

Clustering of massive compact galaxies at $1 \leq z \leq 3$ in CANDELS/3D-HST

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Abstract. We present a measurement of the spatial clustering of massive compact galaxies at $1 \leq z \leq 3$ in CANDELS/3D-HST. We obtain the correlation length and characteristic DM halo masses for compact quiescent galaxies (cQGs) at $z \sim 1.5$ and compact starforming galaxies (cSFGs) at $z \sim 2.5$. By comparison with extended starforming galaxies (eSFGs), our result indicates that eSFGs are less possible to be the progenitors of cQGs at lower redshift. Our results indicate that cQGs at $z \sim 1.5$ could be the progenitors of local luminous ETGs and the descendants of cSFGs and SMGs at $z > 2$.

Keywords. galaxies: high-redshift — galaxies: evolution — galaxies: structure

1. Introduction

Massive ($M_* \geq 10^{10} M_\odot$), quiescent galaxies (QGs) at high redshift ($z \geq 1$) have been found to be more compact than their local counterparts (e.g., Daddi *et al.* 2005; Fan *et al.* 2013a, 2013b). Since massive compact quiescent galaxies (thereafter cQGs) in the local Universe are rare, a significant structural evolution, by a factor of $\sim 3 - 5$, has been required. There, therefore, raised two questions: (1) how these cQGs evolve into local luminous early-type galaxies (ETGs) with larger size? and (2) how these cQGs formed at higher redshift? There are two physical mechanisms which have been proposed to explain the observed structural evolution of cQGs at $z \geq 1$. One is dissipationless (dry) minor merger (Naab *et al.* 2009); The other is “puff-up” due to the gas mass loss by AGN or supernova feedback (Fan *et al.* 2008, 2010).

We measure the cross-correlation between massive compact galaxies and comparison galaxies at $1 \leq z \leq 3$ in CANDELS/3D-HST fields. Our results reveal that the clustering of massive SFGs at $z \sim 2.5$ depends on galaxy structure. Compared to massive cSFGs, eSFGs at $z \sim 2.5$ show much weaker clustering and are less possible to evolve into cQGs at lower redshift. The observed clustering confirmed several previous arguments that cSFGs and SMGs at $z > 2$ could be the progenitors of cQGs at $z < 2$. An evolutionary sequence connecting SMGs, cSFGs, QSOs, cQGs and local luminous ETGs has therefore been indicated.

References

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