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BD +62°2167: A NEW ECLIPSING BINARY IN THE FIELD OF CW Cep

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Name of the object:
BD +62°2167 = GSC 4282_394

Equatorial coordinates:	Equinox:
R.A.= 23 ^h 05 ^m 15 ^s DEC.= +63°23'42''	2000.0

Observatory and telescope:
Mollet Observatory, 0.41-m Newtonian telescope

Detector:	CCD
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Filter(s):	V
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Comparison star(s):	SAO 20406 = BD +62°2166
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Check star(s):	GSC 4282_778
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Transformed to a standard system:	No
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Availability of the data:
Upon request

Type of variability:	EA
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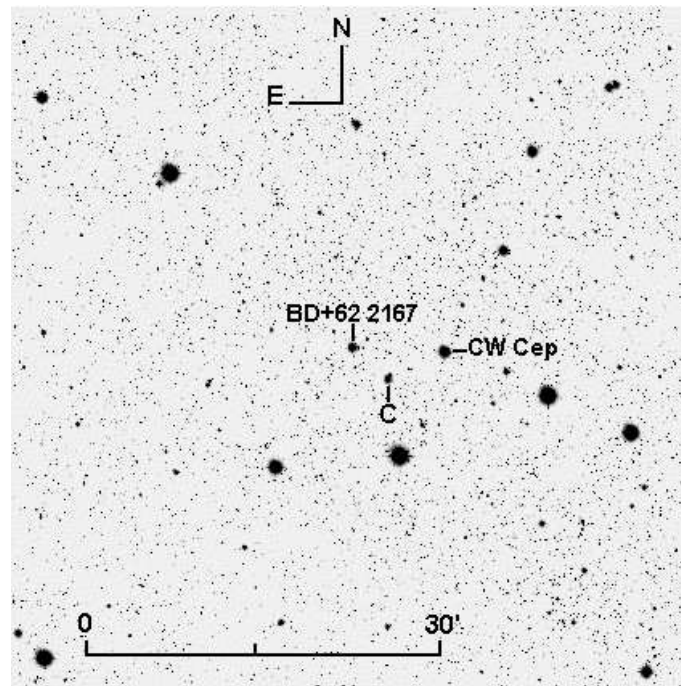


Figure 1.

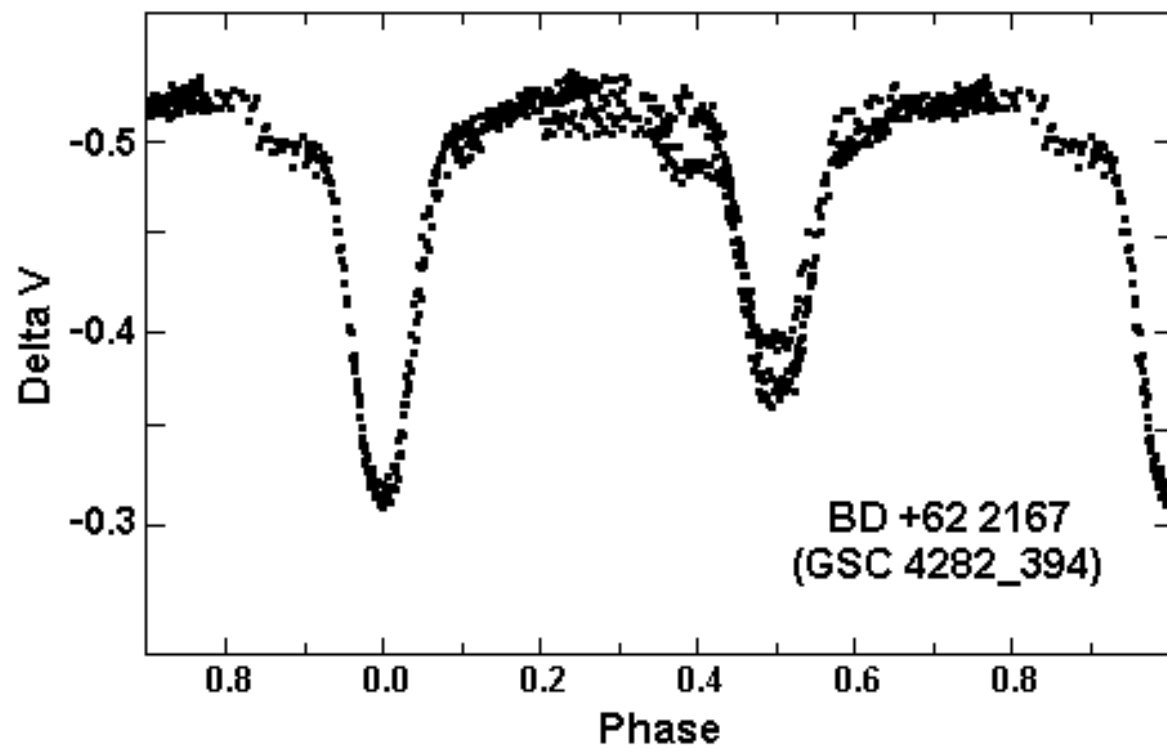


Figure 2.

Remarks:

In a photometric program for searching for new variables with an 8-cm automatic telescope at Mollet Observatory, it was found that GSC 4282_394 of 9^m4 (Figure 1) is an Algol type eclipsing binary star with a period of 1^d3 and an amplitude of 0^m21 in *V*. The star is a visual double and both components are listed as suspected variables in the Tycho Catalogue (1997) with the ‘W’ flag: TYC 4282_394_1 with a variation range between 9.11 and 9.75 ($B - V = 0.427$), and TYC 4281_394_2 (identified with BD +62°2167) with a brightness range from 9.49 to 10.25 ($B - V = 0.394$). This flag indicates that data suggest variability, although other instrumental effects cannot be ruled out, as directly quoted from the Tycho Catalogue’s notes: “variability suspected in the Tycho data; this may due to intrinsic variability since no correlation with position angle was evident. But no thorough investigation has been carried out to eliminate other reasons intrinsic to the Tycho measurements.” Since the separation between the stars is about 6 arcseconds, joint photometry of both stars was performed.

The light curve suggests that the EA system is also intrinsically variable at some phases (Figure 2), probably due to activity in the system. These irregularities have an amplitude of 0^m03, and are more important on the light-curve maxima and are permanently present in the phase intervals 0.2–0.4 and 0.8–0.9, i.e., before the beginning of both eclipses, and also during the secondary minimum affecting its shape and depth. The amplitude of minimum II was variable between 0^m154 and 0^m180. Since it is unlikely that independent intrinsic variations of the optical companion could match the eclipsing binary in such a selective way, real intrinsic light changes for the eclipsing binary system are highly probable.

Observations did not allow to determine which of the visual components of GSC 4282_394 is the Algol-type variable, and it was not possible to deduce it from the Tycho observations either, which do not show the detected variability but a high scatter and spurious oscillations.

The following ephemeris was computed:

$$\text{Min. I} = \text{HJD } 2451034.5344 + 1.3045 \times E. \\ \pm 0.0004 \pm 0.0003$$

Also these minima timings were obtained:

$$\begin{aligned} &\text{HJD } 2451032.5768 \pm 0.0011 \text{ (II)} \\ &\text{HJD } 2451036.4918 \pm 0.0005 \text{ (II)} \\ &\text{HJD } 2451038.4474 \pm 0.0014 \text{ (I)} \\ &\text{HJD } 2451072.3621 \pm 0.0006 \text{ (I)} \end{aligned}$$

Reference:

ESA, 1997, The Hipparcos and Tycho Catalogues, ESA SP-1200