

METALLICITY AND LUMINOSITY FUNCTIONS OF THE GLOBULAR CLUSTERS IN NGC 4472

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NGC 4472, the brightest elliptical galaxy in the Virgo cluster, has a rich globular cluster system. We present a study of the metallicity and luminosity functions of a large number of globular clusters in NGC 4472. Deep Washington CT_1 photometry of a wide ($16' \times 16'$) field of NGC 4472 was obtained using Tek 2048×2048 CCD at the KPNO 4m telescope.

The color-magnitude diagram of $\sim 9,500$ measured point sources (Fig. 1) shows two strong vertical structures in the color range of $1.0 < (C - T_1) < 2.3$ which consist mostly of globular clusters, and a dominant horizontal structure fainter than $T_1 \approx 23$ mag most of which are unresolved faint background galaxies.

We have estimated the metallicity of $\sim 1,300$ globular clusters brighter than $T_1 = 22.5$ mag from the $(C - T_1)$ colors. The metallicity distribution of the bright globular clusters shows two strong peaks at $[\text{Fe}/\text{H}] = -1.3$ dex and -0.1 dex (Fig. 2). The metal-rich globular clusters are spatially more concentrated than the metal-poor globular clusters (see also Kim *et al.* 1995). The mean metallicity of the globular clusters is decreasing as the galactocentric radius is increasing. These results are consistent with the merger model for the formation of giant elliptical galaxies.

The luminosity function of the globular clusters shows clearly a peak at $T_1 = 23.3 \pm 0.1$ mag (Fig. 3). Comparing this with the value for the galactic globular clusters ($M_R = -7.9$ mag), we derive a distance modulus of $(m - M)_0 = 31.2 \pm 0.2$ mag ($d = 17.4 \pm 1.6$ Mpc). This value is very similar to the distances to M87 ($d = 16.8$ Mpc) and M100 ($d = 17.1$ Mpc) in the same cluster (Whitmore *et al.* 1995; Freedman *et al.* 1994). Then we

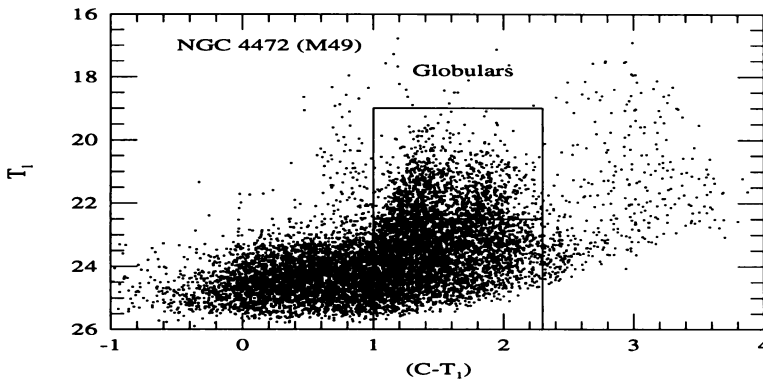


Figure 1. $T_1-(C - T_1)$ color-magnitude diagram of $\sim 9,500$ measured point sources in NGC 4472 image.

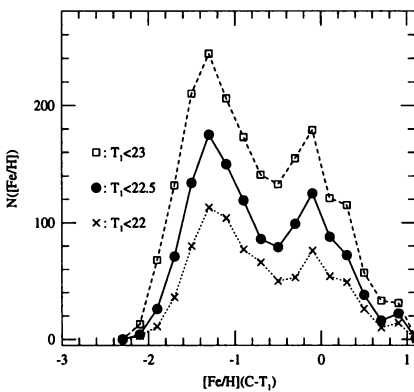


Figure 2. Metallicity distribution of the bright globular clusters in NGC 4472.

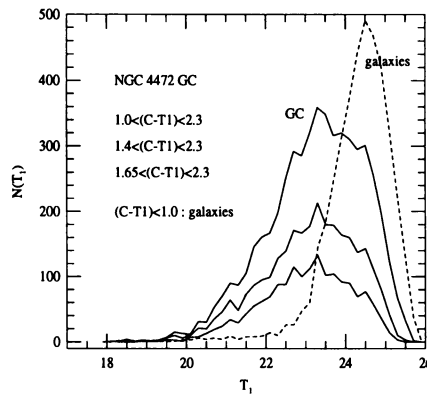


Figure 3. T_1 luminosity functions of the globular clusters in NGC 4472 (the solid line) and background galaxies (the dashed line).

estimate the Hubble constant to be $H_0 = 68 \pm 14$ km/s/Mpc and 79 ± 17 km/s/Mpc for the cosmic expansion velocity of the Virgo $v = 1179$ km/s (Jerjen & Tammann 1993) and 1380 kms/s (Mould *et al.* 1995), respectively.

References

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