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**BrhV35 = GSC 0703-1930 IS A SHORT-PERIOD RRc VARIABLE**

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BrhV35 (GSC 0703-1930,  $05^{\text{h}}17^{\text{m}}22^{\text{s}}.0 + 10^{\circ}18'28''$ , 2000,  $V \approx 12^{\text{m}}.7$ ) was discovered as a short-period variable of unknown type by Bernhard (2000) as part of a programme to discover and classify new variables in selected fields on the edge of the northern Milky Way (see Bernhard & Lloyd 2000 for further details). Following the eight survey observations, additional long runs were made on one night by Bernhard, and on six nights by Kiyota. The observations were made using a 20-cm Schmidt–Cassegrain telescope and an unfiltered Starlight Xpress SX CCD camera with a Sony ICX027B chip (see Bernhard & Lloyd 2000), and a 25-cm Schmidt–Cassegrain telescope with an Apogee AP-7 CCD camera and Johnson  $V$  filter. The comparison stars used were GSC 0703-2180,  $V \approx 12^{\text{m}}.2$  and GSC 0703-1901  $V \approx 12^{\text{m}}.2$ , which were found to be constant with a magnitude difference  $< 0^{\text{m}}.03$ .

The magnitudes, relative to GSC 0703-1901, of the two data sets were simply combined; it was not necessary to apply any offset to the unfiltered observations. The periodogram of the data shows two possible periods, close to 4.4 and 5.4 cycles day<sup>-1</sup>, which are part of a series of strong 1-day aliases. However, the  $\sim 4.4$  c/d is inconsistent with the data. The longer period emerges unambiguously, giving the ephemeris of maximum light

$$\text{JD}_{\text{Max}} = 2451614.873 + 0.22630 \times E.$$

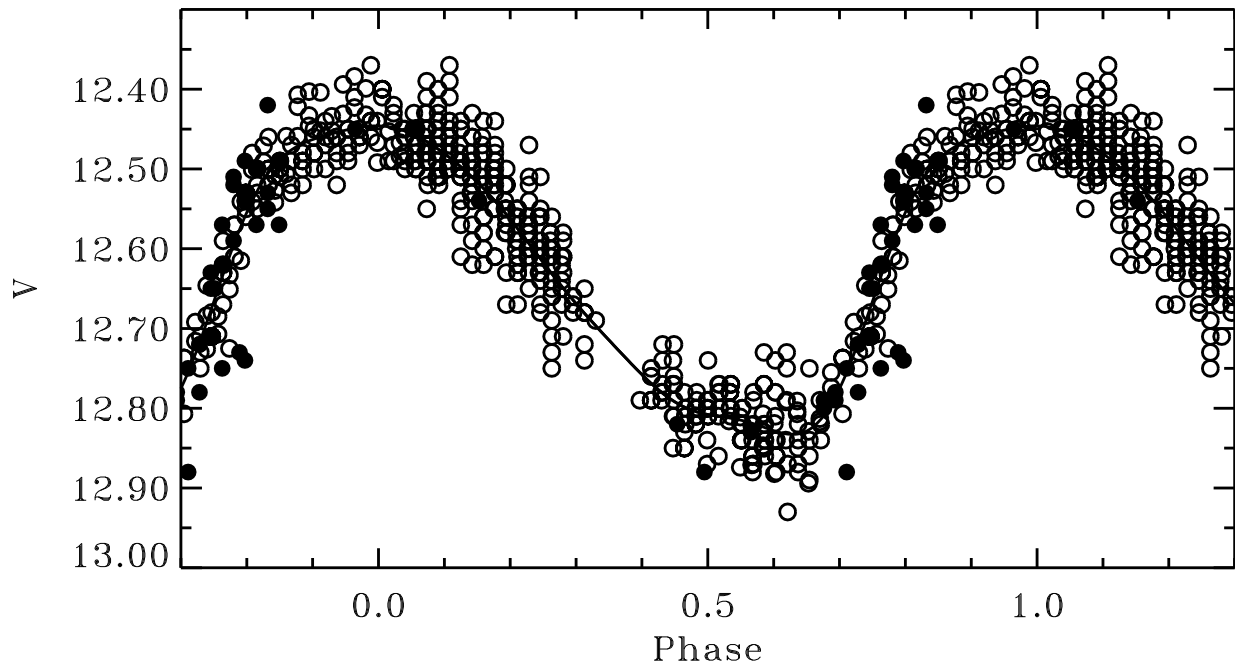
$\pm 5 \qquad \qquad \pm 1$

The light curve using this ephemeris is shown in Figure 1, and has a slightly non-sinusoidal shape with a full amplitude of  $0^{\text{m}}.4$ . The variation is consistent with a c-type RR Lyrae star, but the period is on the extreme edge of the observed range, making it one of the shortest period RRc variables known. In the GCVS only HX Ara ( $P = 0^{\text{d}}.219$ ) has a shorter period (Kholopov et al. 1998). The amplitude and shape of the light curve suggest that it is neither a  $\delta$  Scuti nor  $\beta$  Cephei variable.

The observed colour from the USNO A2.0 catalogue (Monet et al. 1999),  $b - r = 0.1$ , is quite blue, and is consistent with other RR Lyrae stars found by this programme (Bernhard & Lloyd 2000). As the variation is not large, and the two POSS plates on which these magnitudes are based were taken consecutively, the observed value is probably a fair indication of the true  $b - r$ .

The galactic co-ordinates,  $l = 192, b = -16$ , place the star towards the galactic anti-centre, at intermediate galactic latitude, and argue against the  $\delta$  Scuti or  $\beta$  Cephei interpretation. They are entirely consistent with an RR Lyrae star, and coincidentally, the galactic latitude is the same as HX Ara.

This research made use of the SIMBAD database, operated by the CDS at Strasbourg, France.



**Figure 1.** The phase diagram of the BrhV35 assuming that the comparison star GSC 0703-1901 has  $V = 12.2$ . The CCD observations of Bernhard (filled circles) and Kiyota (open circles) are folded with the ephemeris given in the text, and a high-order Fourier fit over plotted

#### References:

- Bernhard, K., 2000, *vsnet-newvar*, No. 274,  
<http://www.kusastro.kyoto-u.ac.jp/vsnet/Mail/vsnet-newvar/msg00274.html>  
 Bernhard, K., Lloyd, C., 2000, *IBVS*, No. 4920  
 Kholopov, P.N., Samus, N.N., Frolov, M.S., Goranskij, V.P., Gorynya, N.A., Karitskaya, E.A., Kazarovets, E.V., Kireeva, N.N., Kukarkina, N.P., Kurochkin, N.E., Medvedeva, G.I., Pastukhova, E.N., Perova, N.B., Rastorguev, A.S., Shugarov, S.Yu., 1998, *The Combined General Catalogue of Variable Stars*, 4.1 Edition  
 Monet, D., Bird, A., Canzian, B., Dahn, C., Guetter, H., Harris, H., Henden, A., Levine, S., Luginbuhl, C., Monet, A.K.B., Rhodes, A., Riepe, B., Sell, S., Stone, R., Vrba, F., Walker, R., 1998, *The USNO-A2.0 Catalogue*