The Population of Neighborhood Galaxies around Radio AGNs

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Introduction

The feedback due to radio galaxies is an efficient growth crontrol mechanism observed in the cluster of galaxies. However, is still unknown what is its effect on the non-active, normal population of galaxies that form the cluster.
We study the environments of high and low excitation radio galaxies (HEGRs and LERGs, respectively), analizing the the distribution of luminosity and color around radio galaxies.

Data & Methodology

The radio galaxies we used for our analysis were selected from Best et al. (2012). We correlated this catalog with the MPA-JHU, FIRST and NVSS catalogs. We selected objects within the main spectroscopic SDSS sample, with magnitudes within 14.7 < r <17.77 and redshifts in the range 0.03 < z <0.3. From SDSS DR7, we obtained neighboring galaxies with available photometric redshift and analyzed various cylindrical volumes around radio AGN, up to a proyected distance of Rp=2 Mpc and redshift difference ΔZ=0.05. For the cosmology, we use Ωm=0.3, ΩΛ=0.7, H0=70 $kms^{-1}Mpc^{-1}$.

To distinguish the true effect of radio galaxies, we build control samples of non-active galaxies matched in stellar mass, redshift, D4000 and optical luminosity. Then, we compare the neighbors of radio galaxies to the the neighbors of the control galaxies. We also apply the Kolmogorov-Smirnov test to study the neighbors of radio AGN with high/low stellar mass, and high/low luminosity.

Results

The neighbors around LERGs are brighter than those around HERGs (see figure 1). Neighbors of radio galaxies are brighter than those of non-active galaxies of the same age, absolute magnitude, redshift and stellar mass of the the radio AGN.

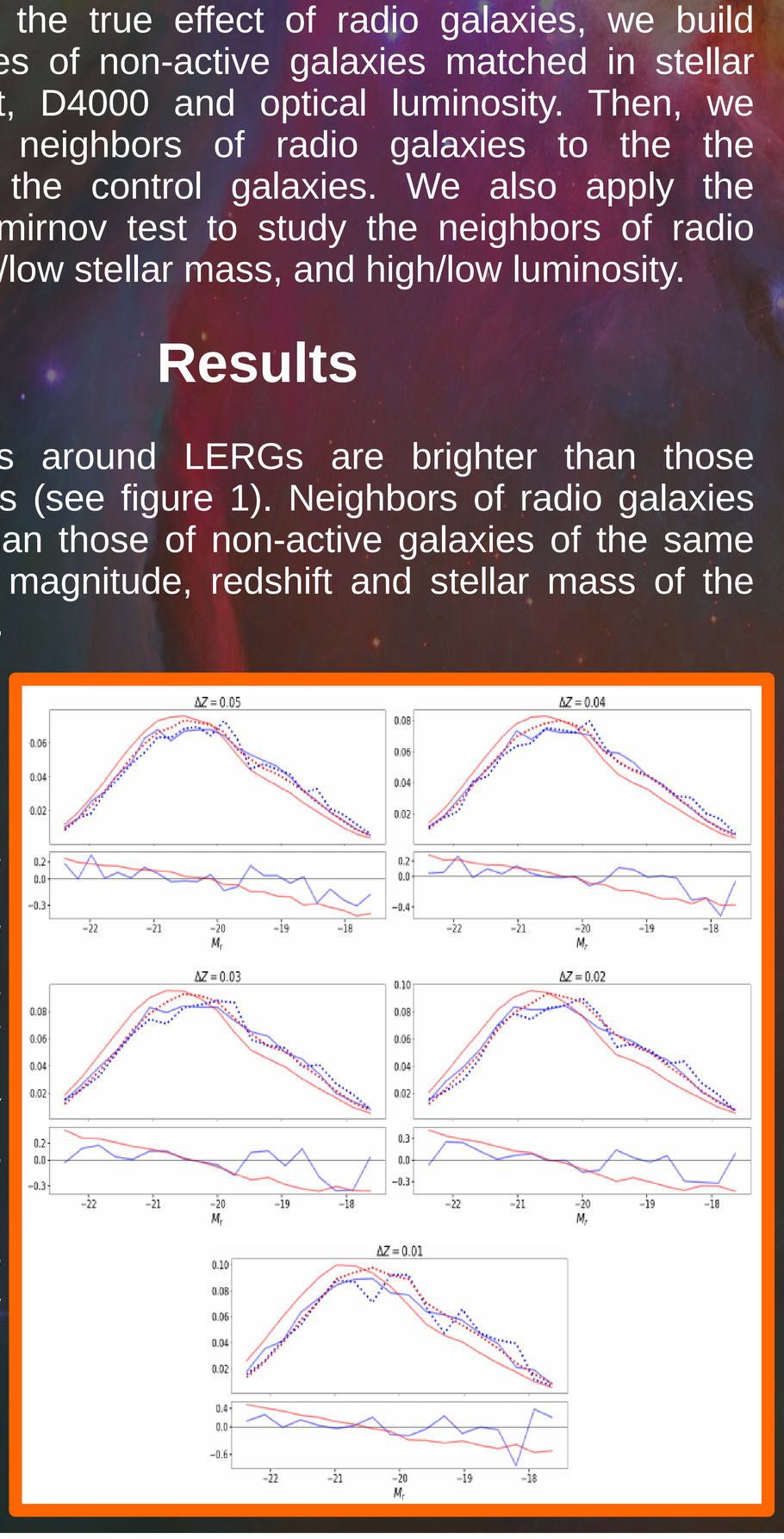

Figure 1: Solid red lines and blue lines are HERGs and LERGs distributions, respectively. Doted lines are control galaxies distributions. Lower boxes show differences betwen radio galaxies and control galaxies distributions, normalized. In all cases we consider Rp=1 Mpc.

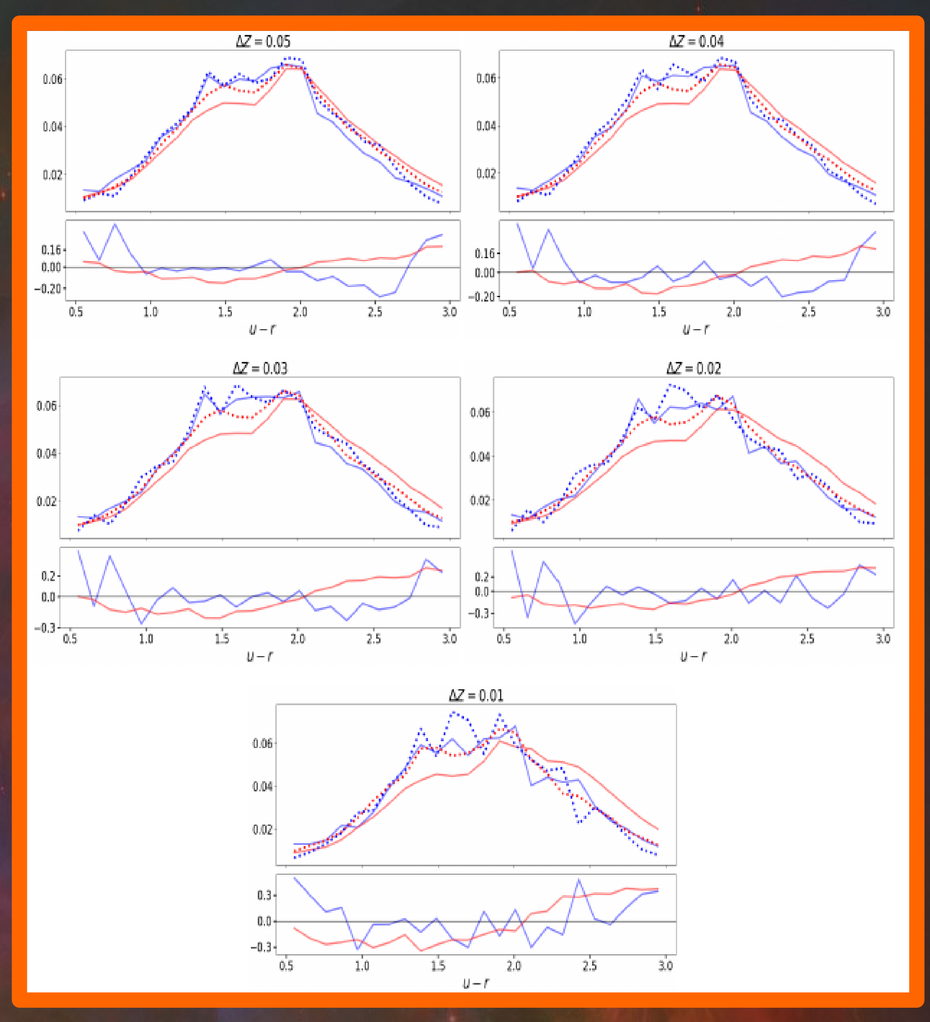

Figure 2: In all cases we consider Rp=1 Mpc.

Neighbors of HERGs are bluer than neighbors of LERGs (see figure 2) and neighbors of LERGs are redder than controls galaxies.
We also find that around radio galaxies of low stellar mass, the distribution of optical luminosity of neighbors of HERGs is similar than that of LERGs, while for larger stellar masses the distributions are different (see figure 3).

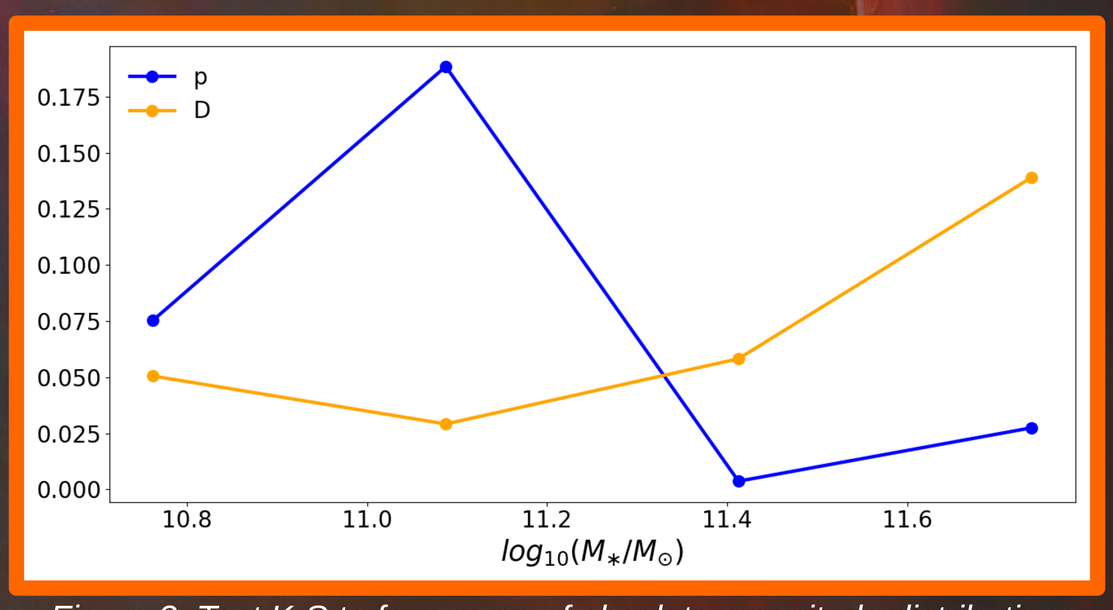

Figure 3: Test K-S to four pares of absolute magnitude distributions.

We also find that the absolute magnitude of neighbors of LERGs of high radio luminosity is quite diferent than that of control galaxies. This effect is, however, not present in low luminosity radio AGN

Conclusions

Our results suggest that LERGs inhabit dense enviroments like clusters or large galaxy groups, while HERGs belong to less dense groups.

The presence of a HERG or LERG can potentially influence luminosities and colors of other member galaxies in a group or cluster.

References

Best P. N., Heckman T. M., 2012, MNRAS, 421, 1569