

THE GLOBULAR CLUSTER SYSTEM OF M 87

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Long exposures with the 4-Shooter at the Cassegrain focus of the 200-inch telescope at Palomar Observatory have been obtained for M87 (and two other giant ellipticals in Virgo). Ellipse fitting with a code specially developed to reject point sources has been carried out to determine the surface brightness in various bandpasses of the underlying galaxy. The color gradients in the galaxy are quite small over the entire regime between 2 and 350 arc-sec from the nucleus of M87. Also I find that there is no difference between the ellipse parameters (position angle and eccentricity) derived in the various colors, i.e. the isochromes and the isophotes coincide. Details of the study of the halo of M87 are described in a paper submitted to the *Astronomical Journal*.

Subtraction of the best fit ellipses reveals the globular cluster system of M87 in its full glory. I added up the 7 best exposures (from a set of 15), each 800 seconds long, in the g filter of the Thuan-Gunn system after ellipse fitting had been carried out on each of them. Thus objects whose magnitude is near 26.5 are obvious on the final frame, and reliable photometry can be obtained down to $g = 26$ mag. Only 1 exposure each in the r and i bandpasses of the Thuan-Gunn system are available. Photometry down to about magnitude 23 is reliable in the r and i frames.

An automatic point source detection code was run on the summed g frames to find the globular clusters (plus small galaxies). Regions with chip defects or relatively large nearby resolved galaxies (of which there are several in the halo of M87) were not included. Then all the objects that are resolved (presumably more distant galaxies) were removed by hand. This eliminated about 70 objects in the 9x9 arc-minute field and effectively removed nearly all galaxies brighter than 23.5 mag. A total of about 7500 point sources remain after this in the M87 field. Most of these objects are globular clusters surrounding M87, although fainter than 23.5 mag there is substantial contamination by almost unresolved background galaxies.

The median and quartiles of the color distribution of the M87 globular clusters were found as a function of distance from the nucleus (expressed as bins in semi-major axis since beyond 1 arc-minute from

the nucleus M87 is noticeably elliptical). They reveal only a small color gradient in the M87 cluster system itself, of size comparable to that in the light of the underlying galaxy. It does appear that at any given point, the median color of the globular cluster system is bluer (by about 0.15 mag in $(g-r)$ and by about 0.3 mag in $(g-i)$) than M87 itself.

Full details of this work and a similar analysis of the globular cluster system of NGC 4472 and NGC 4406 will be presented in a paper now being prepared for submission to the *Astrophysical Journal*.