

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1733

Konkoly Observatory
Budapest
1980 January 24

PHOTOELECTRIC PHOTOMETRY OF THE SPECTROSCOPIC BINARY HD 91948

The star HD 91948 (BD+60°1274) has been found to be a spectroscopic binary by Gorga (1971) with an orbital period of $2^{\text{d}}.7700266$. No photoelectric work on this star is available in the literature. The purpose of our photoelectric measurements was to study the variable nature of this binary star.

The star was observed by us photoelectrically on the 38-cm reflector of the Uttar Pradesh State Observatory on a total of 17 nights during the period May 1973 - May 1978. The conventional UBV filters of Johnson and Morgan and standard d.c. techniques were employed. The observations collected during 1973 to 1975 were obtained with an unrefrigerated 1P21 photomultiplier tube, while the remaining ones were obtained using a similar tube refrigerated to -20°C . Two comparison stars BD+60°1270 and BD+60°1289 were used to begin with. However, the latter was found to be a better comparison star than the former, hence all the final reductions were done using that star. The standard deviations of the comparison star on typical nights when an unrefrigerated photomultiplier tube was used were $0^{\text{m}}.013(\text{B})$ and $0^{\text{m}}.012(\text{V})$, while when a cooled photomultiplier was used were $0^{\text{m}}.011(\text{B})$ and $0^{\text{m}}.010(\text{V})$. Our observations were planned on the basis of the following ephemeris

$$\text{Primary minimum} = \text{JD } 2440243.334 + 2^{\text{d}}.7700266 \cdot E \quad (\text{Gorga, 1971}).$$

Due to the large scatter in U filter, on most of the nights, the light curves only on B and V filters are given in Figure 1. On the first observational night of 22 May 1973 (JD 2441825) which was planned near primary minimum (at phase $0^{\text{d}}.09$), we noticed light variations in U, B and V. The differential magnitudes (instrumental)

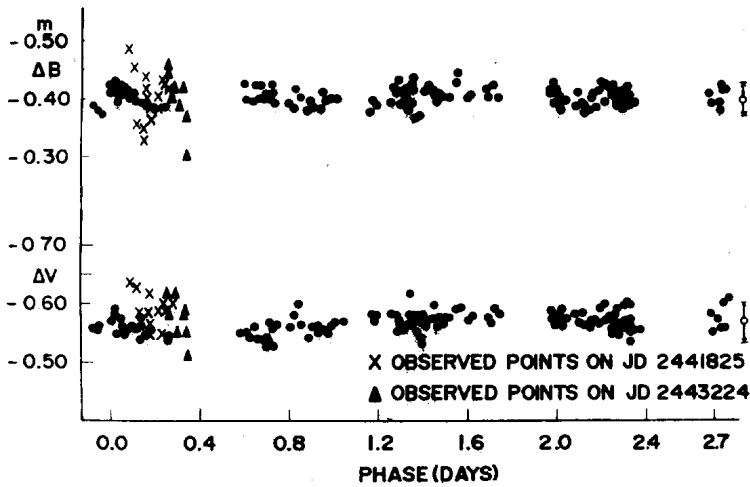


Figure 1. Light curves of HD 91948 on an assumed period of 2^d7700266. The differential magnitudes are in the sense variable minus comparison. The $\pm 2\sigma$ error bars for the comparison star are indicated along the side.

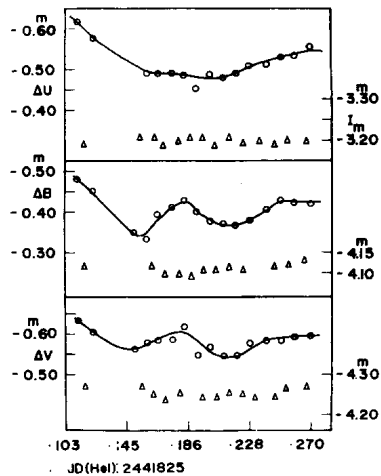


Figure 2. Individual observations on the night of JD 2441825. The differential magnitudes are in the sense variable minus comparison. The solid line indicates free hand curve. Points with Δ are instrumental magnitudes for comparison star used.

against JD are given in Figure 2. Below each light curve, the instrumental magnitude of the comparison star used, is also given, with its magnitude scale on the right hand side. This variation demanded further observations of the system in the entire phase region. However, on an other night of 21 March 1977 (JD 2443224) at phase $0^d.25$, a variation of $0^m.26$ in U, $0^m.15$ in B and $0^m.10$ in V filter, in two hours of duration was noticed and is given in Figure 3. The individual observations on the night of JD 2441825 and JD 2443224 are shown by cross and solid triangles respectively in Figure 1.

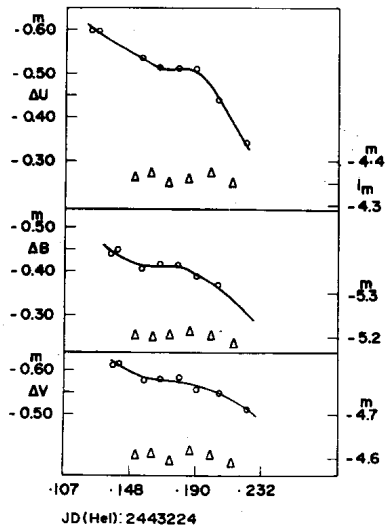


Figure 3. Individual observations on the night of JD 2443224. The differential magnitudes are in the sense variable minus comparison. The solid line indicates free hand curve. Points with Δ are instrumental magnitudes for comparison star used.

Gradual variation of light (increasing or decreasing) has been noticed in case of Be stars which are also spectroscopic binaries. For example, Landis et al. (1977) V measurements of 4 Her on the night of JD 2442542 indicate gradual brightening of the star for at least $0^m.05$ during 3 hours (0.13 days). But it is unusual in case of HD 91948 which has been reported tentatively as spectral class F6V. HD 91948 has a companion star

of 11^m at $4.4''$ apart (Batten et al. 1978). This companion star, could not be separated out in the diaphragm of 38-cm reflector and hence was observed together with the main star. Considering that the latter is of magnitude $M_v = 7.3$, the companion does not contribute effectively to the total light coming through.

Due to lack of U observations, no definite colour class could be assigned to this star. However, B-V values, based on the mean values of B and V filters in Figure 1, were determined and came out to be $+0.016^m$, which corresponds to AOV spectral class. Our light curves in Figure 1 show the absence of eclipses at scheduled primary and secondary minima phases. Unfortunately we could not get any night in the gap which occurs just after the aforesaid night of JD 2443224. The variability of this star in the aforesaid two nights is quite significant as compared to the error of our observations. Since there is no consistency in the shape of the light curves obtained on those two individual nights, it is difficult to assign the type of variability to this star. However, we conclude that HD 91948 is a suspected variable. Also the light curve does not point towards the star being an eclipsing binary.

The author is thankful to Dr. S.D. Sinval for helpful discussions and suggestions.

T.D. PADALIA

Uttar Pradesh State Observatory
Manora Peak, Naini Tal-263129
India

References:

- Batten, A.H., Fletcher, J.M., Mann, P.J., 1978, Seventh catalogue of the Orbital Elements of Spectroscopic Binary Systems, DAO Publ. Vol. XV, No.5, p. 156
- Gorza, W., 1971, J.R.A.S. Can., 65, 277
- Landis, H.J., Lovell, H.P., Hall, D.S., Uckotter, D.G., 1977 Acta Astronomica, 27, 265