SIMILARITIES OF THE INTERMEDIATE-AGE SMC STAR CLUSTER NGC 152 WITH INNER DISK CLUSTERS IN THE MILKY WAY

T. RICHTLER, KLAAS S. DE BOER, A. VALLENARI, W. SEGGEWISS
Sternwarte der Universität Bonn
Auf dem Hügel 71
D-5300 Bonn
Germany

A colour-magnitude diagram (CMD) of the region containing the intermediate-age SMC globular cluster NGC 152 was published recently (Melcher & Richtler 1989). A particularly interesting feature of this CMD is the "clump" of He-core burning stars, which are predominantly field stars. A selection of stars near the cluster centre leads to the CMD shown in Figure 1. The vertical extension of the clump (explainable by the evolution of stars younger than 1 Gyr) is replaced by a "tilted horizontal branch" (we use this expression for lack of a better one). The age of NGC 152 is about 1.3 Gyr and the reddening is small; the metallicity is unknown but less than -0.6 dex, which is the mean metallicity of the young SMC population. The tilted HB can be reproduced in CMD simulations using the method developed by Vallenari *et al.* (1990), and thus can be considered as a normal feature of star clusters like NGC 152. It is evident also in other intermediate-age MC clusters like Kron 3 (Rich *et al.* 1984).

Recently, CMDs of some galactic globular clusters of the inner disk system were published. The clusters are NGC 6316, 6342, 6496, 6539, 6760, Pal 8 (Armandroff 1988) and NGC 6553 (Barbuy *et al.* 1989). All clusters show a similarity to the above-mentioned MC clusters with respect to the morphology of their loci of He-core burning stars. None of the cluster CMDs shows the main sequence turn-off, and so the ages remain unknown.

Barbuy *et al.* suspect that in the case of NGC 6553 the tilted HBis due to a combination of very high metallicity and differential reddening. Indeed, the reddening vector is nearly parallel to the tilted HB of NGC 6553. However, this is not the case for NGC 6539, where Armandroff suspects differential reddening to be present. Here the reddening vector is too shallow, whereas it is too steep for NGC 6496 and 6316. Additionally, the total reddening is very different from cluster to cluster, whereas the (V-R)-extension of the tilted HB is more or less the same. Thus, differential reddening does not seem to work well as a general explanation.

According to CMD simulations (described by Vallenari *et al.* 1990), a high metallicity can indeed produce a tilted horizontal branch. At solar metallicity, the decrease in V-magnitude along the HB amounts to 0.2 mag. However, examining the published metallicities (Zinn & West 1984, Pilachowski 1984, Bica & Pastoriza 1983) shows that except for the scale of Bica and Pastoriza, no evidence for "supermetallicity" can be seen. Moreover, a very recent high dispersion study reveals -0.8 dex (or even lower) for NGC 5927, another cluster of this group (P. Francois, private communication), supporting clearly Pilachowski's (1984) scale.

So, an intermediate age of these clusters still stands as a promising possibility for the explanation of the tilted HB. It seems clear, however, that none of these clusters is as young as NGC 152. But a lower limit of 4-5 Gyr does not contradict the published CMDs. Perhaps, future

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main sequence photometry will uncover clusters in the inner galactic disk that are real counterparts of intermediate-age Magellanic Cloud clusters.

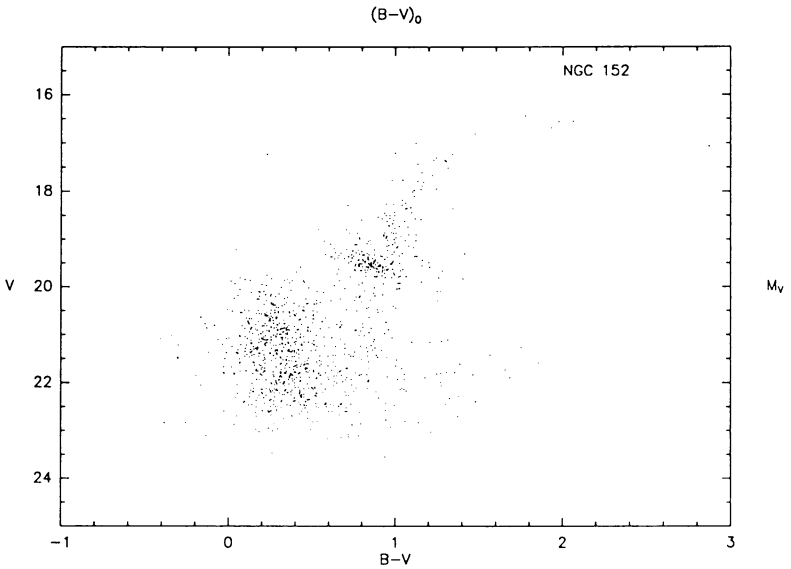

Figure 1. Colour Magnitude Diagram of stars near the centres of clusters.

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