

THE LARGE MAGELLANIC CLOUD R CrB STAR - HV12842

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The star HV12842 is one of the 5 R CrB stars listed in the catalogue of variable stars in the LMC (Payne-Goposchkin 1971) and is located 4 deg. to the north of 30 Doradus. At this location it falls in the north-eastern part of one of two standard LMC fields used by the UK 1.2 m Schmidt Telescope. Since 1976 a series of I-plates (normally 90 minute exposures of hypersensitized Kodak IV-N emulsion through a Schott RG 715 filter) has been obtained on both the standard fields (LMC (N) and LMC (S)). This paper describes the behaviour of HV 12842 during the period 1976-1985 as it appears on the 38-I-plates of LMC(N) taken with the UK 1.2 m Schmidt Telescope. Earlier, the UB_V magnitude at maximum light are given as $V=13.65$, $B-V=0.51$, $U-B=-0.11$ (Sherwood 1974) and the spectral type as F (Feast 1979).

The magnitudes of HV 12842 were estimated by eyeball comparison with a sequence of neighbouring stars for which magnitudes had been estimated through an eyeball comparison with the UB_V photoelectric sequence No.VIII of Martin (1977). I-magnitudes in the Cousins photoelectric system were calculated for the stars of the photoelectric sequence using the (B-V) vs (V-I) colours of Cousins (1978) and an assumed reddening of $E(B-V)=0.05$ with a reddening relation $E(V-I)/E(B-V)=1.25$. The colours were checked by visual inspection of the available UKST objective prism plates available at the ROE.

These I-magnitudes were then transformed to UKST I-magnitudes using the transformation of Blair and Gilmore (1982). A new procedure has now been started using measurements made with the COSMOS measuring machine at the ROE (for details see MacGillivray and Stobie 1984). Machine magnitudes of all stars within 5 arcmin

of HV 12842 and 5 arcmin of the Martin NO VIII sequence were obtained on plate 17385 (1981 Dec 5). This yielded a value of $I = 13.4$ for HV 12842 at maximum brightness. The photoelectric sequence and the HV 12842 regions suffer from very similar degrees of vignetting and there were no apparent density gradients across the 2 degrees between the regions.

The results are shown in Fig.1. Since the time difference between successive plates is sometimes very small compared with the total duration of the observations, points close together at maximum have been given slightly greater separation than is strictly accurate. The eyeball estimates are perfectly adequate to show the nature of the brightness variations of HV 12842.

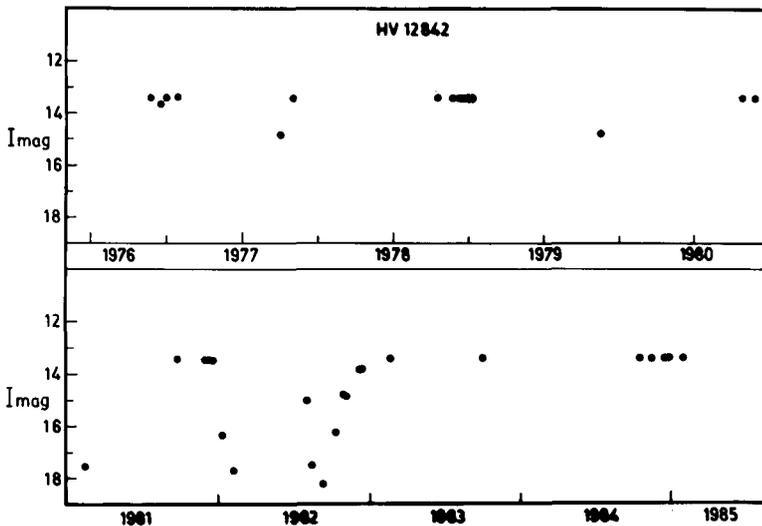


Fig.1

Fig. 1. I Magnitudes of HV 12842 obtained during the period 1976-1985.

Fig.1. shows HV 12842 to have the typical light curve of an R CrB star with a constant magnitude at maximum brightness and a large number of complex minima. During the period concerned 5 minima are detected Sep. 1977, Nov. 1979, Feb. 1981, Feb. 1982 and Sep. 1982 ;i.e. a minimum at least once in every 1.8 years similar to R CrB. The best monitored minimum is that of Aug-Dec 1982, though even then we cannot tell whether the minimum started from maximum light or when the star was brightening from an earlier minimum in Feb.1982. The recovery seems to be slower than the drop in light.

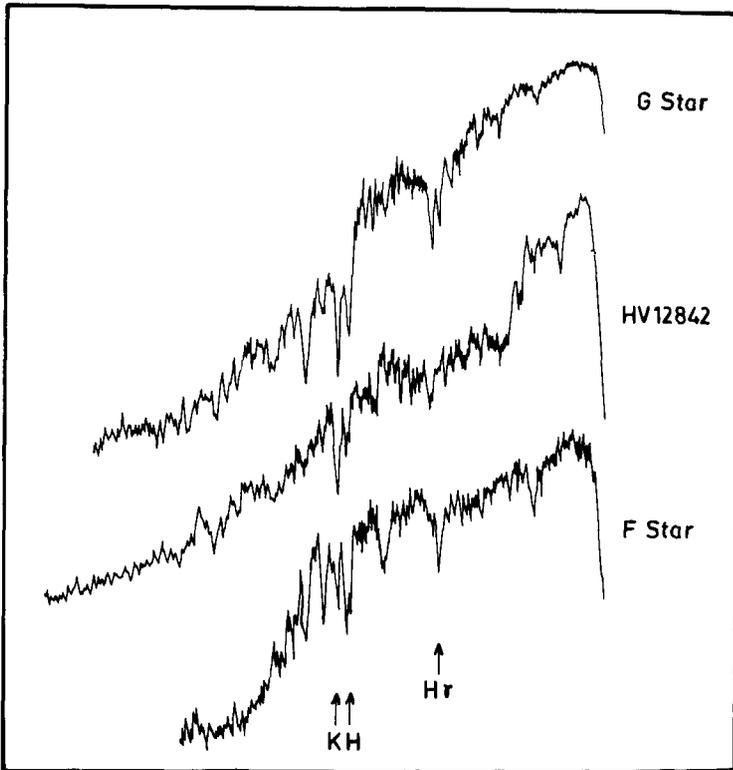


Fig. 2. Spectra of HV 12842 and two comparison stars of similar magnitudes.

Fig.2. shows a tracing of the spectrum of HV 12842 and some comparison stars of a similar magnitude and spectral class. These tracings were made from plate UJ 9015P, an UKST objective prism plate at 800 Å/mm dispersion on hypersensitized Kodak IIIa-J emulsion exposed for 45 min. The plate was taken on 1984 Feb.3 when the star was at maximum. The plate was widened to give 80 micron images. For details of the prisms see Cannon et al. (1982). The spectrum of HV 12842 shows strong H and K lines and other weaker lines; but it does not show the drop in flux at 4000 Å or strong hydrogen lines as would be normal in F-G stars. Assuming a spectral type of F5I with normal (V-I) colours and an LMC distance modulus at 18.5 we obtain, for HV 12842, $V=13.9$ and $M_v = -4.6$.

The reduction of COSMOS measure of HV 12842 in other colours from plates obtained during the minimum of Sep. 1982 has started

and the results will be published later. However, these do indicate that particularly on the recovery part of the light curve the colors get redder than usual similar to other R CrB type stars.

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