LETTERS TO THE EDITOR

ASTRONOMY

Globular Cluster *NGC* 362

THE globular cluster *NGC* 362 (α_{1950} = 01h 01·6m, $\delta_{1950} = -71°\ 07'$) is situated about 1° north of the north end of the Bar of the Small Magellanic Cloud (SMC). Its integrated spectral type[1], *F*8, and integrated colours[2], $B-V$ = 0·78m and $U-B$ = 0·17m, would indicate that it probably belongs to the group of globular clusters typified by *M*3 and *M*5. These clusters have colour magnitude (c–m) diagrams characterized by a horizontal branch with a fairly even distribution of stars across the *RR* Lyrae gap, and a giant branch which, at $(B-V)_0$ = 1·4m, rises to a height, ΔV, of approximately 2·6m above the horizontal branch[3]. *NGC* 362 has seven cluster type variables the mean period of which is 0·542d. This period is also characteristic of the variables in *M*3-type globular clusters.

The c–m diagram of *NGC* 362 has now been obtained to $V \doteqdot$ 16·2m and $B \doteqdot$ 17·7m by means of photographic photometry of five plates taken with the 40 in. reflector at Siding Spring Observatory. The mean deviations were ± 0·03m in V (three plates) and ± 0·05 in $B-V$ (two plates). Preliminary measurements for selected stars on one ultra-violet plate have also been made. The c–m diagram is shown in Fig. 1, where no corrections of any kind have been applied.

It can be seen that the horizontal branch is confined essentially to the red of $B-V$ = 0·47m. If we assume a reddening of E_{B-V} = 0·07m, we find that ΔV = 2·44m. (This value for the reddening brings the edge of the horizontal branch to $B-V$ = 0·40m; also, Feast *et al.*[3] found this value for the average foreground reddening of the SMC.) If any more blue horizontal branch stars with $V <$ 16·2m were present in the region of the cluster that was photometered, they would have been found. The ultra-violet excess is approximately 0·20m.

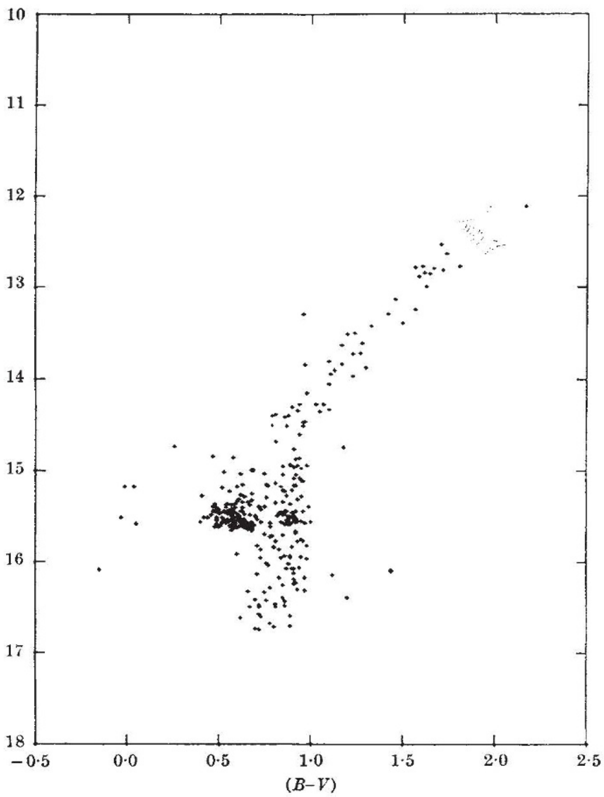

Fig. 1. The c–m diagram for 332 stars in *NGC* 362. No corrections have been applied.

Thus while *NGC* 362 shares many characteristics with the metal deficient cluster *M*3, the horizontal branch in its c–m diagram is similar to those of 47 *Tuc* and *NGC* 6171, which are both only slightly deficient in metals.

In fact, no galactic globular cluster is known which has a c–m diagram similar to that of *NGC* 362, although such diagrams are not completely unknown. The two intergalactic globular clusters, *Pal* 3 and *Pal* 4, have essentially red horizontal branches and a ΔV of approximately 2·3m and 2·6m, respectively[4], while the cluster *NGC* 121 (ref. 5) in the SMC also has a red horizontal branch and ΔV = 2·5m. *NGC* 362 is definitely a galactic globular cluster, however, because its distance modulus, after an absorption correction of A_V = 0·21m, is 14·79m, which corresponds to a distance of 9·1 kpc from the Sun (if M_V (horizontal branch) = +0·5m).

It would be of considerable interest to extend the c–m diagram of this cluster to the main sequence so that any possible age effects can be calibrated out. It would also be useful to have the luminosity function to faint magnitudes. The turn-off point on the main sequence, however, is expected to be at $V \approx$ 19m, and a much larger telescope than is now available will be needed to make accurate measurements sufficiently far down the main sequence.

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Received April 14, 1967.

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Brightness and Temporal Variation of Radio Emission from Galactic OH

THE recent interferometric observations of the angular sizes of OH radio sources[1–3], which imply minimum brightness temperatures of between 10^6 and 10^{11} °K, remove any theoretical difficulty in accepting the temporal variations of intensity that the radio astronomy group at Berkeley claim to have detected[4]. The time constant for a variation of intensity may, in the absence of a rigorous solution of the equations of transfer and population densities for even a simple model, be estimated in two ways that lead to the same result. A simplified equation of transfer for any one of the four radio frequency lines is

$$\frac{\partial I_{ij}}{\partial x} = \alpha_{ij}\, \nu_{ij}\, I_{ij} - \frac{1}{c}\frac{\partial I_{ij}}{\partial t}$$

where i denotes the upper level of the Λ-doublet as split by hyperfine interaction, j denotes the lower level, I_{ij} is the intensity of the radiation, ν_{ij} is the difference of the number of densities in the two levels, c is the velocity of light and

$$\alpha_{ij} = \frac{c^2}{\gamma\pi\nu^2\delta\nu} A_{ij}$$

(A_{ij} is the Einstein coefficient for spontaneous emission and $\delta\nu$ the width of the line.) This equation of transfer incorporates a number of approximations which seem