

# Scaling relations of early-type galaxies at $1 < z < 2$

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We studied the scaling properties of a sample of 65 ETGs at  $1 < z < 2$  with spectroscopic confirmation of their redshift and spectral type. The sample collects proprietary (Longhetti *et al.* 2007) and archival HST data and it is composed of 30 ETGs with HST-NICMOS observations (see Saracco *et al.* 2009) and of 35 ETGs from the GOODS-South field covered by HST-ACS observations. The whole sample is covered also by ground-based optical and near-IR observations while complementary mid-IR data (Spitzer or AKARI) are available for 45 galaxies. The study of the Kormendy, the size-luminosity and the size-mass relations of these ETGs shows that a large fraction ( $\sim 50\%$ ) of them follows the local relations. These 'normal' ETGs are not smaller (denser) than their local counterparts with comparable stellar mass, luminosity and surface brightness and no size evolution is required for them. On the contrary, the remaining half of the sample is composed of very compact ETGs with sizes (densities) 2.5-3 (15-30) times smaller (higher) than the other ETGs and than local ETGs. Thus, not all the high- $z$  ETGs are superdense and, consequently, only some of them must experience size evolution showing that the evolutionary path of ETGs at  $0 < z < 2$  is not univocal. We also find that the stellar population of normal ETGs formed at  $1.5 < z_{form} < 3$  while it formed at  $2 < z_{form} < 9$  in compact ETGs. This suggests that different histories of mass assembly must take place at high- $z$  to produce both the normal and the superdense ETGs seen at  $1 < z < 2$  (Saracco *et al.* 2010).

## References

- Longhetti, M., Saracco, P., Severgnini, P., *et al.* 2007 *MNRAS* 374, 614  
Saracco, P., Longhetti, M., & Andreon, S. 2009 *MNRAS* 392, 718  
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