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HR 3084 - AN EARLY TYPE CLOSE BINARY*

Radial velocity variations of HR 3084 have been detected by Wilson (1914) from three spectra obtained in Jan. 1914. He found a velocity range of about 94 km/s and classified this star as a spectroscopic binary (Wilson, 1953). This tentative assignment appears again in the 4th edition of the Bright Star Catalogue although in the meantime only one additional measurement by Buscombe and Kennedy (1964) had been published.

During a four colour survey of standard stars Olsen (1974) found the scatter for this star to be about twice than normal and concluded that it might be a variable with an amplitude of about $0^m.07$ in V. The spectral type of B2.5 V (Hiltner et al., 1969) or B3 IV (Cousins and Stoy, 1963) led Jerzykiewicz and Sterken (1977) to put HR 3084 on their list of program stars in searching for β Cep variability. They observed this star together with two comparisons and found light variations in the range between $0^m.02$ and $0^m.03$. However, they could not attribute this variability to one star exclusively. But they concluded, that if the variations were periodic, the period would be longer than half a day.

During five consecutive nights in March 1977 the author obtained 30 blue spectra (12 A/mm; IIa-O) with the coudé spectrograph of the 1.5m telescope on La Silla (ESO). The radial velocities have been determined using the Grant machine and the reduction facilities of the ESO headquarter in Garching. In most cases 11 Balmer lines and 6 He lines could be measured with a r.m.s. error of about 8.5 km/s for a single plate. This relatively large scatter is mainly due to the rotational distortion of the lines (v sin i = 221 km/s according to Uesugi

*based on observations collected at the European Southern Observatory.

and Fukuda (1970)). Olsen (1977) kindly provided the 57 unpublished photometric observations (V), which he had obtained within 94 nights from Nov. 1971 to Febr. 1972. A periodogram analysis of these photometric and the spectroscopic measurements in the range $0^d.02$ to $2^d.5$ revealed a most probable period of $1^d.112 \pm 0^d.001$.

Fig. 1 presents the light curve according to this period. Two minima of unequal depths ($\sim 0^m.050$ and $\sim 0^m.025$) are shown, which are separated by half a cycle. The phase is computed with the ephemeris

$$\text{HJD } 244\,1267.358 \pm 1.112\ E,$$

where the initial epoch is the approximate time of the deeper minimum.

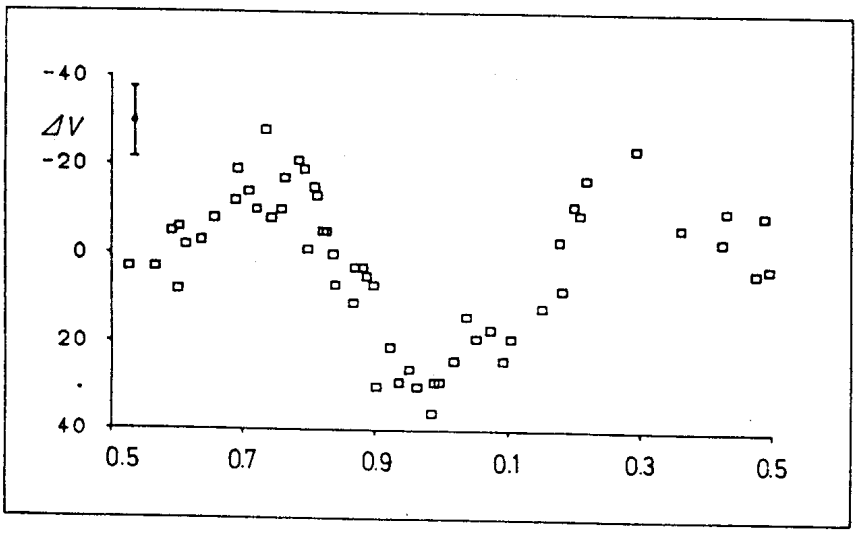

Fig. 1 The light curve of HR 3084. Shown are V magnitude differences (in units of 10^{-3}) with respect to the mean value, which was derived by Olsen (1974) to be $4^m.500$. The r.m.s. error of $0^m.008$ is indicated in the upper left.

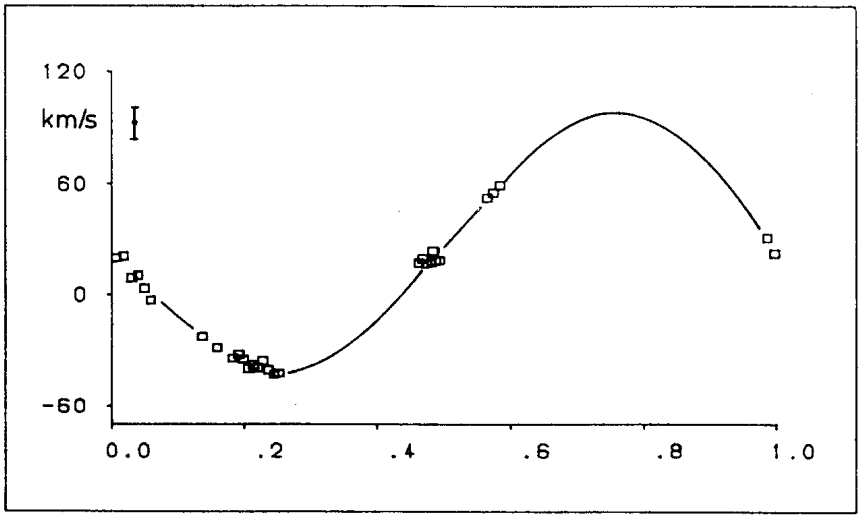

Fig. 2 The radial velocity curve of HR 3084. The r.m.s. error of 8.5 km/s is shown in the upper left.

Fig. 2 shows the radial velocity curve. A sine fit revealed an amplitude of K = 71 km/s and a systemic γ velocity of 29.5 km/s. This yields $a_1 \sin i = 1.09 \cdot 10^{11}$cm and for the mass function $f(M)_\odot = 0.041$. No spectroscopic evidence for the secondary star and no emission features have been found so far. Phase zero corresponds to HJD 244 3229.017. This phasing is consistent with variations obtained performing a narrow band (H_β) photometry some nights prior to the spectroscopic observations. The time elapsed between Olsen's photometry and the spectroscopy is too long for the determination of a more precise value of the period.

This preliminary results show, that a β Cep variability certainly can be excluded. The light variations and the phase relation between light curve and radial velocity curve are consistent with a binary nature of HR 3084. Probably it does not

eclipse but is rather an ellipsoidal variable. In order to find out whether the system is in a semidetached or a contact configuration a light curve synthesis program will be applied and the results will be published elsewhere.

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