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

Number 2146

Konkoly Observatory
Budapest
1982 May 17

HU ISSN 0374-0676

HD219634 - A MASSIVE NEW ECLIPSING BINARY

HD 219634 = HR8854 is a known spectroscopic binary (Pub. D.D.O. 1, 71, 1939) for which an orbital solution has not, as yet, been published. Extensive spectroscopic observations of the star have been made by Hube during the past 8 years using the 1.88m reflector and the Cassegrain spectrograph (reciprocal dispersion 15 Å mm^{-1}) at the Dominion Astrophysical Observatory, Victoria. An orbital solution based on approximately 80 radial velocities gives a circular orbit of period 2.3912 days and, of particular relevance to the following discussion, a mass function of 0.16 ⊙. The large value of the latter led us to suspect that the system might be eclipsing.

On August 21, 1980, Lowe observed the star using a photon-counting photometer equipped with an EMI9502S photomultiplier on the 0.5m telescope at the Devon Observatory. He detected a primary eclipse but relatively poor sky conditions and the brevity of the observing session necessitated confirmatory observations.

On 6 nights in November 1981, Gulliver obtained differential U,B,V photometry using the #3 0.4m telescope and a photon-counting system equipped with a cooled RCA 1P21 photomultiplier at the Kitt Peak National Observatory. Portions of two primary and two secondary eclipses, plus two out-of eclipse phase intervals were observed. The Kitt Peak data are presented in Figure 1, where the magnitudes are taken differentially with respect to HD 220057, and the phases are measured from the time of nodal passage, T_o = JD 2443334.945.

We note that there are significant night-to-night variations in the light curves. In particular, the two sets of data obtained during primary eclipses are displaced relative to one another by approximately $0^m.02$ in V and $0^m.01$ in B. We

believe that this represents an intrinsic variation in HD 219634 itself, but we cannot at this time completely rule out the possibility that it is due in part to a variable comparison star —— HD 220057 has a spectral type B2IV and is, therefore, in or close to the β Cephei instability region.

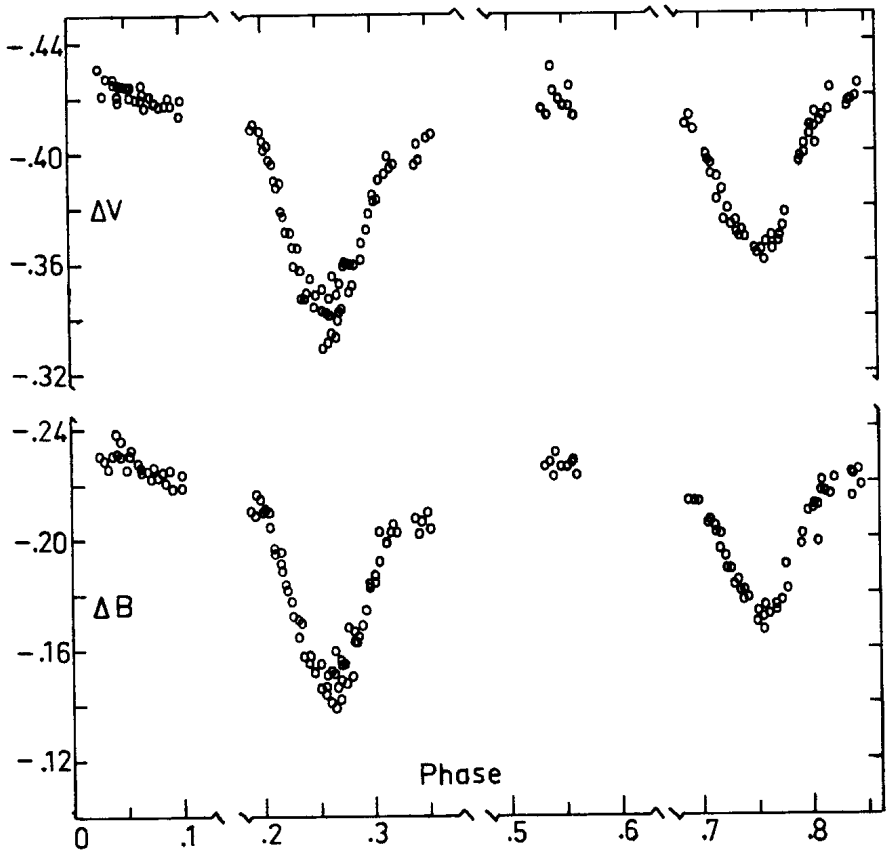

Figure 1

We classify HD219634 as B0Vn in agreement with Cowley (1972). The HD spectral type is B8. The difference in classification is due to the very strong interstellar CaII K-line. The interstellar reddening amounts to approximately $0^{m}.53$ in (B-V).

The secondary component has not been detected spectroscopically. The B0Vn primary should have a mass of approximately 17 ⊙ (Allen, 1972). Adopting i ~ 90° and F(M) = 0.16, we find a secondary mass of approximately 4 ⊙ which, for a normal dwarf, corresponds to a spectral type of approximately B8.

Finally, we note that HD219634 lies on the edge of the error box of the as-yet-unidentified X-ray source 4U2316+61 (Forman et al, 1978). The available spectroscopic and photometric data are suggestive of a strong interaction, including tidal distortions and mass exchange, between the two components and, perhaps, a possible source of X-radiation.

Details of the spectroscopic and photometric observations will be published elsewhere.

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