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A CEPHEID VARIABLE IN NGC 6067

HD 144972 (CPD -54°7159) has been classified as of type F6 I by Drilling (1968). The star is in the region of the cluster NGC 6067 discussed by Thackeray, Wesselink and Harding (1962, Plate 5) but not observed by them. It is included in a current program of intermediate band, H $\beta$  and RI observations of southern supergiants during which a variation of 0.3 mag was found in visual light. The observations are shown in Figure 1, where filled circles represent means of two observations in different cycles. The observations were obtained in the interval between 1 May and 7 September, 1980 with the 0.9 m reflector on Cerro Tololo. The preliminary light elements are  $\text{Max.} = \text{JD } 2444361.875 + 3^{\text{d}}770$ . The path of the variable in the (V, b-y) plane is shown in Figure 2 where the top of the main sequence is shown schematically and two, known supergiants in the cluster (-53°7400p and -53°7400f) are labeled with the types assigned by Thackeray et al. Both the median magnitude and the spectral type are intermediate between the two cluster supergiants, supporting cluster membership. The cluster velocity is -43.4 km/sec from four stars observed by Thackeray et al. and cluster membership for HD 144972 could be tested in this way.

The cluster modulus, from the discussion by Thackeray et al., and a not entirely independent derivation by Engver (1966), is

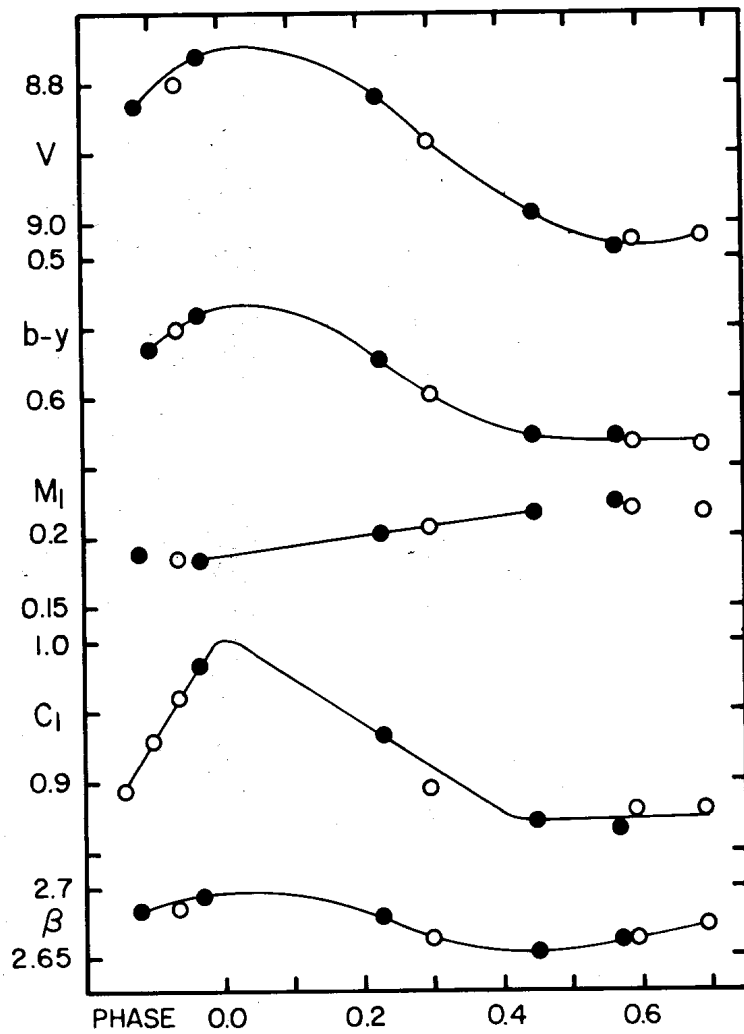


Figure 1

near 11.5 mag. Adopting the mean reddening determined by Thackeray et al.,  $E(B-V) = 0.33$  mag, ( $E(b-y) = 0.25$  mag) the intrinsic values of the median magnitude and color (read at phase 0.25) of HD 144972 are  $V_0 = 7.8$  mag and  $(b-y)_0 = 0.33$  mag. The modulus of 11.5 gives  $M_V = -3.7$  for the variable, which is about one magnitude brighter than predicted by current period-luminosity relations.

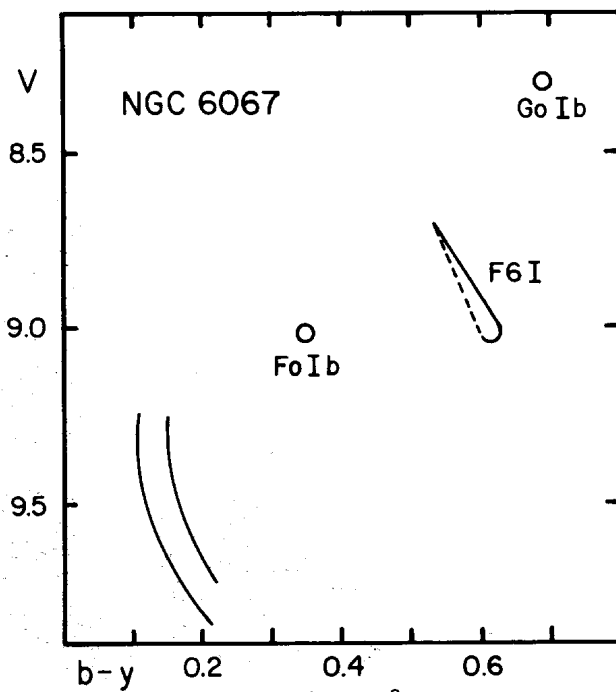


Figure 2

The situation is reminiscent of that for Polaris, also a short period (4 days) and small amplitude (0.1 mag) variable, for which McNamara (1969) finds  $M_V = -3.7$  mag from intermediate band and  $H\beta$  observations of the common proper motion companion. It should be noted that if both these cepheids are first overtone pulsators, the fundamental periods would indicate luminosities near  $M_V = -3.7$  mag from the P-L relations.

An alternate possibility is that the cluster modulus is about one magnitude too large, a not unprecedented situation for very young clusters fitted to a universal main sequence (see e.g. Eggen 1976). There is some preliminary indication that this may be the case, in that single intermediate band and  $H\beta$  observations of three

early type cluster stars, with visual magnitude between 9.0 and 11.2, give a mean modulus of  $10.6 \pm 0.05$  ( $\sigma$ ) mag and a mean reddening of  $E(b-y) = 0.29 \pm 0.02(\sigma)$  mag. These values, if confirmed, will lead to  $M_V = -3.0$  mag for the median luminosity of the variable.

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