VARIABILITY OF GSC 1062-33 AND GSC 1062-92

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We report on the discovery of brightness variations of the stars GSC 1062-33 and GSC 1062-92. The former is an Algol-type eclipsing binary with a period of 1.6 days; the latter seems to be a pulsating variable with a period of about 26 days.

The variability of GSC 1062-33 was discovered by K. Bernhard with his private 8-inch reflector and CCD camera after about half a year of systematic search for new variables close to very bright stars (Altair in this case). On September 18, 1997 the star was found about half a magnitude brighter than a few days before. Follow-up measurements by the discoverer and W. Quester quickly revealed the nature and period of the variability. Figure 1 shows the resulting Algol-type lightcurve after folding according to the ephemeris

$$\mathrm{JD(min\ I)} = 2450749.295\ (\pm 0.001) + 1.6160\ (\pm 0.0008) \times \mathrm{E}$$

These lightcurve elements were derived by weighted least-squares adjustment to the 7 primary minima listed in Table 1. The period is unambiguously determined in spite of the short observing season before the star got lost in the evening twilight. No aliases or multiples are possible, and periods shorter than 1.6 days are excluded by the total length of primary plus secondary minima. The depths of the primary and secondary minima in the unfiltered CCD band are about 0.52 mag and 0.11 mag, respectively. A series of CCD observations by S. Kiyota (minimum no. 7 in Table 1) shows that the primary minimum is about 0.1 mag deeper in the V band than in the unfiltered CCD band. The widths of both minima are around $D = 8$ hours or 0.21 periods; no phase of constant minimum light exists. Within the uncertainties of the observations, the secondary minimum is symmetric at phase 0.5.

Figure 1 displays relative magnitudes, with the different instrumental scales (for details see Table 1) shifted to give zero at the star's maximum light. In the GSC magnitude scale (IIaD plates), the brightness of the star is between 10.5 and 11. All observations shown in Figure 1 used several neighbouring GSC stars as reference. Crosses are data from K. Bernhard, circles from W. Quester.

In the course of the follow-up observations for GSC 1062-33, W. Quester noticed that the immediately neighbouring star GSC 1062-92 (0.6 arcmin to the south-west) had slowly
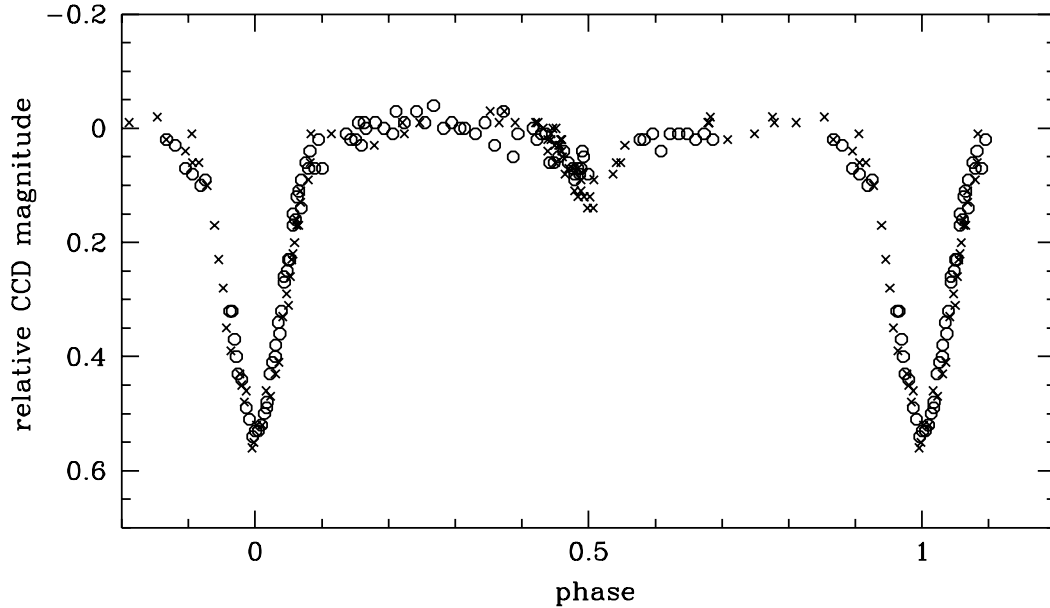
Figure 1.   Folded lightcurve of GSC 1062-33.

Table 1

Primary minima of GSC 1062-33 between September 10 and November 8, 1997. Observers are: B = Klaus Bernhard, 20 cm Schmidt-Cassegrain, CCD camera Starlight SX unfiltered; Q = Wolfgang Quester, 20 cm Cassegrain, CCD camera ST-7 with filter KG5/2; K = Seiichiro Kiyota, Tsukuba, Japan, 25 cm Schmidt-Cassegrain, CCD camera Bitran BT-20 with Johnson V filter. Minima nos. 2, 4, 5 and 7 were only partly observed. The minimum times for these four cases were determined by fitting the observed rising/declining branches to the shape of the completely observed minima. This is duly reflected in the assigned timing uncertainties. The uncertainty of minimum no. 1 (the single discovery exposure) was conservatively set to one quarter of the total eclipse width.

No.	BJD		E	Obs.	Comment
1	2450702.415	±0.08	−29	B	single exposure
2	2450715.36	±0.04	−21	B	rise
3	2450728.28	±0.01	−13	B	min. plus rise
4	2450741.235	±0.01	−5	Q	rise
5	2450744.37	±0.04	−3	Q	decline
6	2450749.295	±0.001	0	Q	complete
7	2450758.98	±0.02	6	K	decline

faded by more than 0.1 mag over a time interval of about 10 days. On request, K. Bernhard confirmed the variability by checking his own CCD frames of the field. The nightly series of exposures for the neighbouring Algol variable revealed no quick variations of GSC 1062-92. Thus, we present in Figure 2 the daily means of the available observations.

They allow no definitive statement about the variability type and lightcurve elements, but they strongly point to GSC 1062-92 being a pulsational variable with a period of about 26 days and an amplitude of the order of 0.15 mag. Figure 2, like Figure 1, shows relative CCD magnitudes (the GSC magnitude of GSC 1062-92 is between 11.5 and 12.0). Symbols are as in Figure 1. The tick marks above and below the data points indicate the times of maxima and minima of the suggested 26-day pulsations.
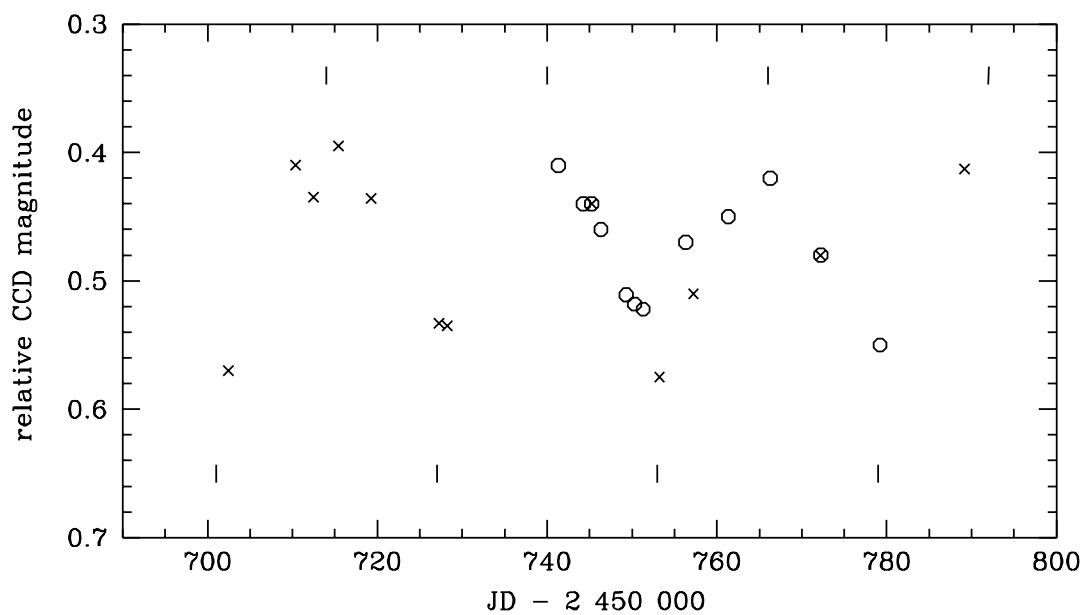
Figure 2. Lightcurve of GSC 1062-92 from September 10 to December 6, 1997.

For both newly-discovered variables, GSC 1062-33 and GSC 1062-92, definitive light-curve elements can in principle be derived during the observing season 1998.