

Kinematics of superdense galaxies in clusters

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Abstract. We present the first results obtained by analyzing the detailed kinematics of a subsample of 9 massive and compact galaxies found in the WINGS survey. The observed galaxies are very old (both luminosity and mass-weighted age are on average ≥ 10 Gyr), while they resemble more typical galaxies in the other characteristics. The total M/L ratio is determined using as free parameters the anisotropy β and the galaxy inclination i .

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1. Sample selection and analysis

Valentinuzzi *et al.*, 2010 found in the WINGS sample of local cluster of galaxies ($0.04 < z < 0.07$) a significant number of massive and compact galaxies ($3 \times 10^{10} M_{\odot} < M < 4 \times 10^{11} M_{\odot}$, $\Sigma_{50} > 3 \times 10^9 M_{\odot}/kpc^2$), that have not been found in other local surveys (e.g. SDSS). Our results show that selecting already passive galaxies at high z means selecting the most compact ones. Assuming they do not resume the star formation activity at later times, the high- z sizes should be compared with the sizes of the oldest (in terms of their LW-age) low- z galaxies, to avoid a significant progenitor bias. Taking into account this progenitor bias Poggianti *et al.*, 2013b found that for compact galaxies in low density environments a significant size evolution for these compact objects is not needed. In order to validate our stellar masses, derived using fiber spectroscopy and our spectrophotometric tool SINOPSIS (Fritz *et al.*, 2007,2011), we obtained two sets of IFU observations for a subsample of 17 WINGS SDGs. 9 of them have been observed with G-MOS @GEMINI and 8 of them with VIMOS (purple and green dots, respectively, in Fig. 1, top left panel).

We present here WINGS SDGs that have been observed with GEMINI G-MOS with an exposure time of 2700 s, using the B600 grism in the 1-slit mode. The FoV is $3.5'' \times 5''$. The wavelength coverage goes from 4000 to 6900 Å. We derived the stellar kinematics by using the pPXF algorithm by Cappellari & Emsellem (2004), that works in regions where $S/N=10$ (defined by a Voronoi tessellation). In our case we used as templates a set of MILES SSPs with 16 values of ages and 6 metallicities. Fig. 1, bottom panel shows the velocity map for one of our galaxies. We derived the luminosity-weighted angular momentum λ_R following Emsellem *et al.*, 2007, and found that most SDGs are fast rotators (Fig. 1, top right panel). We then started evaluating the dynamical mass using the Jeans Anisotropic MGE models by Cappellari 2008. This model requires an accurate estimate of the galaxy light decomposition, that is made by superimposing a set of multiple gaussian profiles (MGE expansion). We then used a self-consistent JAM

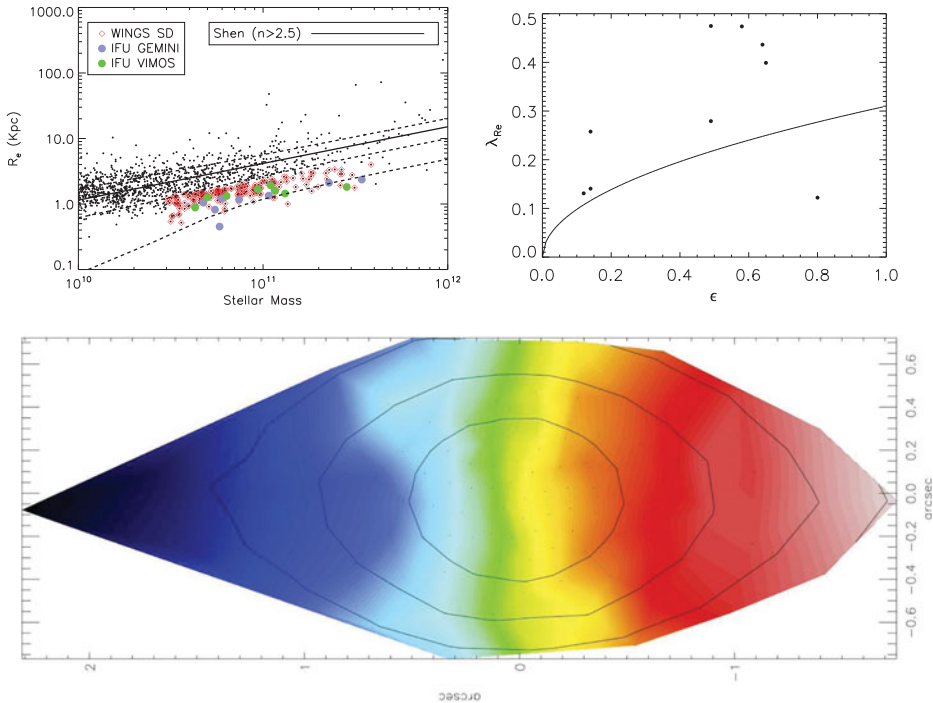


Figure 1. Top left: Mass-size relation for WINGS cluster members. Black lines are the local (SDSS) relations. Red dots are WINGS SDGs. Green and purple symbols are IFU candidates. Top right: Luminosity weighted angular momentum (λ_R) within R_e versus ellipticity. The line divides fast rotators (FR) from slow rotators (SR). Bottom panel: example of the velocity map derived for our SDGs.

model (see Cappellari *et al.*, 2013, Paper XV), where the underlying assumption is that the mass distribution follows the light one derived from the MGE fit, to evaluate the M/L ratio. This model has two non linear parameters (the vertical anisotropy β and the galaxy inclination i). The M/L ratio is then derived imposing the match with the observed V_{rms} . The derived M/L is the total one, and not only the stellar one. We are currently deriving the M/L JAM for our galaxies with the aim of estimating the dark matter fraction inside R_e (by comparing it with the stellar M/L derived from spectrophotometry) and the possible influence of the adopted IMF.

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