THE NGC 6752 HR-DIAGRAM

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Deep electronographic photometry has been performed down to m_V 21.7 with the 90 mm McMullan camera on the Danish 1.54 m telescope at La Silla. Three exposures per colour were obtained. The plates have been scanned with the Geneva microdensitometer. The selected stars are isolated and are located in the outer corona. The magnitudes are obtained by the profile fitting method, cf. Blecha (1982), which enhances the dynamical range of the plate and reduces the noise due to crowding. The random error appears magnitude independent down to $m_V = 21$ with $\sigma = .05$ per colour. Below $m_V = 20$ a number of galaxies were identified and rejected according to their image profiles.

The structure of the resulting HR-diagram is complicated by the presence of non-member stars, namely the foreground dM with $(B-V) \geq 1.3$ and V from 18 to 21, and the background stars belonging to the galactic bulge. The latter cause a broadening of the MS between V 18.0 and 19.5. The turn-off is located at V = 17.35 and B-V = 0.44 approximately. Between V 19.2 and 21.2 the MS slope becomes identical to that of Pop. I stars. For (B-V) larger than 0.6, the Carney (1979) sequence is brighter by 0.44 mag. One star is a possible blue straggler with V 16.76 and (B-V) +.32. The blue object, at V 21.4 and (B-V) 0.00 is probably a foreground white dwarf.

The distance modulus is obtained by comparison of the cluster unevolved main sequence with that of nearby subdwarfs having significant parallaxes. Small blanketing corrections have been brought on the subdwarf's M_V for reducing all metallicities to [M/H] = -1.30, the value observed for the red giants in NGC 6752 (Grenon, 1982). With $E_{B-V} = 0.04$, the distance modulus is now equal to 13.94 $\pm$ .08. This value is significantly larger than those commonly accepted for this cluster ranging from 13.0 to 13.5.

The HB apparent magnitude is somewhat uncertain as the blue branch does not extend up to the flat portion of the HB. With our modulus,

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M_V(HB) is estimated to 0.07 ± 0.18. If such a bright value were to be accepted for all metal-poor globular clusters, then the galactocentric distance based on their spatial distribution would be 1.28 times greater than that obtained using the classical 0.6 value for M_V(HB). The 1980 Harris' value of 8.5 kpc for R_o would become 10.8 kpc.

For comparing the 6752 ridge sequence with the models the T_{eff} are transformed into $(B-V)_o$ using an ad hoc relation valid for [M/H] = -1.30. VandenBerg's BC for metal poor stars are adopted. The Ciardullo and Demarque isochrones with Y = .20, Z = 0.001 and α = 1.0 fit exactly the subdwarf $M_V/(B-V)$ sequence as well as the slope of the 6752 MS below the turn off. A value α = 1.0 is not adapted for the SGB and GB stars. VandenBerg's (1983) isochrones with α = 1.6 underestimate the luminosity of the MS but describe better the shape of the GB. The observed location of GB stars suggests a value of 1.9 for the mixing length parameter. The luminosity of the flat portion of the SGB appears brighter than predicted by the models.

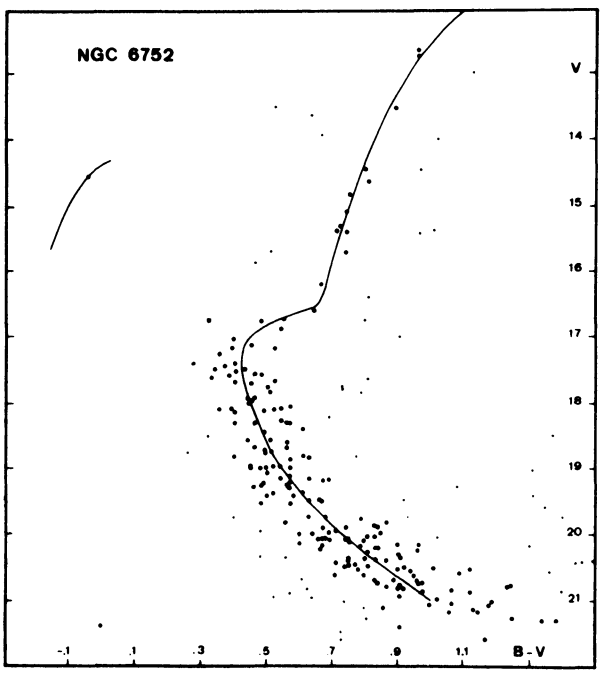

Fig. 1 : Solid lines: electronographic and p.e. ridge sequences. Small dots: probable non-members

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DISCUSSION

Richer: The distance modulus you derive for NGC 6752 puts the horizontal branch at M_V = .07. This seems somewhat bright, and is caused, I think, by the fact that you determined the distance by fitting the main sequence to the Carney subdwarf sequence. We show in Richer and Fahlman (Ap.J., Feb 1, 1984) that the Carney sequence is incompatible with the VandenBerg isochrones in the sense that the Carney subdwarfs are about 0.4 magnitudes brighter than the appropriate isochrone. A recent Phd thesis (Dawson, Univ. of Victoria) shows that with a much larger sample of stars good agreement with the VandenBerg isochrones can be obtained.

Grenon: Our cluster sequence has been fitted to that formed by a set of nearby stars from Wooley's catalogue. Their parallaxes are rather accurate and some of them have been recently improved. The discrepancy with the VandenBerg main sequence luminosity is much larger than the uncertainty of the subdwarf MS location in the HRD.

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