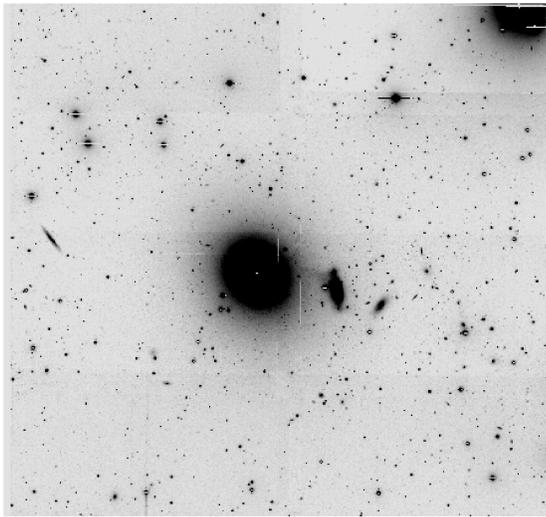


THE GLOBULAR CLUSTER SYSTEM OF THE ELLIPTICAL GALAXY NGC 2986



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ABSTRACT

We use deep, wide-field V and I images of NGC2986 taken with Magellan 6.5m and IMACS at Las Campanas Observatory, Chile. We analyze the color distribution of the Globular Cluster System using a KMM test and show that the system is clearly bimodal as frequently found in early-type galaxies. In addition, we have derived a radial profile of the cluster candidates. By means of a comparison field, we are able to estimate the level of contamination with high confidence. Also, we study the azimuthal distribution and the Luminosity Function to estimate the distance to NGC2986 which is in good agreement with previous work.

OBSERVATIONS

The observations were acquired at the 6.5m Magellan I telescope, together with IMACS. The total exposure times were 5x600s in V and 5x450s in I. The seeing averaged 0.8" in each band.

DATA REDUCTION AND SELECTION CRITERIA

The data were processed using IRAF standard tools, plus some routines written in IDL. Each chip was processed separately and the final stacked image was obtained with Swarp (Bertin et al., 2002). Source detection was achieved with SExtractor (Bertin, E. & Arnouts, S., 1996). The photometry was done using DAOPHOT package of IRAF. To select the Globular Cluster (GC) candidates we applied colour and magnitude cuts of $21.5 < V < 25.5$ and $0.5 < (V-I) < 1.4$

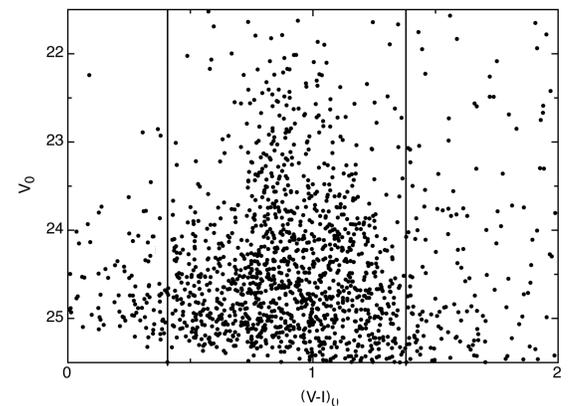


FIGURE 1: CMD of the extracted sources. For the GC candidate selection we did a color cut between 0.5 and 1.4 and a magnitude cut between 21.5 and 25.5 in V-band.

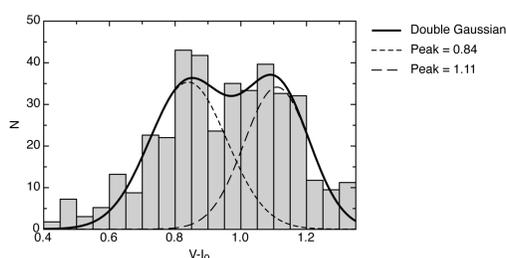


FIGURE 2: Histogram of the GC candidates, after background subtraction.

COLOR DISTRIBUTION

To analyze the color distribution of the GC candidates, we used KMM test (Zepf, Ashman, 1992), which supports a bimodal distribution with a great confidence, based on the resulting p-factor equal to 0. The population of GC candidates is well fitted by two gaussians, whose centers are in $(V-I)_0 = 0.84$ and 1.11

RADIAL PROFILE

We used a power law to fit the radial profile of the candidates. The exponent of the whole population was $n=-2.1$. Beyond 5 arcmin there is a large background contamination. In addition, we analyzed the radial profile for the red and blue subpopulations.

AZIMUTHAL DISTRIBUTION

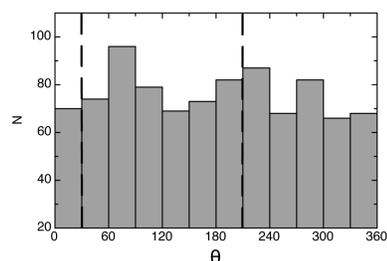


FIGURE 5: Azimuthal distribution of the whole population. The dashed lines indicates the position angle of the major semi axis. We used 30° bins/30° bins.

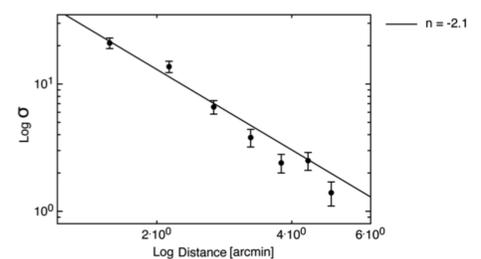
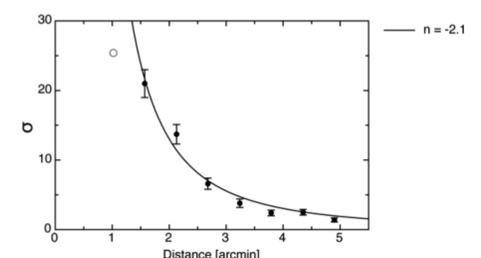


FIGURE 4 : Radial profile for the whole GC candidate population, after correcting for background contamination.

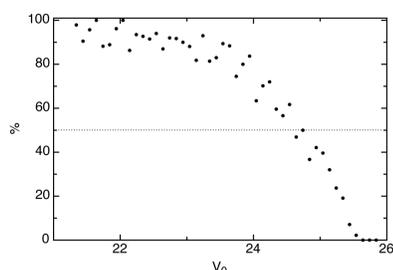


FIGURE 6: Completeness diagram in V magnitude. The 50% of the detection corresponds to $V_0=24.7$ and is indicated by the dashed line.

COMPLETENESS AND LUMINOSITY FUNCTION

We performed artificial-stars experiments with IRAF/ADDSTAR, with the aim of quantifying the detection limits. Using the results of the completeness test we scaled the raw number of candidates. We used a Gaussian to fit the Luminosity Function, with $\sigma=1.1, 1.2$ and 1.3 , which are used for elliptical galaxies (Ashman, Zepf, 1998). For $\sigma=1.1$ we obtained a Turn Over Magnitude (TOM) equal to 25.5 ± 0.13 , which gave us a distance ~ 38 Mpc. This agrees with the distance of ~ 36 Mpc taken from NED.

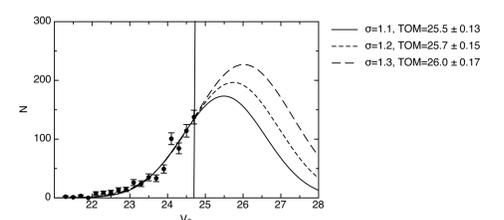


FIGURE 7: Luminosity function in V. The vertical line indicates the 50% completeness limit.

REFERENCES

- NED: NASA/IPAC Extragalactic Catalogue
 Harris, Withmore, et al., Apj Vol 363, pp 90
 Zepf, Ashman, et al., Apj 108, 1994
 Ashman, Zepf, Globular Cluster Systems (Cambridge Astrophys. Ser.)
 Bertin, E. & Arnouts, S. 1996: SExtractor: Software for source extraction, Astronomy & Astrophysics Supplement 317, 393
 Bertin et al. 2002: The TERAPIX Pipeline, ASP Conference Series, Vol. 281, 2002 D.A. Bohlender, D. Durand, and T.H. Handley, eds., p. 228