

A COMPLETE SAMPLE OF GLOBULAR CLUSTERS IN NGC 5128

Ray Sharples

Anglo-Australian Observatory

ABSTRACT. We present the results of an unbiased survey to search for globular clusters around the nearby elliptical galaxy NGC 5128. A total of 44 clusters has been identified on the basis of radial velocities alone. The cluster system appears to be flattened towards the major axis of the galaxy but does not show any dynamically significant rotation. There is a deficit of clusters in the core when compared with the power law density profile seen at large radii.

1. THE SAMPLE

Previous studies of the globular cluster system associated with NGC 5128 (Hesser, Harris & Harris 1986, and references therein) have relied primarily on selecting slightly resolved candidates for subsequent spectroscopic confirmation. However, only the brightest and largest clusters are predicted to be resolved, even on good seeing plates (Harris et al. 1984). Such samples are therefore limited in size and may possibly be biased in their properties. To determine the significance of any bias it is necessary to study complete magnitude-limited samples.

The present study is based on B, V photographic photometry from 4 m prime focus plates calibrated with a CCD sequence. After rejecting obvious galaxies, magnitudes and (B-V) colors have been derived for all objects $18.0 < V(\text{mag}) < 20.0$ between radial limits of $1.5 < R(\text{arcmin}) < 9.0$ from the nucleus of the galaxy. Spectroscopic observations were then obtained using the multi-object fiber spectrograph on the Anglo-Australian Telescope (Gray 1983) to acquire intermediate dispersion spectra of 227 of these candidates from which radial velocities have been derived using a standard cross-correlation technique.

2. RADIAL VELOCITIES

The systemic velocity of NGC 5128 has been accurately determined from studies of the kinematics of the stellar spheroid (Wilkinson et al. 1986) and the ionized gas in the dust lane (Bland 1985) to be $538 \pm 10 \text{ km s}^{-1}$. Fig. 1 shows that, on the basis of radial velocities alone, 44 objects in the spectroscopic sample are probable globular clusters associated with NGC 5128. The remaining 183 are foreground stars, as expected from the low galactic latitude of the field.

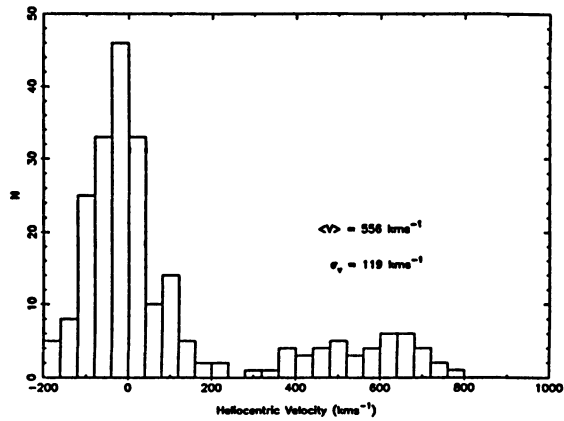


Fig. 1. Histogram of heliocentric velocities showing the clear separation into Galactic stars and globular clusters associated with NGC 5128.

3. SPATIAL DISTRIBUTION

The distribution of clusters is not symmetrical, but shows an excess in the NE and SW quadrants in which the major axis of the elliptical galaxy is also found ($PA = 35^\circ$). If this distribution is modeled using a system of constant flattening, ellipticities $> E2$ are inferred for the cluster system i.e. flatter than the isophotes of the stellar spheroid. However, a search for global rotation of the cluster system about the minor axis shows only a marginal trend (NE: $\langle V \rangle = 538 \pm 22$; SW: $\langle V \rangle = 586 \pm 32$) in the same sense as that of the stellar component. This is insufficient to produce the inferred flattening of the cluster system.

The surface density profile falls as $R^{-1.8}$ for $R > 3$ arcmin, but is much flatter at smaller radii. The presence of a core in the radial distribution is similar to that found by Lauer & Kormendy (1986) for the M 87 cluster system, but with a smaller characteristic radius $R_c \sim 3(D/3)$ kpc, where D is the distance to NGC 5128 in Mpc.

REFERENCES

- Bland, J. 1985 Ph.D. Thesis, University of Sussex.
 Gray, P. 1983 Proc. SPIE 445, 57.
 Harris, H. C., Harris, G. L. H., Hesser, J. E., and MacGillivray, H. T. 1984 *Astrophys. J.* 287, 185.
 Hesser, J. E., Harris, H. C. and Harris, G. L. H. 1986 *Astrophys. J.* 303, L51.
 Lauer, T. R. and Kormendy, J. 1986 *Astrophys. J.* 303, L1.
 Wilkinson, A., Sharples, R. M., Fosbury, R. A. E. and Wallace, P. T. 1986 *Monthly Notices Roy. Astron. Soc.* 218, 297.