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PHOTOMETRIC VARIABILITY OF HR 3119

HR 3119 is a double-lined spectroscopic binary with components of similar spectral types. Young and Koniges (1977) have given an F8V spectral classification based on a spectrum obtained at an epoch when the lines of the components were not resolved. The orbital period of the binary is 11.08 days and mass ratio of the components is very close to unity (Harper 1939).

We included HR 3119 in a photometric programme of late type emission binaries on the basis of its classification as a radio binary by Spangler et al. (1977). The star was observed with the 34-cm Cassegrain reflector of the Kavalur Observatory through standard B and V filters. Observations were made on 15 nights between December and January 1979-80. HD 65301 and HD 67224 were observed along with HR 3119 as comparison stars. The figure is a plot of differential magnitudes against phase computed with the following ephemeris (Eaton et al. 1981):

$$JD = 2444530.0 + 10^d.17 E.$$

Each point is an average of three or four independent measurements of a single night and the total uncertainty of a point is ~ 0.008 mag. The light curve is nearly sinusoidal with an amplitude of ~ 0.04 mag. The B-V colour does not show any significant variation. Eaton et al. (1981) observed the star on five nights during the interval covered by our observations and these fall on the mean light curve shown in the figure.

From the spectral class, Ca II H and K emission photometric light variation and radio emission, Eaton et al. classify HR 3119 as a member of RS CVn binaries. Young and Koniges (1977),

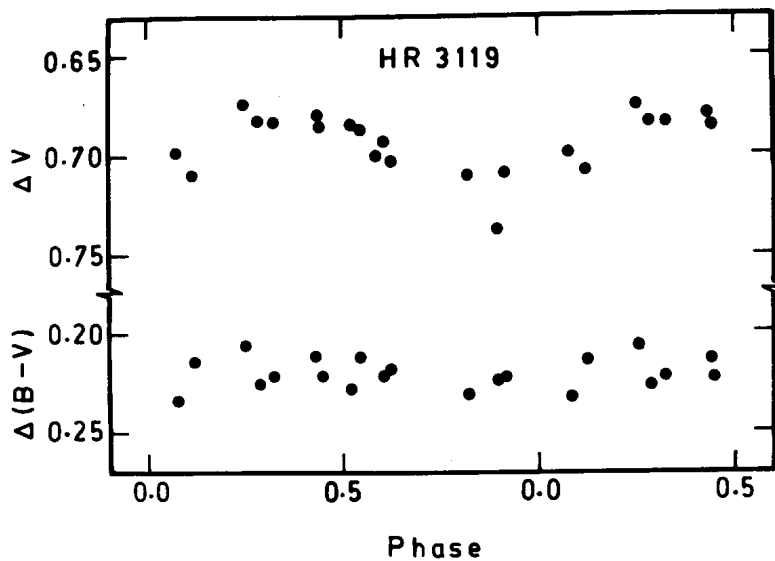


Figure 1

from a spectrum obtained in the single-lined phase, find that the radial velocity derived from the Ca II H and K emission lines are more negative by 22 km s^{-1} than that derived from the absorption lines and so the emission might not be of chromospheric origin. HR 3119 stands out in several aspects from the classical RS CVn systems. All of the classical RS CVn binaries have near-circular orbits and their photometric and orbital periods differ very little due to orbital synchronisation. The higher eccentricity ($e = 0.11$) of the orbit observed in the case of HR 3119 may be the reason for the significant difference in its orbital and photometric periods. In a typical RS CVn system the spectral type of the secondary component is $\sim K0$, whereas both the components of HR 3119 are of earlier spectral types ($\sim F8$). In this respect this star resembles $\sigma^2 \text{CrB}$, where the components are F6 and G1. Spangler et al., in their radio survey of close binaries, find that these two stars are the least luminous among the known radio binaries. More systematic observations, both photometric

and spectroscopic, are necessary to understand the peculiarities of this binary.

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