Physical properties of compact groups and field galaxies in the Stripe 82 region

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Introduction

Interactions between galaxies play an important role in their evolution, generating changes in morphology, mass increase, chemical evolution, enhancement of star formation, and also play a role in the type of nuclear activity, thus making the environment of galaxies a key to understanding their evolution. Our goal is to analyze the physical and structural properties of galaxies located in dense environments and compare its properties with field galaxies.

Splus data

We study a sample of 1133 galaxies located in Compact Groups (Cgs) taken from Zheng et al. (2021) and Sohn et al. (2016) catalogues and 943 field galaxies, using the S-PLUS data in the Stripe 82 region.

Morphology and Stellar mass estimation

We use the vika et al. (2015) classification and find that there is a higher proportion of galaxies in late type for the field while for the CGs there is a higher proportion in the transitional and early type region. And we estimate the stellar mass of the galaxies using optical luminosities, g-i colors, and the recipe proposed by Taylor et al. (2011). We found that galaxies in the CGs reach higher mass values than galaxies in the field.

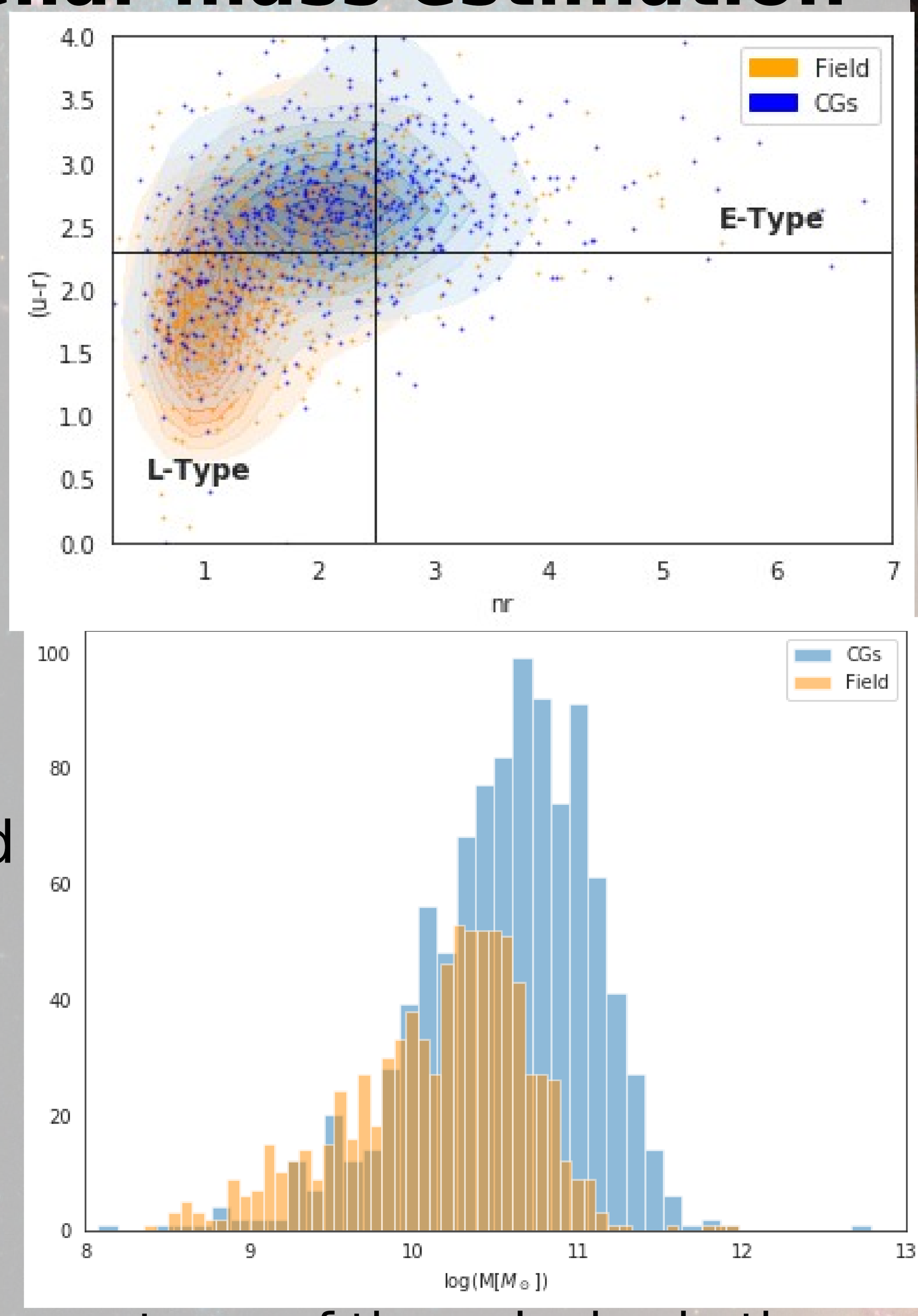


Figure 1: The upper plot are the contours of the galaxies in the field (orange) and in the CGs (blue) with the original data (dots). And the lower plot is the histogram for both environments

SDSS data: oxygen abundance

We estimate oxygen abundances derived from the R23 relation proposed by Pérez-Montero et al. (2006), and metallicity by N.V. Asari et al. (2007) for the star-forming galaxies.

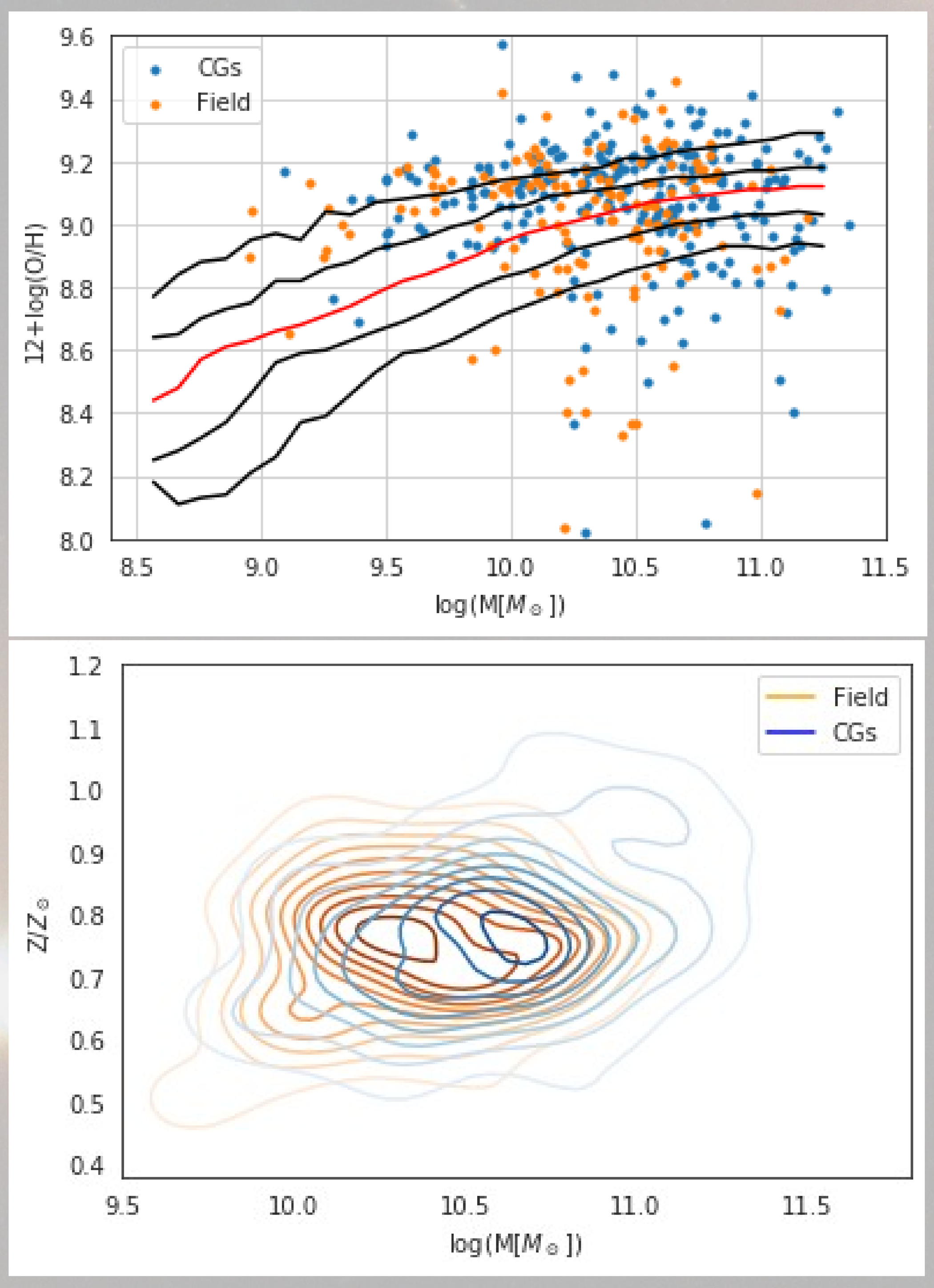


Figure 2: Oxygen ratio in galaxies in the field (orange) and in CGs (blue).The solid lines are the contours which enclose 68% and 95% of the data and the red line shows a polynomial fit to the data by Tremonti et al. (2004). Contours for the mass-metallicity relation for gas for star forming galaxies in the field (orange) and in CGs (blue).

SDSS data: BPT diagram

Differences in the relative contribution of CG and field galaxy populations, with more Liner galaxies in the CGs than in the field and more star-forming galaxies in the field than in the CG. And the transition region for field galaxies is dominated by nuclear activity, while for CGs it is dominated by galaxies with low emission lines.

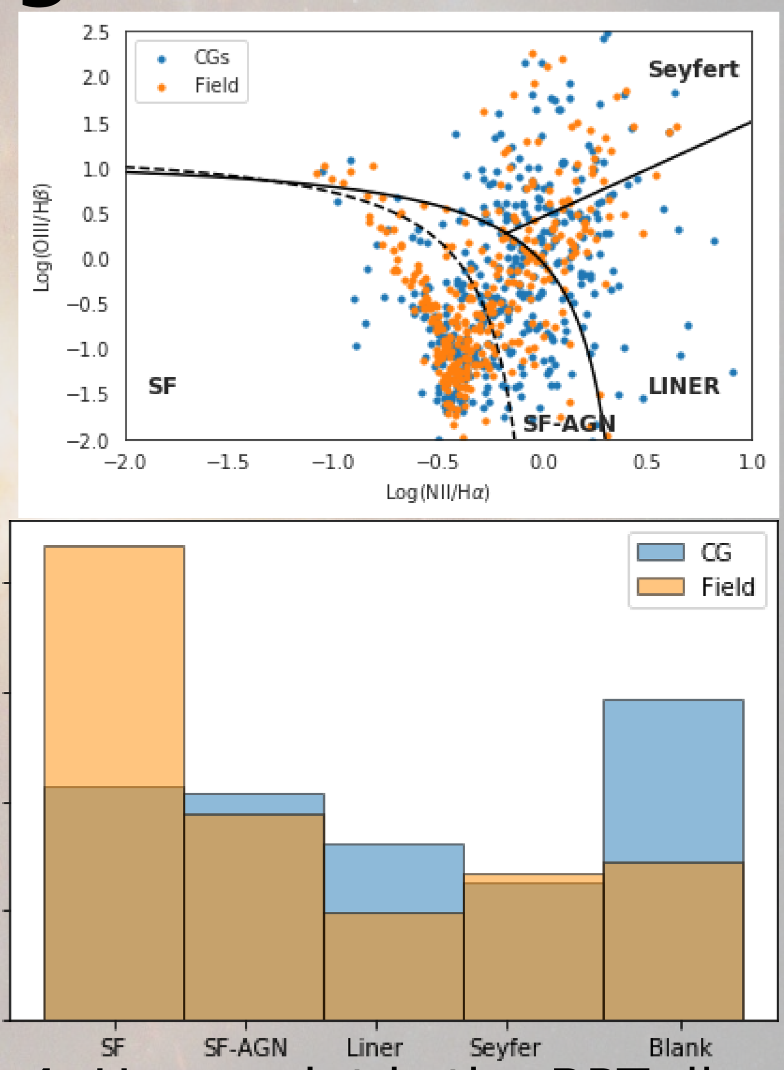
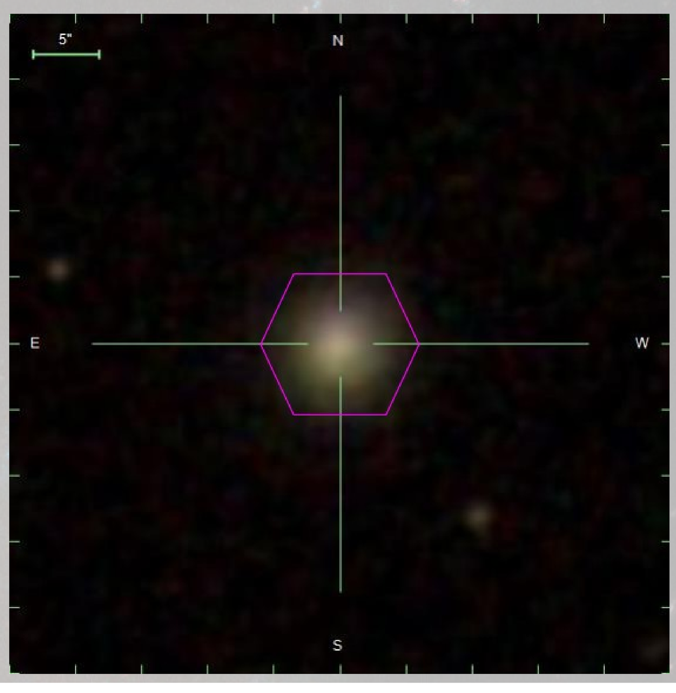


Figure 4: Upper plot is the BPT diagram for galaxies in the field (orange) and in CGS (blue), and the lower plot is the proportion of each type.

MaNGA

We cross-matched our S-PLUS data with Nearby Galaxies at APO (MaNGA) catalogs and found MaNGA 3D data for 36 galaxies in CGs and 28 galaxies in the field which we will use to study their kinematics and ionization mechanisms.



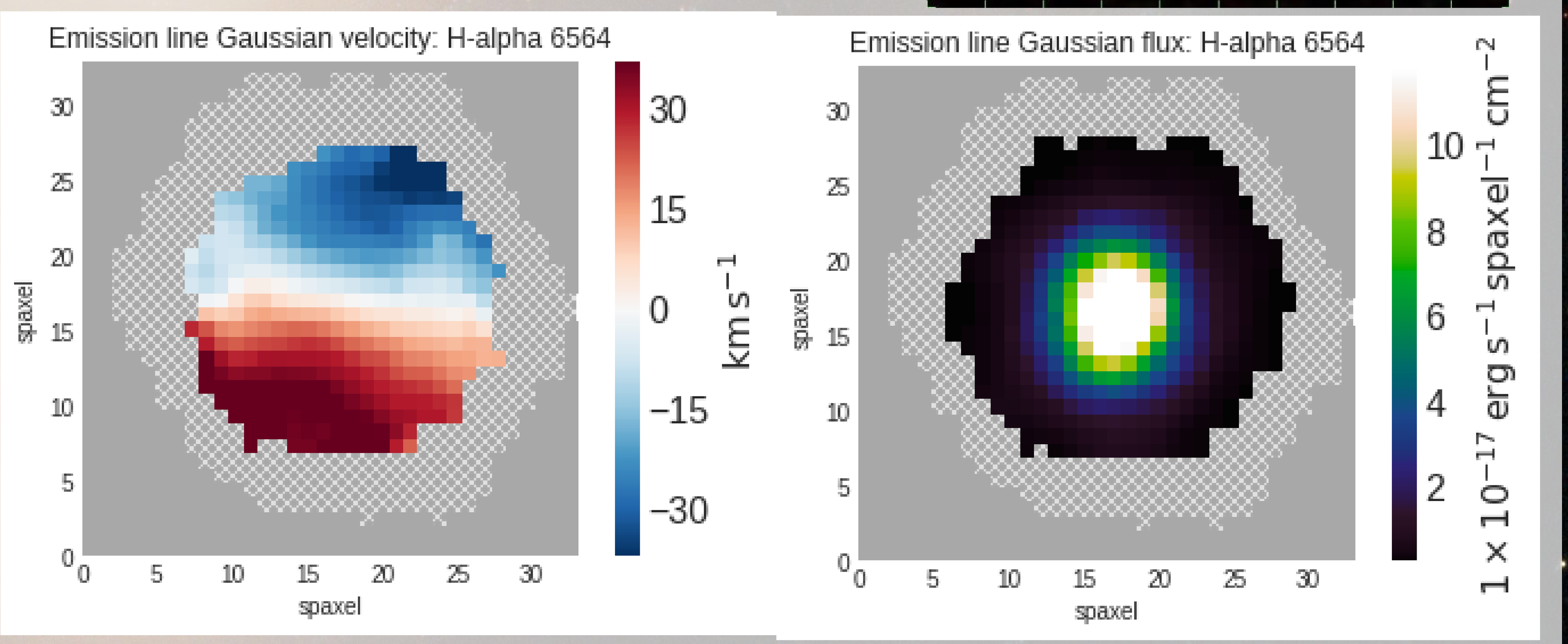


Figure 5: MaNGA maps resulting for a galaxy in a CG, the top image is the SDSS, the bottom left image is the velocity map for the Halpha emison line with S/N>10 for each spaxel, and the right image is the flux of this line.

Summary

- For the same metallicity values, higher mass values are observed for galaxies in CGs compared to the field data.
- We found a sub-sample of our original data in Manga that will allow us to study the ionization mechanisms and kinematics of these galaxies in the future.

Reference

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