VBR	vis	51748.419	155	+0.012
VBR	vis	51840.330	204	+0.008
VBR	vis	52501.556	556.5	+0.014
VBR	vis	52533.406	573.5	-0.025
VBR	vis	52547.496	581	-0.003
CHC	vis	52672.241	647.5	+0.001
VBR	vis	52833.556	733.5	-0.003
VBR	vis	52834.487	734	-0.010
VBR	vis	52848.579	741.5	+0.013
CHC	vis	52851.330	743	-0.050
VBR	vis	52896.406	767	+0.007
CHC	vis	52928.180	784	-0.008
CHC	vis	52957.377	799.5	+0.014
CHC	vis	52989.271	816.5	+0.020
CHC	vis	53020.222	833	+0.020
CHC	vis	53049.275	848.5	-0.002

Table 1 : the 21 instants of minimum of GSC 3627 1580 with ephemeris (1)

5. Conclusion

GSC 3627 1580 And is an eclipsing binary of the EA or EB type. The elements of its period is given by ephemeris (1). Its period may be half shorter.

6. Bibliography

Piquard S., 2001, "Détection et classification des étoiles variables du programme Tycho", thesis directed by J. L. Halbwachs, ULP Strasbourg.

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