GALAXY EVOLUTION IN GROUPS OBSERVED BY THE IFS MUSE, A DYNAMICAL APPROACH.

Valentina Abril-Melgarejo[1]

Supervisors: Benoît Epinat [1], Philippe Amram[1]

[1]Laboratoire d'Astrophysique de Marseille. INSU, CNRS : UMR7326, CNES, Aix Marseille Université

Abstract

Galaxies are strongly affected by their environment, various mechanisms seem to occur in dense environments to remove gas efficiently from galaxies. In particular, Star forming quenching and the build up of the red sequence happen earlier in dense environments than in field[1]. The goal of this project is then to understand the impact of the environment on galaxy mass assembly mechanisms and on the establishment of the Hubble sequence observed in the local Universe. The influence of the environment seems to begin to be effective between **0<z<1**, when cosmic star formation begins to decrease. Studying spatially resolved integrated properties of star forming galaxies, may help in better understanding the various processes responsible for the transition. However, up to now all this kind of studies have been performed independently from the environment influence due to the sample selection criteria and/or observational limitations.

Aims of the Project

- Study of the spatially resolved kinematics of SF galaxies in dense environments.
- Determine the impact of the environment in galaxy mass assembly → accretion of baryons into DM halos
- Comparison with similar studies in low density environments to probe the impact of the environment on the evolution mechanisms of galaxies.

Data Sample

This project is based on the exploitation of a unique sample from **GTO MUSE[4] VLT** (Multi Unit Spectrograph Explorer) observations targeted on galaxy groups at **0.3 < z <1.**

- These FoVs are part of the COSMOS survey, so our sample is complemented with high spatial resolution images from the **HST** in F814W band.
- **327** galaxies in total, from which **220** are in groups at **z~0.7** (See Table 1). In all the sample **~30% (98)** of the galaxies have active star formation from which **68** are in groups at **z~0.7** .

Table 1.

# of Groups according to T_{exp}	Redshift z	# SF galaxies/ Total
3 Deep Fields $T_{exp} > 5$h	~0.7	42/81
6 Snapshot Fields $1h < T_{exp} > 2.25$h	~0.7	26/139

Metodology Figure 1

- Extraction of the spatially resolved information of the ionized gas (Hα, Hβ, OII, OIII and SII emission lines), using the python code CAMEL →Observational rotation velocity and velocity dispersion. Figure 1 and Figure 2.
- Cleaning process based on S/N limits and a visual inspection assuring the selection of the suitable spaxels to be analyzed.
- Morphological analysis on the HST images using GALFIT to model the surface brightness (Figure 1 and Figure 3). Bulge-disk decomposition: De Vaucouleurs and exponential disk profiles.
- Kinematic modeling to obtain the maximum velocity rotation and σ.

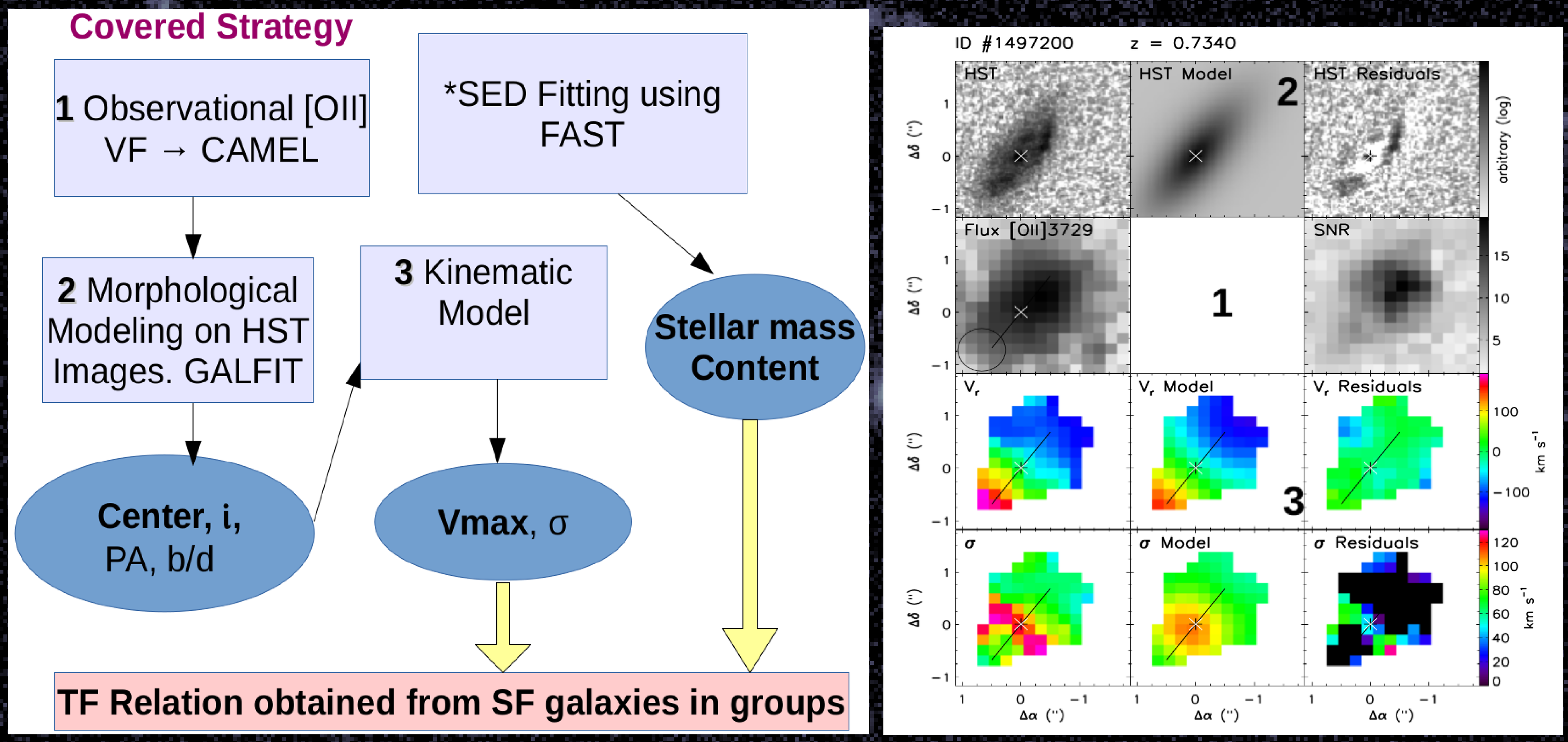

Figure 1. **Left:** Scheme of the followed methodology to obtain the Tully Fisher relation. **Rigth:** Specific example ilustrating each step of the process.

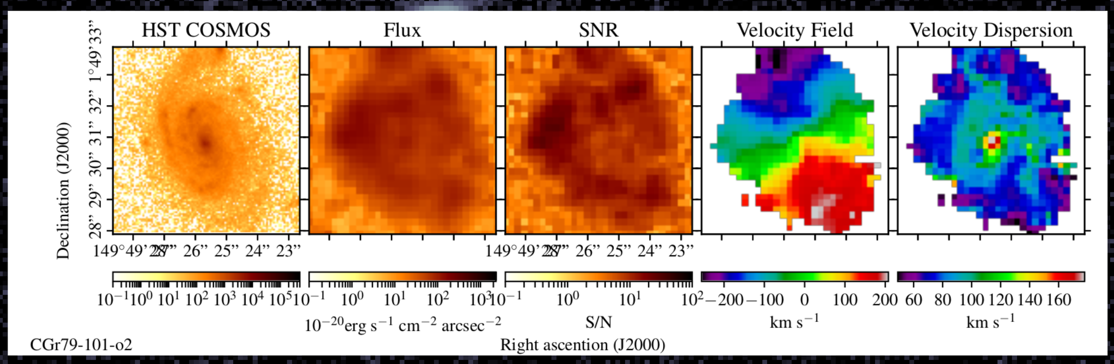

Figure 2. From left to right, HST F814 image of galaxy 101 of group 79, MUSE Flux map of OII , Signal to Noise, Velocity field and Velocity dispersion maps.

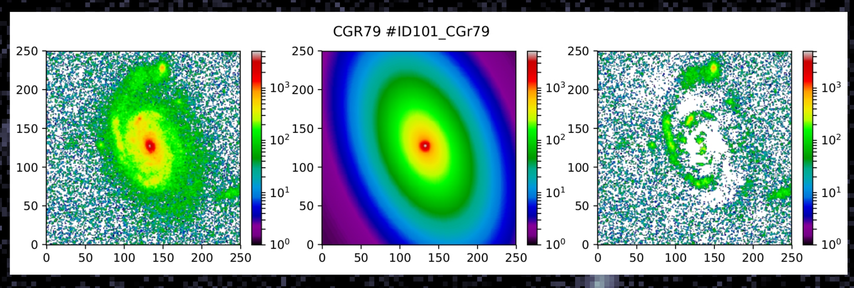

Figure 3. From left to right, HST F814 image of galaxy 101 of group 79, GALFIT model of the surface brightness and Residual.

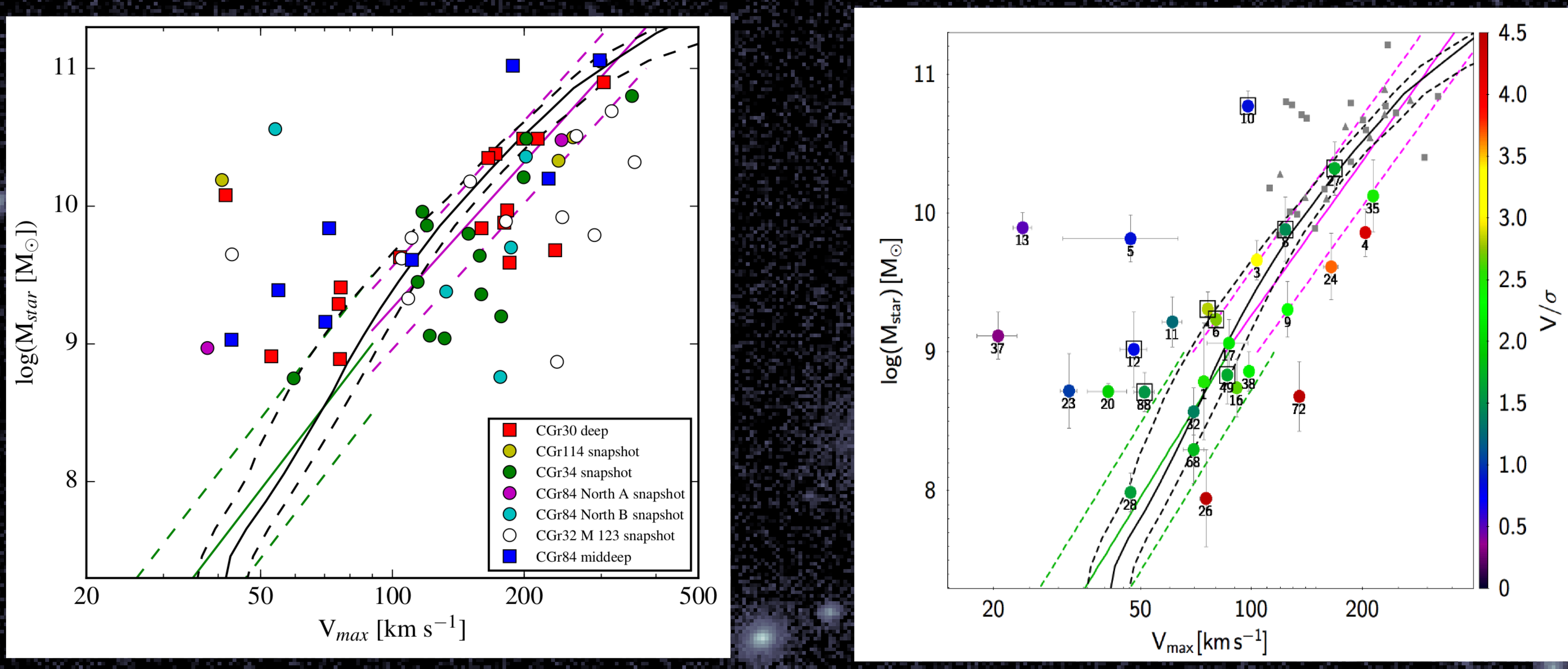

Figure 4. Left: Preliminary Tully Fisher relation (TFR) for galaxies in groups obtained with our analysis. Rigth: TFR obtained in field galaxies in Contini et al. 2016.

Preliminary Results

In Figure 4 Left, we present a preliminary result of the TFR for galaxies in groups compared with the same relation for isolated galaxies from the analysis of Contini et al. 2016[3]. Although for now we still don't see strong differences we already have dynamical information for 61 galaxies suitable for deeper analysis. We observe some dispersion which has to be constrained by the determination of uncertainties on Vmax and the determination of the dynamical support. We already have a first advanced draft of our first paper with this sample. We processed also galaxies at other redshifts which give us the possibility of expand our analysis to more local galaxies.

Future Work

- Make the calculation of uncertainties for Vmax
- Use information on sigma (e.g. to infer the dynamical support: rotation-dominated or dispersion-dominated)
- Perform other analyses of galaxy kinematics (angular momentum, dynamical mass)
- Use of additional new deep data from three MUSE fields (currently in reduction)
- Produce a draft for publication within the next months
- Determination of the stellar kinematics to study on the structure and evolution of the passive galaxies.

References:

1. Peng et al. 2010, **ApJ** 721, 193
2. Epinat et al. 2018, **A&A**, 609, A40
3. Contini et al. 2016, **A&A**, 591, A49
4. Bacon et al. 2015, **A&A**, 575,A75

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@contact : valentina.abril@lam.fr