GLOBULAR CLUSTERS DETECTED IN THE COMA CLUSTER'S CENTRAL GIANT GALAXY NGC 4874

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We have used the Canada-France-Hawaii Telescope on Mauna Kea to obtain two deep CCD exposures in the central region of the Coma cluster, and we have used the new images to detect globular clusters in the central giant galaxy NGC 4874. One exposure with a total integration time of 2 hours lies in the halo of the giant galaxy. A second (comparison) exposure of the same integration time was taken within the cluster core but well away from any other bright galaxy. Our analysis, which includes both photometry and image classification with the automated routines called FOCAS, extends to a limiting B magnitude of 26.25. Image classification is a necessary part of this study because at the faintest limiting magnitudes globular clusters are easily confused with the rich population of faint background galaxies. We have been particularly successful in sorting stellar objects from galaxies because the image quality on our images is quite good: FWHM ~ 0.6 arcsec. The data were taken with the fast autoguiding instrument called ISIS (Thompson and Ryerson 1984)

In the near environs of NGC 4874, we find an excess of both stellar-like objects (the globular clusters) as well as an excess of extended galaxy-like objects (presumably dwarf galaxies). Because of the substantial population of true background galaxies, we can say very little about the radial distribution of dwarf galaxies relative to NGC 4874. However, once the galaxy-like objects are removed, the globular cluster population is relatively unaffected by background objects, and the corresponding radial distribution can easily be determined. As shown in Fig. 1, the globulars possess a very flat radial distribution when compared to the light of the underlying galaxy. This indicates that the globulars may be more closely associated with the cluster as a whole rather than being associated exclusively with the underlying starlight in NGC 4874.

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By comparing the apparent luminosity functions of the globular cluster candidates in the Coma cluster with the well-studied globular cluster populations of M87 and our Galaxy, we can certify that we have, indeed, detected the globulars in Coma (see Fig. 2).

Unfortunately, the new Coma cluster data includes only the bright tail of the luminosity function, so there is no reliable way to use the new observations to determine the Coma cluster distance modulus. We can adopt the known distance modulus difference between Coma and Virgo and then use our new data to determine the total number of globular clusters in the small area of our study. This we combine with the luminosity of NGC 4874 contained in our data frame to determine the "specific frequency" of globular clusters. We find the value to be ~2.7, unusually low for a giant galaxy at the center of a rich cluster. Other giant galaxies have specific frequencies ~15 (Harris 1986). Our low value for NGC 4874 may be another indication that the globular clusters follow a very flat distribution relative to the galaxy light. In such situations, local values of the specific frequency should be lower than the norm in the central regions of the galaxy (where we observed) yet higher than the norm in the outer regions of the galaxy. This matter will remain unresolved until someone determines the specific frequency for NGC 4874 using images encompassing a wider field of view than ours.

REFERENCES

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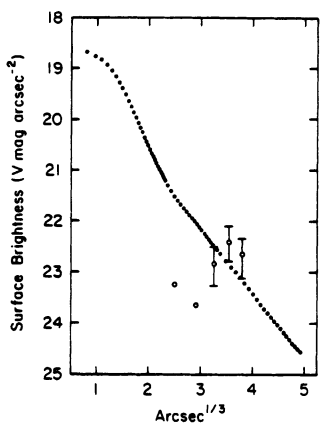

Fig. 1. Radial distribution of galaxy light (filled circles) and globular clusters (open circles).

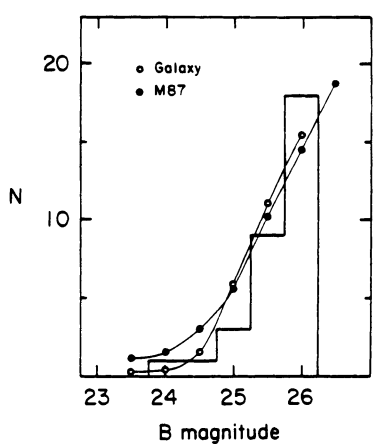

Fig. 2. Globular cluster luminosity functions NGC 4874 (histogram), M87 (filled circles), and the Galaxy (open circles).

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