

The Early-Type Dwarf Galaxy Population of the Fornax Cluster

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Abstract. AIMS: We analyse the photometric properties of the early-type Fornax cluster dwarf galaxy population ($M_V > -17$ mag), based on a wide field imaging study of the central cluster area in V and I bandpasses. We used the instrument/telescope combination IMACS/Magellan at Las Campanas Observatory, providing much larger light collecting area and better image resolution than previous wide field imaging surveys.

METHODS: We create a fiducial sample of Fornax cluster dwarf ellipticals (dEs) in the following three steps: (1) To verify cluster membership, we measured I -band surface brightness fluctuations (SBF) distances to candidate dEs known from previous surveys; (2) We re-assessed morphological classifications for those candidate dEs that are too faint for SBF detection; and (3) We searched for new candidate dEs in the size-luminosity regime close to the resolution limit of previous surveys.

RESULTS: (1) We confirm cluster membership for 28 candidate dEs in the range $-16.6 < M_V < -10.1$ mag by means of SBF measurement. We find no SBF background galaxy. (2) Of 51 further candidate dEs in the range $-13.2 < M_V < -8.6$ mag, 2/3 are confirmed as probable cluster members by morphological re-assessment, while 1/3 are re-classified as probable background objects. (3) We find 12 new dE candidates in the range $-12.3 < M_V < -8.8$ mag, two of which are directly confirmed via SBF measurement. The resulting fiducial dE sample follows a well-defined surface brightness - magnitude relation, showing that Fornax dEs are about 40% larger than Local Group dEs. The sample also defines a colour-magnitude relation that appears slightly shallower than that of Local Group dEs. The early-type dwarf galaxy luminosity function in Fornax has a very flat faint end slope $\alpha \simeq -1.1 \pm 0.1$. We discuss these findings in the context of structure formation theories.

CONCLUSIONS: The SBF method is a very powerful tool to help constrain the faint end of the galaxy luminosity function in nearby galaxy clusters. For the Fornax cluster, morphological cluster memberships – if performed at sufficient resolution – are very reliable.

Keywords. galaxies: clusters: individual: Fornax cluster – galaxies: dwarf – galaxies: fundamental parameters – galaxies: luminosity function – techniques: photometric

This contribution is based on Mieske *et al.* (2006).

Reference

Mieske, S., Hilker, M., Infante, L., & Mendes de Oliveira, C. 2006, *A&A* accepted, astro-ph/0610516.