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A PRELIMINARY REPORT ON THE LIGHT VARIATION OF
THE EXTREME A-SUPERGIANT CD-33^o12119 (=3U1727-33?)

1. Introduction

The extreme A2 supergiant CD-33^o12119 ($m_V=10.2$ mag, A2Ia) has been suggested to be the optical counterpart of the compact X-ray source 3U1727-33 (Krzeminski and Garrison, 1973; Hensberge and Zuiderwijk, 1975). In this note we present a preliminary reduction of photoelectric observations of this star, which have been made with the Walraven five-colour simultaneous photometer, attached to the 90-cm Light-Collector of the Leiden Southern Station (at the SAAO-Annexe, formerly the Republic Observatory Annexe) Hartebeestpoortdam, South Africa. A description of the photometer and the photometric system has been given by Walraven and Walraven (1960) and by Rijf, Tinbergen and Walraven (1969). We only give here a light-curve in the V-passband.

2. The Observations

The observations were made in the period May 10 - August 13, 1975. The comparison star used was a 9.2 mag. B-star HD 208883. The integration time for one observation was 0.5 or 1 min. Fig.1 shows the brightness of CD-33^o12119 minus comparison star in log intensity for the V-passband. The observational error is about 0.005 in log intensity. The observations reveal that there is a variation on a long time-scale. This variation appears like a double wave on a time-scale of about 75 days and might indicate that we are possibly dealing here with a binary system. We will continue our observations of the star to study this variation in more detail.

Unfortunately, the present observations are contaminated with a few percent extra light due to straylight of a 13 mag. companion star (at a distance of about 15 seconds of arc). This was due to a sudden shift of the diaphragm with respect to the grid in the

oculaire, over a distance of a few seconds of arc into the direction of this faint companion. Dr. P.R. Warren who could not confirm the supposed flare activity of this star (van Genderen, 1975), suggested to us the possibility of a faint companion star in or near the diaphragm (Warren, 1975).

3. Discussion of the Results

We derive for CD-33^o12119 the following mean brightness and colour index in the Johnson UBV-system: $V_J \cong 10^m25$ and $(B-V)_J \cong 1^m9$, in good agreement with the results of Krzeminski and Garrison (1973).

Assuming the star to be a normal A2 supergiant, we calculate a blue (interstellar) absorption of $A_{BJ} \cong 8.5$ mag. from the Walraven V-B/B-U diagram of standard stars. For the comparison star HD 208883 we derive $A_{BJ} \cong 1.3$ mag. The reddening of CD-33^o12119 may be partly of interstellar and partly of circumstellar origin (e.g. due to circumstellar dust). Taking this reddening into account, the star is much more luminous in the Walraven L-passband than normal A-supergiants. This might be due to the fact that the hydrogen absorption lines and the Ca II (K and H) lines are less deep than in normal A-stars (Hammerschlag-Hensberge et al., 1975), due to partial filling in by emission at the red side of these lines. Assuming that the A-supergiant has a mass of $25 M_{\odot}$ and a radius of 1 AU (cf. Wolf, 1972, 1973; Lamers, 1974), we derive a lower limit for the orbital period of a possible companion star of $P \geq 73$ days. This might support our suggestion that the long term variation (over 75 - 80 days) observed in the light-curve, is due to gravitational deformation of the A-supergiant by a compact companion star.

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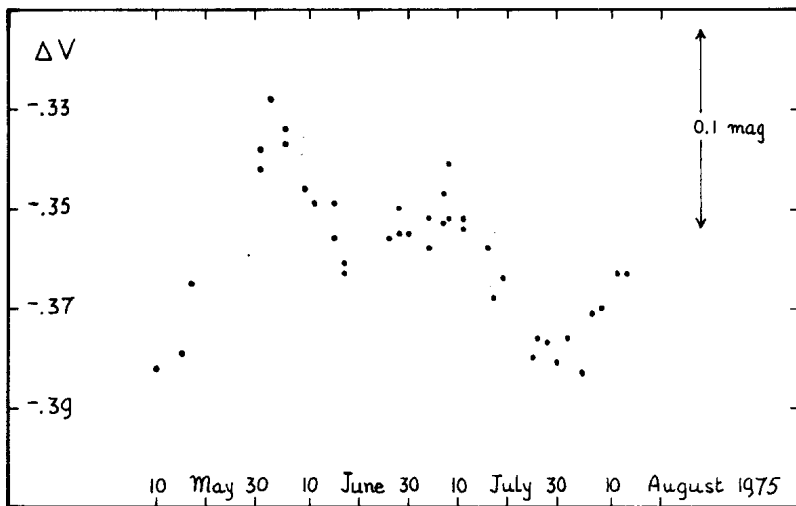


Fig. 1. The brightness of CD-33^o12119 (=3U1727-33?) minus comparison star (in log intensity) plotted against the South African calendar dates for the V-passband.

References:

- van Genderen, A.M. 1975, IAU Circ. No. 2814
Hammerschlag-Hensberge, G., Zuiderwijk, E.J., van der Heuvel, E.P.J. 1975, in preparation
Hensberge, G., Zuiderwijk, E.J. 1975, IAU Circ. No. 2791
Krzeminski, W., Garrison, R.F. 1973, IAU Circ. No. 2569
Lamers, H.J. 1974, paper presented at the Discussion Meeting on Astronomy in the UV, Organised by the Royal Society, London.
Rijf, R., Tinbergen, J., Walraven, Th. 1969, Bull. Astr. Inst. Netherl. 20, 279
Walraven, Th., Walraven, J.H. 1960, Bull. Astr. Inst. Netherl. 15, 67
Warren, P.R. 1975, private communication
Wolf, B. 1972, Astron. Astrophys, 20, 275
Wolf, B. 1973, Astron. Astrophys, 28, 335