Galaxy properties from voids to clusters in the SDSS-DR4

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Abstract. We investigate the environmental dependence of galaxy populations properties in the SDSS-DR4. Our aim is to search for systematic variations in the properties of galaxies with the local galaxy density in order to find hints that can be related to the presence of a void galaxy population. We find that galaxies in underdense regions (voids) are fainte and bluer than cluster galaxies. Moreover, the transition from underdense to overdense regions is smooth, as well as the percentage of late-type galaxies decreases while the percentage of early-type galaxies increases smoothly from underdense to dense environments.

We used data from the SDSS (York *et al.* 2000), to build a complete volume-limited sample of galaxies ($0.05 \leqslant z \leqslant 0.095$, $M_r \leqslant -20.0$). Our sample contains 91566 galaxies separeted in early- and late-type, usign the SDSS database parameters Eclass (spectroscopic) and FracDev (photometric). In order to investigate a dependence of galaxy colors on the environment, for each galaxy we compute the local galaxy density as the number of neighbours within $5Mpc$ and $|\Delta(cz)|_{ij} < 1000 kms^{-1}$ (with $H0 = 75 kms^{-1}Mpc^{-1}$).
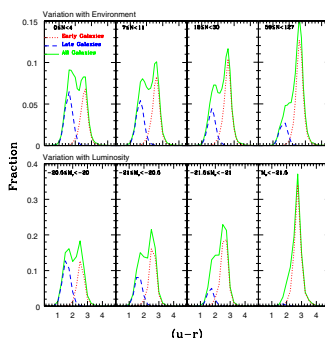

Figure 1. The $(u - r)$ color distribution with environment (top) and luminosity (bottom), taking into account the contribution of early- and late-type galaxies.

We can conclude that:

• Changes in the $(u - r)$ color distribution are related to the environment, to the luminosity, and to the morphology of the galaxies. On average, fainter galaxies are bluer, late-type and in underdense regions (voids) than brighter galaxie, which are redder, early-type and in overdense regions (clusters).

• We don't find any sudden transition in the properties of "void" galaxies, respect to cluster galaxies, as suggested by Peebles 2001. On the contrary, our results show a continuity in the properties of the galaxies, from voids to clusters. For better details see Sorrentino *et al.* 2006 (astro-ph/0608368)

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