GLOBULAR CLUSTERS WITHIN 5^{O} OF THE GALACTIC CENTER

B. BARBUY
Universidade de São Paulo
C.P. 3386, São Paulo 01060-970, Brazil
E. BICA
Universidade Federal do Rio Grande do Sul
C.P. 15051, Porto Alegre 91500-970, Brazil
AND
S. ORTOLANI
Università di Padova
Vicolo dell'Osservatorio 5, I-35122 Padova, Italy

1. Introduction.

The knowledge of age and spatial distribution of stars in the Galactic bulge require observational constraints to establish whether its stellar population is very old (Larson 1990) or is a younger, disk-like component (Raha et al. 1992), and if its shape is spherical or extended, or perhaps a bar (Blitz & Spergel 1991). Yet other possibilities are a flattened bulge or a disk-like system (Zinn 1985; Armandroff 1989; Ortolani et al. 1993; Minniti 1995).

Until recently hardly any accurate reddening and distance estimates were available for most clusters in the inner 5^{o} and consequently not much could be inferred about their spatial distribution (Racine & Harris 1989). We now have gathered CCD Colour-Magnitude Diagrams (CMD) data, in the V, I and Gunn z bandpasses, for 16 out of 17 known globular clusters in the central 5^{o} radius, and these data make it possible to study the properties of this inner system. Metallicities are estimated from the horizontal branch morphology and the red giant branch slope and curvature. Reddening values and distances based on this set of CCD data are derived from measurements of horizontal branch and bright giants magnitudes. Most of these CMDs are now published with individual analyses of the clusters, and in the present

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work we build up the most homogeneous and updated set of information for this central sample.

2. Results

We conclude that essentially no cluster is detected beyond the Galactic Center distance, which was not the case of previous determinations. The results favour a flattened bulge extending from the Galactic Center to 4.5 kpc from the Sun. We estimate that missing clusters on the opposite side of the Galaxy bulge may amount $\sim$ 10 clusters similar to those detected on our side. The projected distribution of clusters is asymmetrical, with higher absorption in the southern Galactic hemisphere. We emphasize that the present globular clusters form a distinct population from that discussed by Armandroff (1989), because the scale height is about a factor of $\approx$4 smaller. The distribution of the present sample is much more internal, and compatible with Kent's (1991) bulge exponential distribution.

The metallicity histogram for this central bulge sample, based on the CMD morphology is flat and broad extending from about twice solar to less than one tenth solar abundance (some halo clusters may be contaminating the sample). The sample is small but resembles that of bulge stars (McWilliam & Rich 1994).

Finally, Ortolani et al. (1995), using *Hubble Space Telescope* (HST) data of NGC 6528 and NGC 6553, two metal-rich globular clusters with a CMD morphology comparable to that of Baade's Window (see their Fig. 3), favour an old age for the bulge. Combining the latter dating result with those from the present paper about the spatial distribution based on high-quality ground-based optical photometry for essentially the whole sample of inner globular clusters, the picture which comes out is one of a flat old central bulge, with a common origin for the stellar population of both globular clusters and field stars.

References

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