

Blue Early-type Galaxies in the GOODS Fields

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Abstract. We present a study of the nature of the blue early-type galaxies found in the HST/ACS images of the GOODS north and south fields.

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Recent studies based on the Hubble Space Telescope (HST) images found a new class of early-type galaxies in the distant universe that have different properties from nearby early-type galaxies (e.g. Menanteau *et al.* (2005)). These galaxies look like typical early-type galaxies in the images, but have much bluer colors than typical early-type galaxies at the same redshift. We call these galaxies as 'blue early-type galaxies' (BEGs). Using visual inspection of the images in the GOODS HST/ACS archival data, we have selected 58 BEGs and 113 normal red early-type galaxies (REGs) in the sample of 1,949 galaxies with spectroscopic redshifts. We find that the BEGs are generally bluer, fainter, and less-massive than the REGs, although a few BEGs are exceptionally bright and massive. They are found at the redshift range of $0.1 < z < 3.6$. The number fraction of the BEGs to total early-type galaxies is almost constant around 0.3 at $z < 1.1$. The median sizes of the BEGs decrease as redshift increases. About half of the BEGs show traces of tidal disturbances in their fine structure (elongated cores, off-centered cores, asymmetric internal color distributions, tidally distorted outer structures, collisional rings, or very nearby companions). Twenty-one BEGs are detected in the X-ray and half of them are very luminous, indicating the existence of AGN in their centers.

These results show that at least half of the BEGs may be descendants of mergers/interacting galaxies, and that at least a quarter of the BEGs may be AGN-host galaxies. The BEGs may evolve into low-mass REGs, and the size distribution of the BEGs is consistent with the galactic downsizing scenario. Details are given in Lee, Lee & Hwang (2006).

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References

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