# Scaling relations for globular cluster systems in early-type galaxies

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**Abstract** / We studied a sample of globular cluster systems belonging to elliptical galaxies located in different environments. This sample was supplemented with literature results, in order to analyze different parameters derived from the radial profiles in terms of several properties of the host galaxy.

*Keywords* / galaxies: star clusters: general — galaxies: elliptical and lenticular, cD — galaxies: evolution — galaxies: halos

## 1. Introduction and data

It is believed that the mass accretion history of a galaxy has a main role in the build up of its globular cluster system (GCS), favouring the formation and survival of globular clusters (GCs) by different processes (e.g Kruijssen, 2015; Choksi & Gnedin, 2019). Moreover, in the case of massive galaxies a large fraction of their GCs were not formed in situ, but obtained through mergers (Forbes et al., 2011; Caso et al., 2017). In particular, their radial distributions scale with the properties of the galaxies and their halos (Escudero et al., 2015).

We carried on the photometry of HST/ACS images from several elliptical galaxies with intermediate luminosity, obtained from the HST Data Archive. In addition, we used the photometric catalogues of GC candidates from the Virgo and Fornax clusters (Jordán et al., 2009, 2015). We fitted the radial profiles for a sample of 27 GCSs, using a modified Hubble profile. We also compiled the parameters of the radial profiles available in the literature for a sample of GCSs hosted by early-type galaxies.

## 2. Results

In agreement with previous studies (Forbes, 2017; Hudson & Robison, 2018), our results suggest that the parameters of the GCSs radial profiles correlate with several properties of the host galaxy. The exponent of the Hubble profile inversely correlates with both the stellar mass of the galaxy and the number of GCs, with giant ellipticals presenting more flattened GCSs than their less massive counterparts.

Regarding the extension of the GCS as a function of the stellar mass of the galaxy, it was fitted by a bi-linear relation, with a pivot mass of $\approx 4 \times 10^{10}\,\mathrm{M}_\odot$. It also correlates with the richness of the GCS, but in this case a quadratic function results in an accurate representation. This is probably due to the non-linear relation between the stellar mass and the number of GCs (Harris et al., 2013). The effective radius of the host galaxy and the extension of the GCS might be correlated, but presenting a large scatter. The central velocity dispersion seems to correlate with the extension of the GCS for central galaxies, but its behaviour is different for satellites, pointing to the relevance of the late evolution of the two groups, probably due to the different mass accretion histories in central and satellite galaxies.

Based on a statistical comparison with the halos from the SMDPL dark-matter simulation, part of the Multidark project Klypin et al. (2016), the effective radius and the extension of the GCS scale with the projected effective radius and the virial radius of the halo, respectively.

## References

Caso J.P., Bassino L.P., Gómez M., 2017, MNRAS, 470, 3227
Choksi N., Gnedin O.Y., 2019, MNRAS, 488, 5409
Escudero C.G., et al., 2015, MNRAS, 0, 0
Forbes D.A., 2017, MNRAS, 472, L104
Forbes D.A., et al., 2011, MNRAS, 413, 2943
Harris W.E., Harris G.L.H., Alessi M., 2013, ApJ, 772, 82
Hudson M.J., Robison B., 2018, MNRAS, 477, 3869
Jordán A., et al., 2009, ApJS, 180, 54
Jordán A., et al., 2015, ApJS, 221, 13
Klypin A., et al., 2016, MNRAS, 457, 4340
Kruijssen J.M.D., 2015, MNRAS, 454, 1658