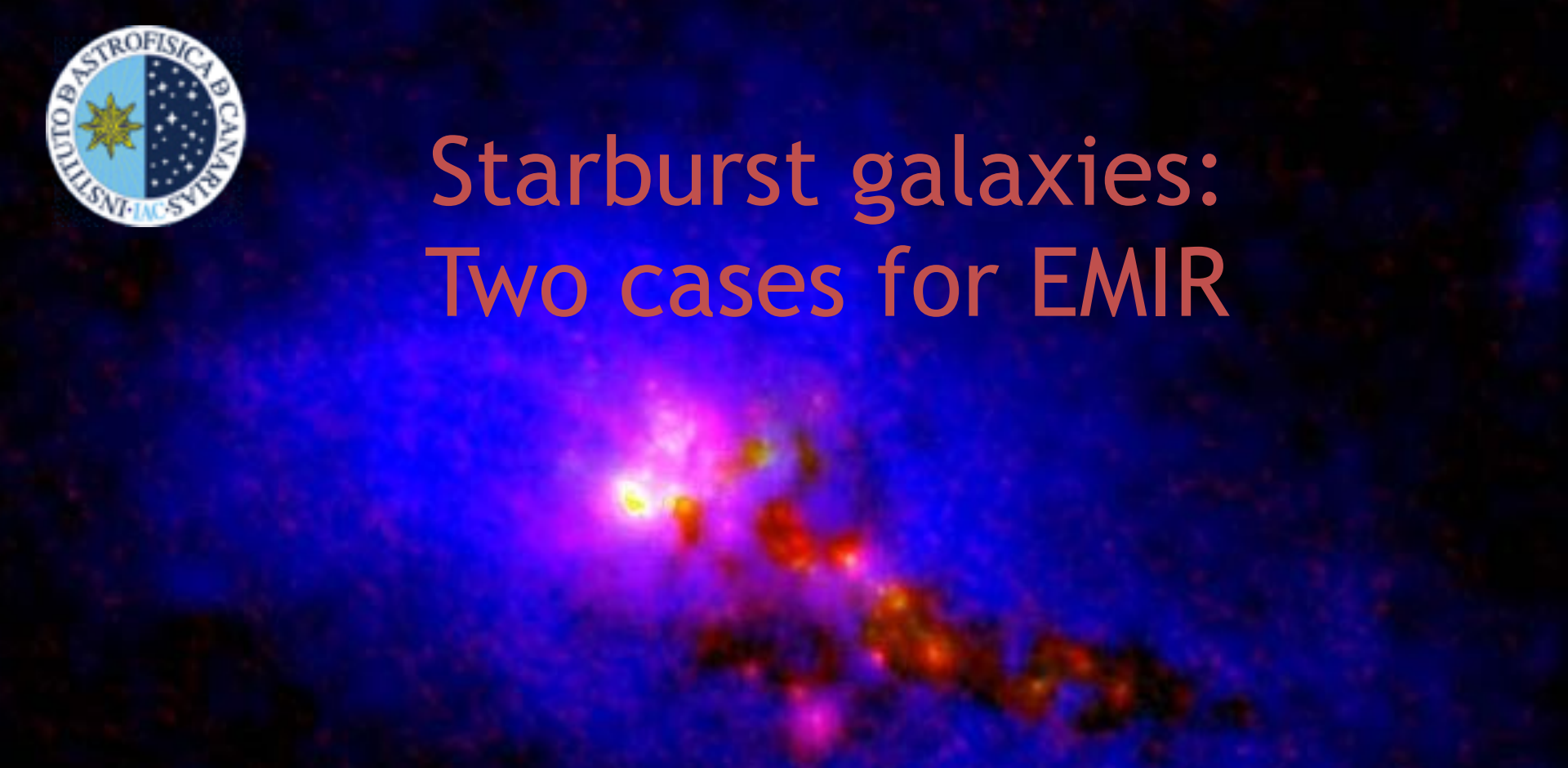
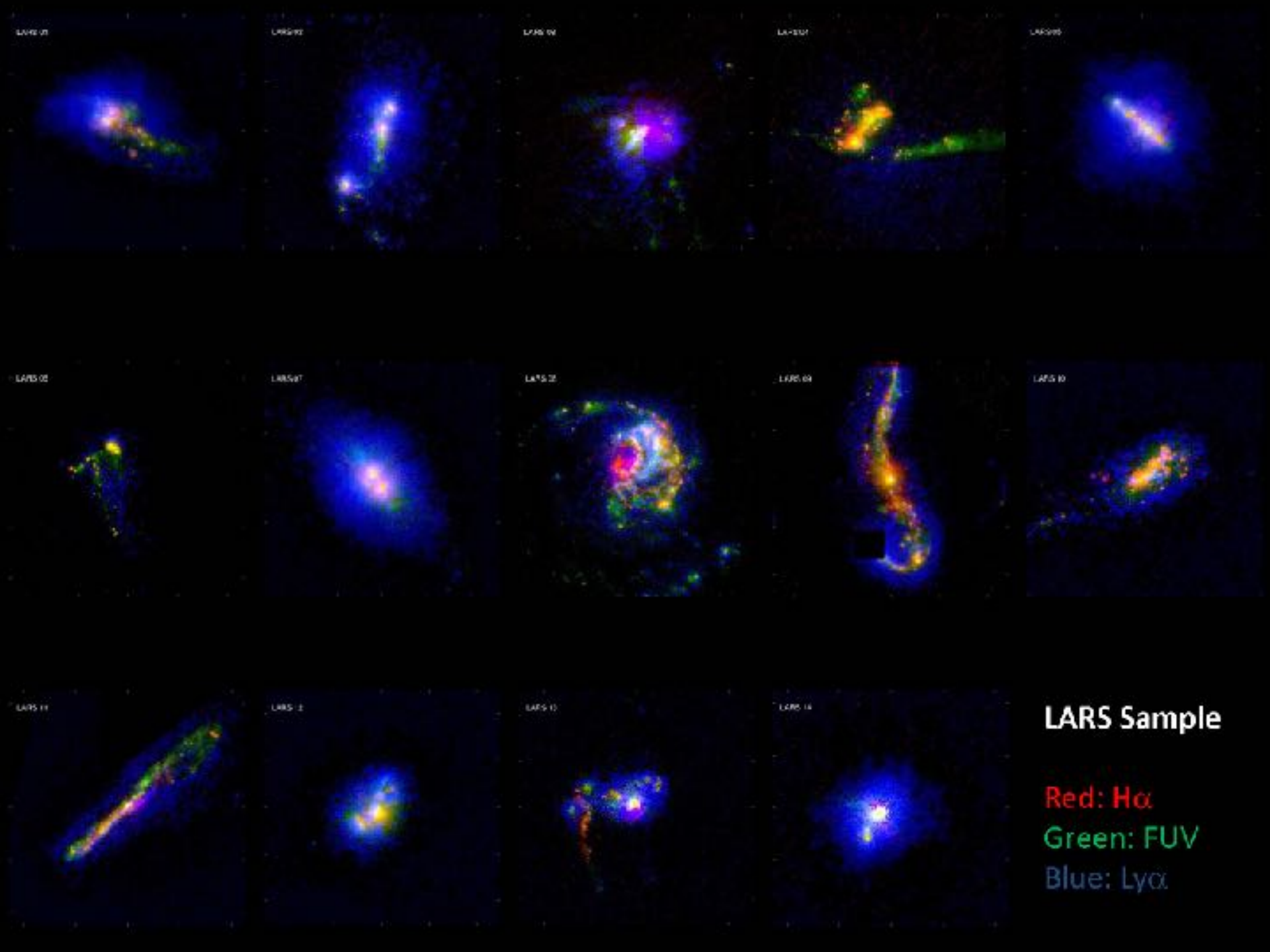
Starburst galaxies: Two cases for EMIR



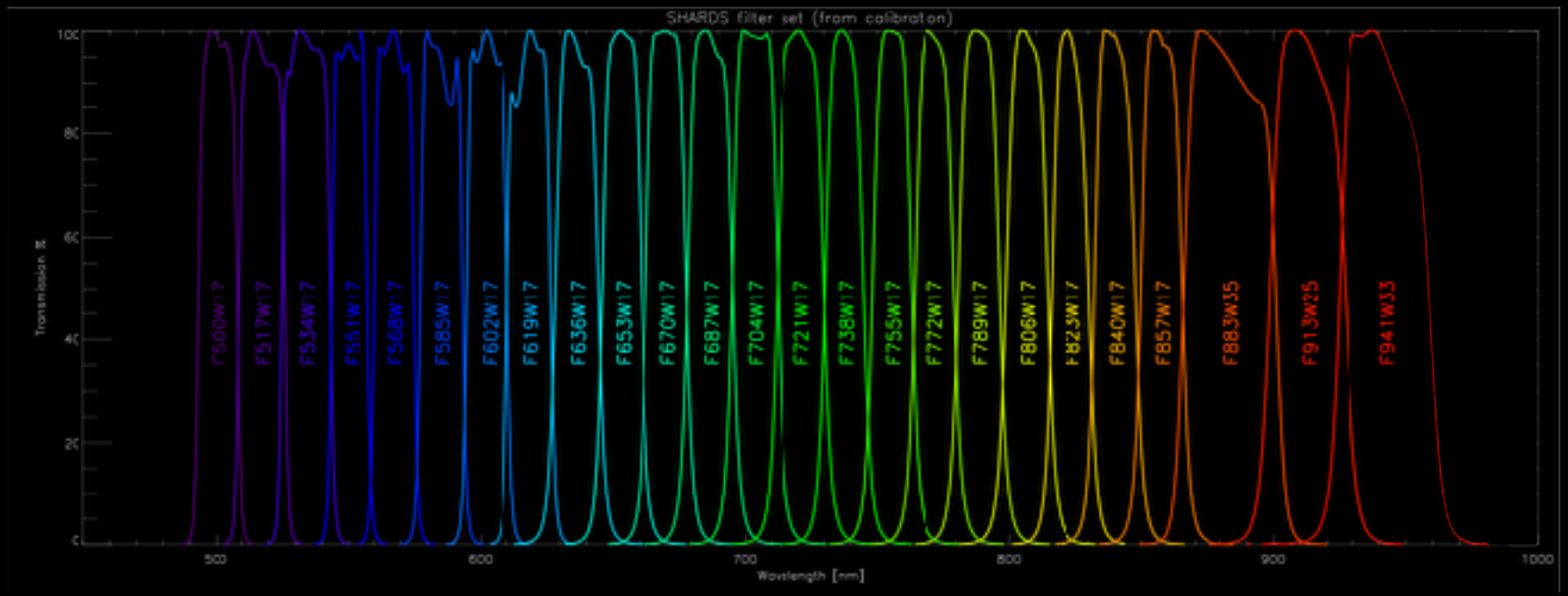
Casiana Muñoz –Tuñon, Jorge Iglesias Páramo (IAA),
Jose M. Rodríguez Espinosa, Ricardo Amorin
Barbieri (IoA),
& *estallidos*_EMIR

"Science verification and commissioning proposals : Starbursts"

- Cases for EMIR for studying starbursts galaxies: One about star-forming galaxies in Clusters at z=2; and a second one to study particular cases from COSMOS/ GOODsN/CANDELS surveys of galaxies at z=2, 6. *(estallidos)*
- *Strong LAEs at median-hight z.*
- *SF galaxies in clusters at z=1,2.*

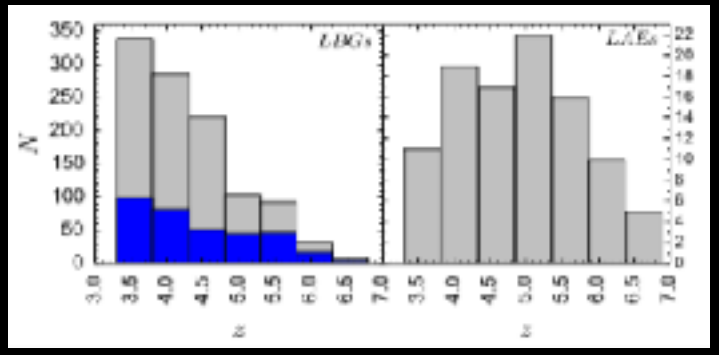

LARS Sample
Red: Hα
Green: FUV
Blue: Lyα

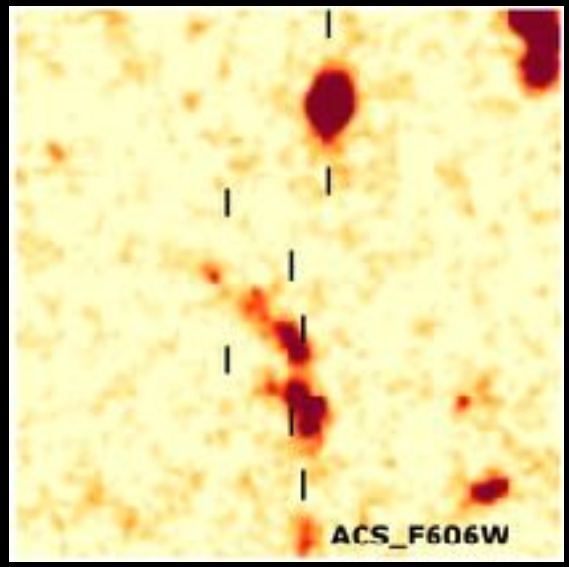
SHARDS FILTERS @ GTC



High_Mid-z sources with EMIR

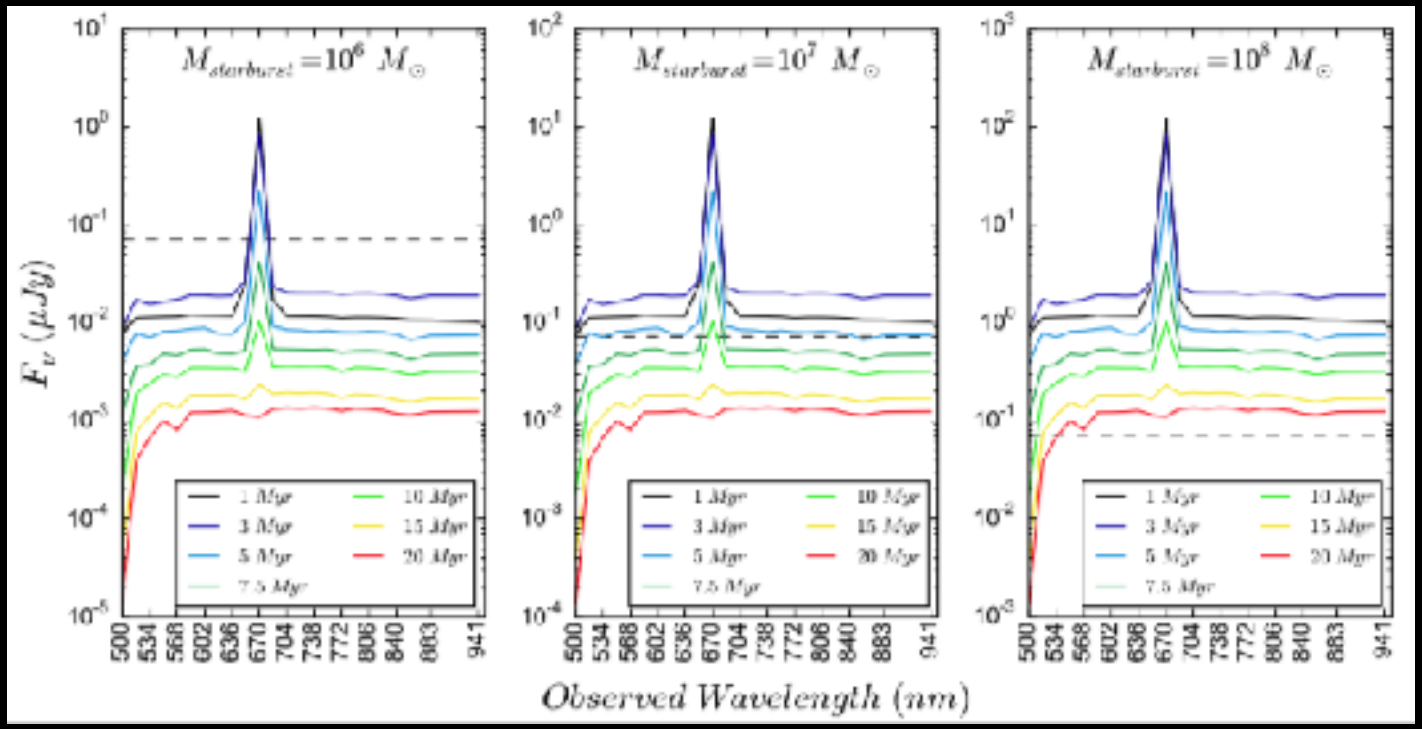
- The SHARDS survey has been investigated for LAEs and LBGs
- We have used the SHARDS filters to get advantage of their number and small width
- This has allowed to detect the Lyα line as well as the UV rest-frame continuum
- We have found over 1500 LAEs and LBGs, many of them in clusters
- We have characterised their redshifts and star formation rates and Luminosity function

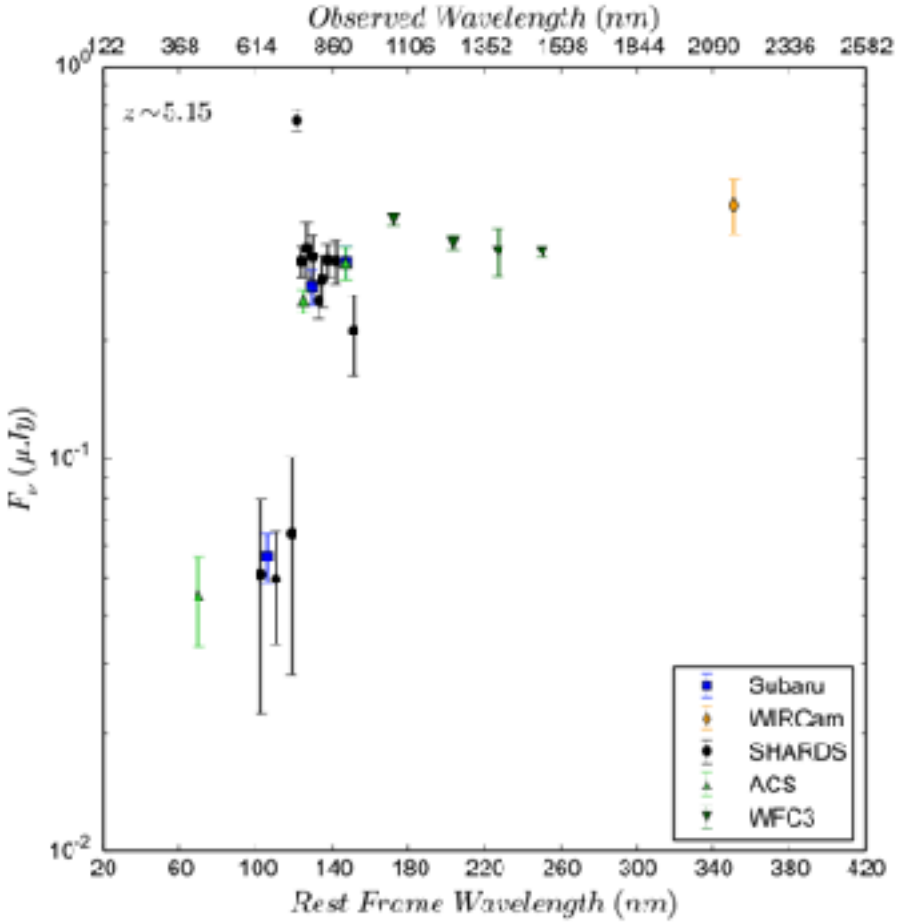




LAEs & LBGs

- The SHARDS filters allow to detect simultaneously both Lyα and LBG sources
- We have shown that both Lyα & LBG sources are members of the same family
- In particular, we find that pure LAEs are young sources with masses ≈10^7 $M_\odot$
- Besides LAEs last no longer than 10-15 Myear



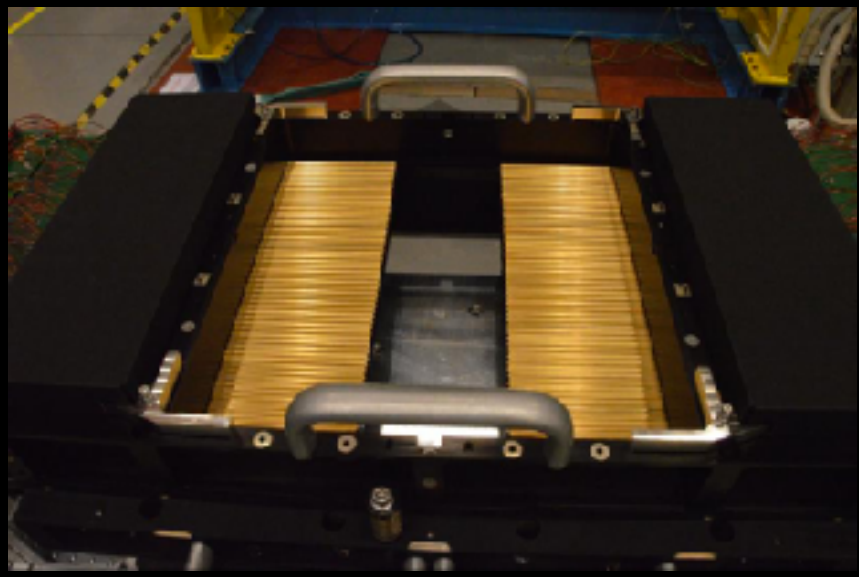


Arrabal et al. 2017 ApJ to be submitted

Figure 2. SED of the candidate SHARDS10005512, a LBG with emission line at 747.5 nm corresponding to the Lyα line at redshift z~5.1. To make this spectral energy distribution we made use of all the surveys available in the Rainbow Database with reliable information on this galaxy. Notice that all emission blueward of the line goes down abruptly, while to the red the UV continuum can be easily seen. The SHARDS images of this same object are shown in Fig. 3.

EMIR

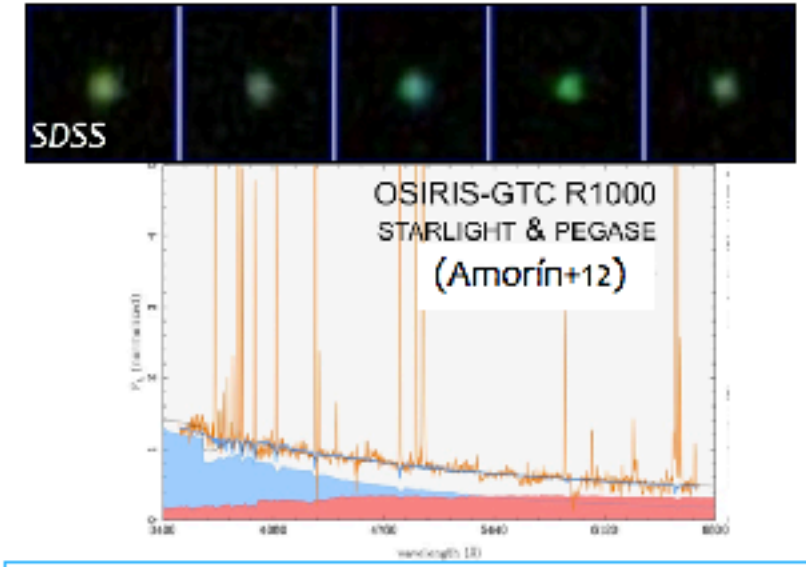
- Little is known about the properties of these sources, other than the Lyα line (LAEs) or the rest-frame UV continuum (LBGs)
- With EMIR we should be able to observe metallic lines such as CIII]1908Å, CIV1546Å, OIII]1666Å and HeII1640Å in objects at z> 4
- This will allow determining metallicities if these high-z sources
- An ideal project for EMIR MOS spectroscopy



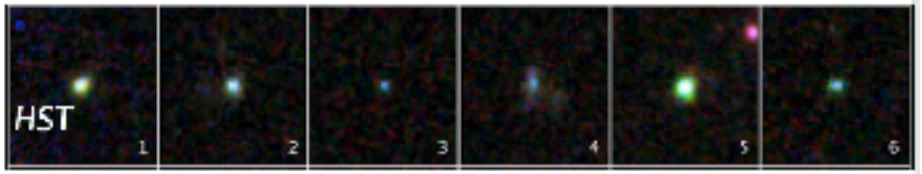
EXTREME EMISSION-LINE GALAXIES FROM LOW TO HIGH REDSHIFT

A substantial population of low-mass starbursts has been discovered due to their very large nebular emission in spectroscopic surveys (rest-frame EW(OIII)~100-2000 A)

Locally EELGs are extremely rare
(e.g. *Green peas* at z~0.2; Cardamone+09, Amorín+10,12)

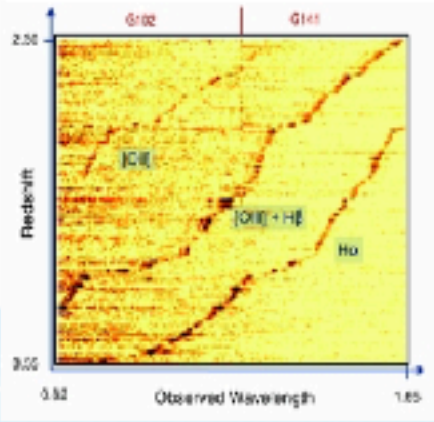


Towards z~1-2 EELG number densities increase rapidly (~2 dex)

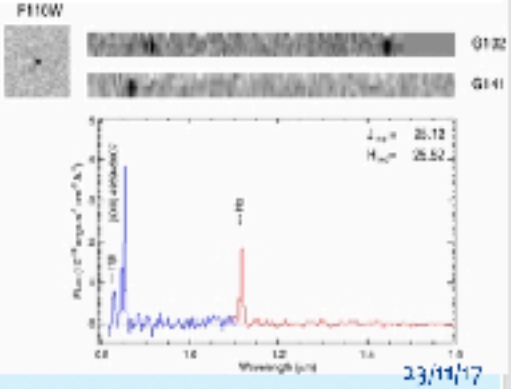


Low-mass starbursts at z=1.8 in CANDELS GOODS
(van der Wel+11, Maseda+14)

HST grism spectroscopy have provided the largest samples (e.g. van der Wel+11, Atek+14)



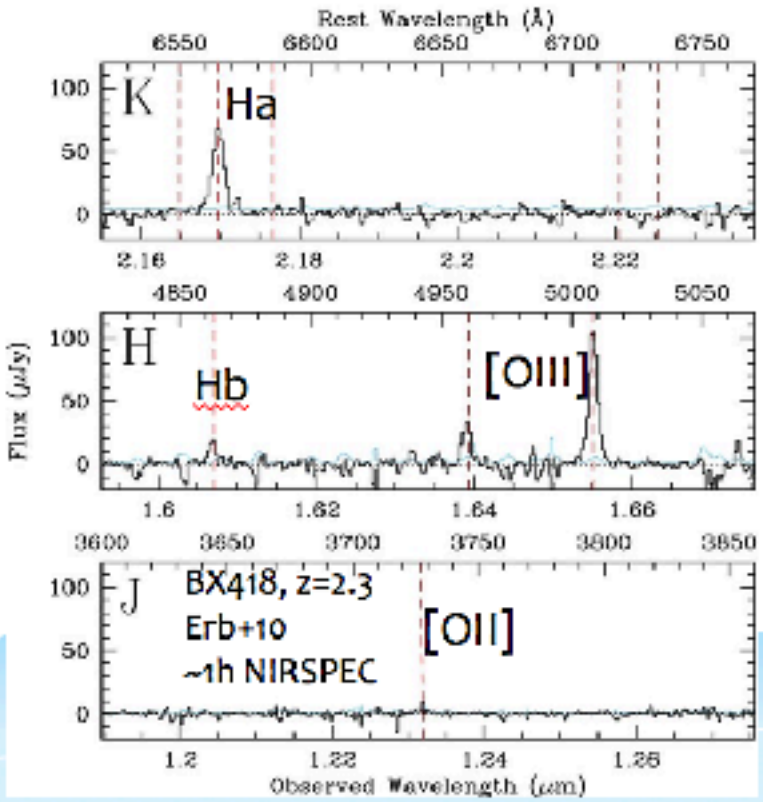
WISP Survey (From Atek+11)

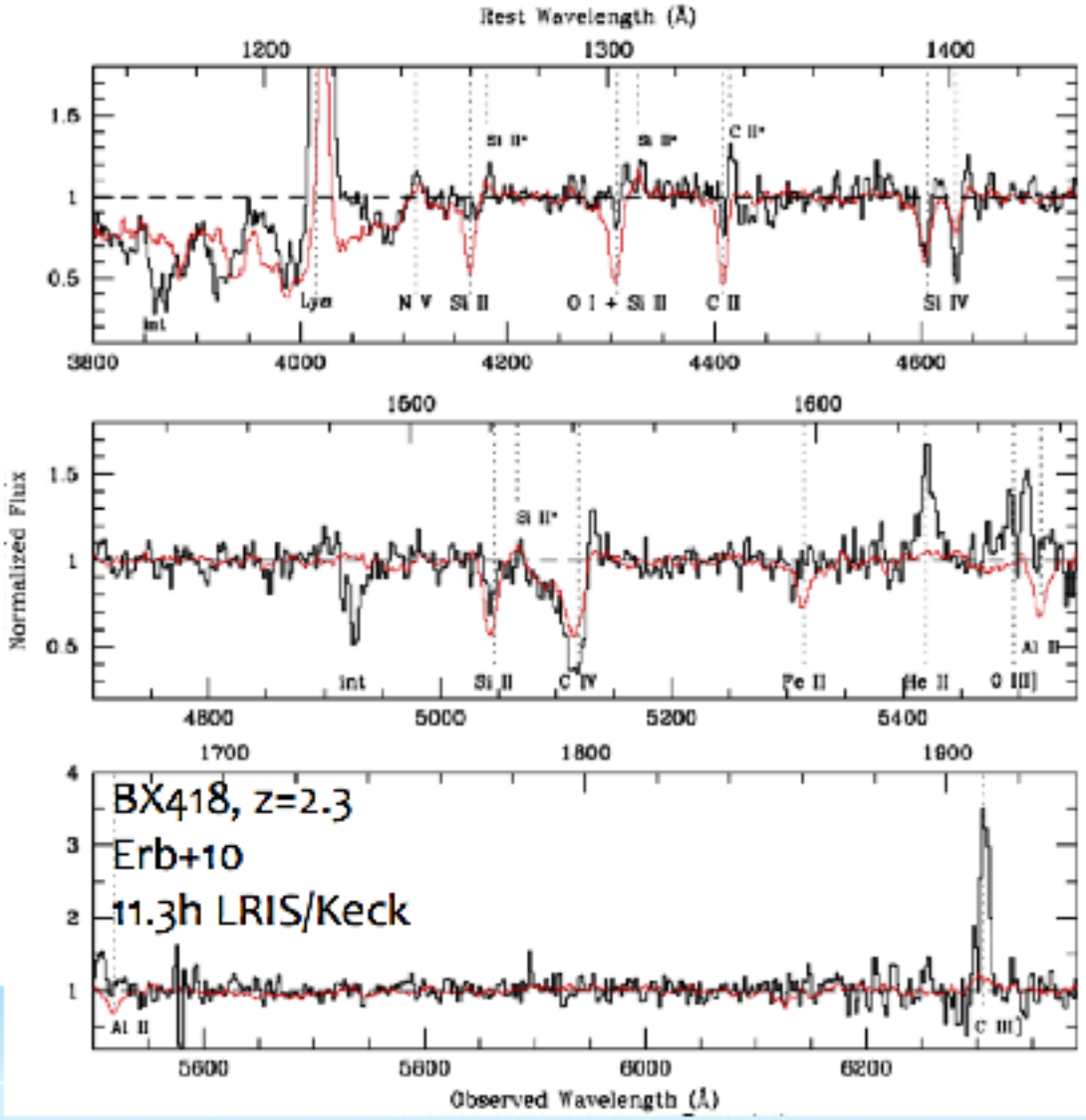


Very compact & young galaxy-wide starbursts:
High SSFR, low-metallicity, high ionization …
Galaxies in early stages of their evolution
Nearby analogs of UV luminous galaxies z>4

The rest-frame UV spectra of EELGs at z≈2

The rest-frame UV spectra show large EW nebular emission lines which are rarely seen in spectra of more massive SFGs (e.g. CIII]1907,1909, OIII] 1661, 1666, HeII 1640 and CIV 1548,1550).





For the sample in COSMOS @ z 2 Hα and Hβ

- In the K band we will observe the Hα line as well as the Hβ line in the H band
- Having Lyα, Hα & Hβ allows to obtain the extinction, the escape fraction & the density of ionising photons

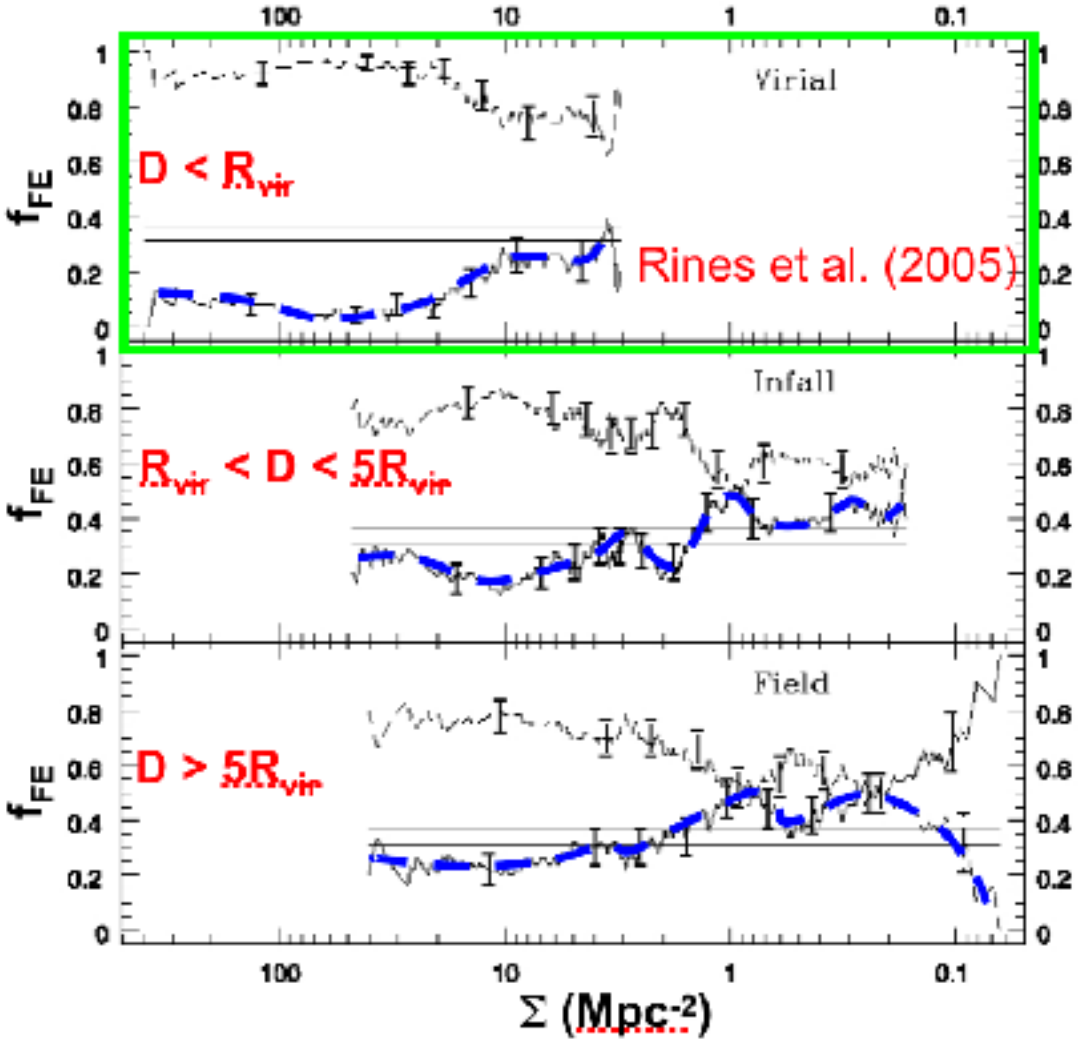


Scientific motivation

Local Universe (z~0)

SF – density relation

The fraction of star forming galaxies (f_{SF}) decreases when the local density of galaxies increases: Balogh et al. (2004), Tanaka et al. (2004), Rines et al. (2005).



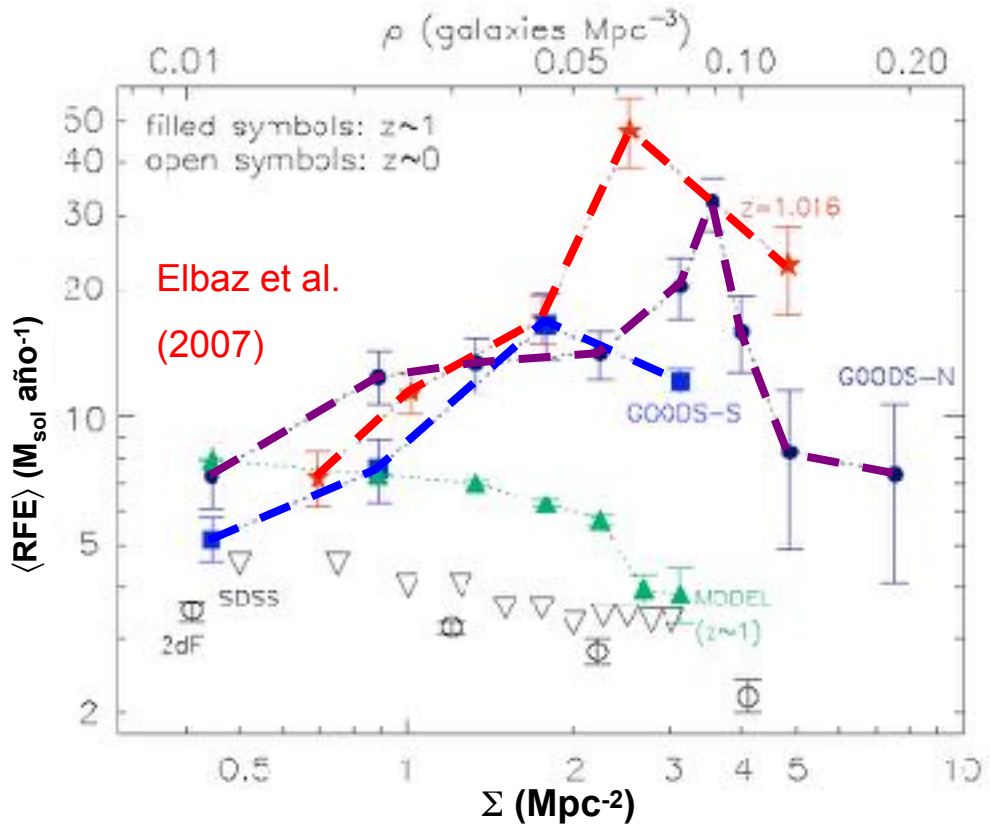
Scientific motivation

Elbaz et al. (2007) found a **revearsal of the SF – density at z~1.**

Are strong starbursts expected near the center of distant clusters?

Which is their nature and origin?

How do they evolve?

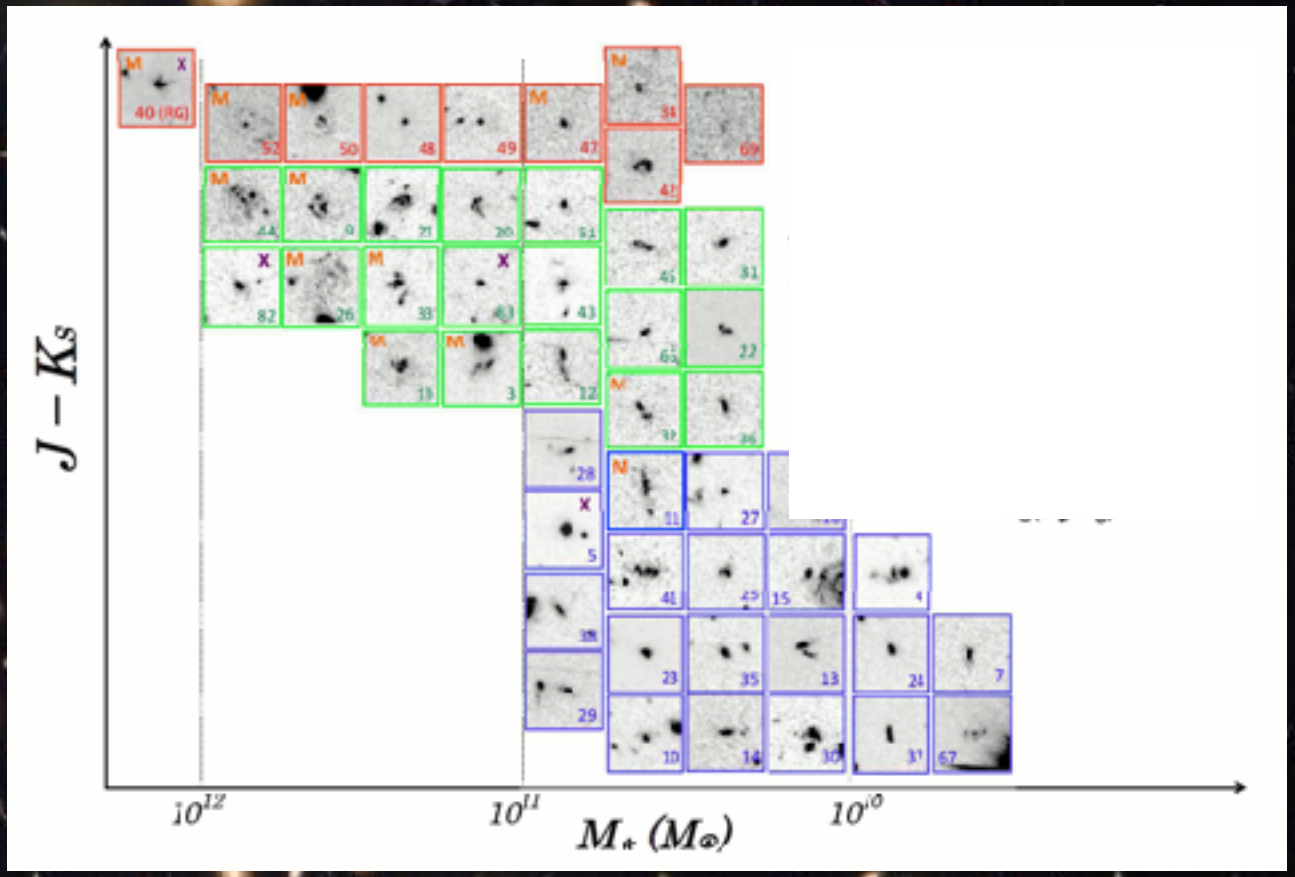


Scientific motivation

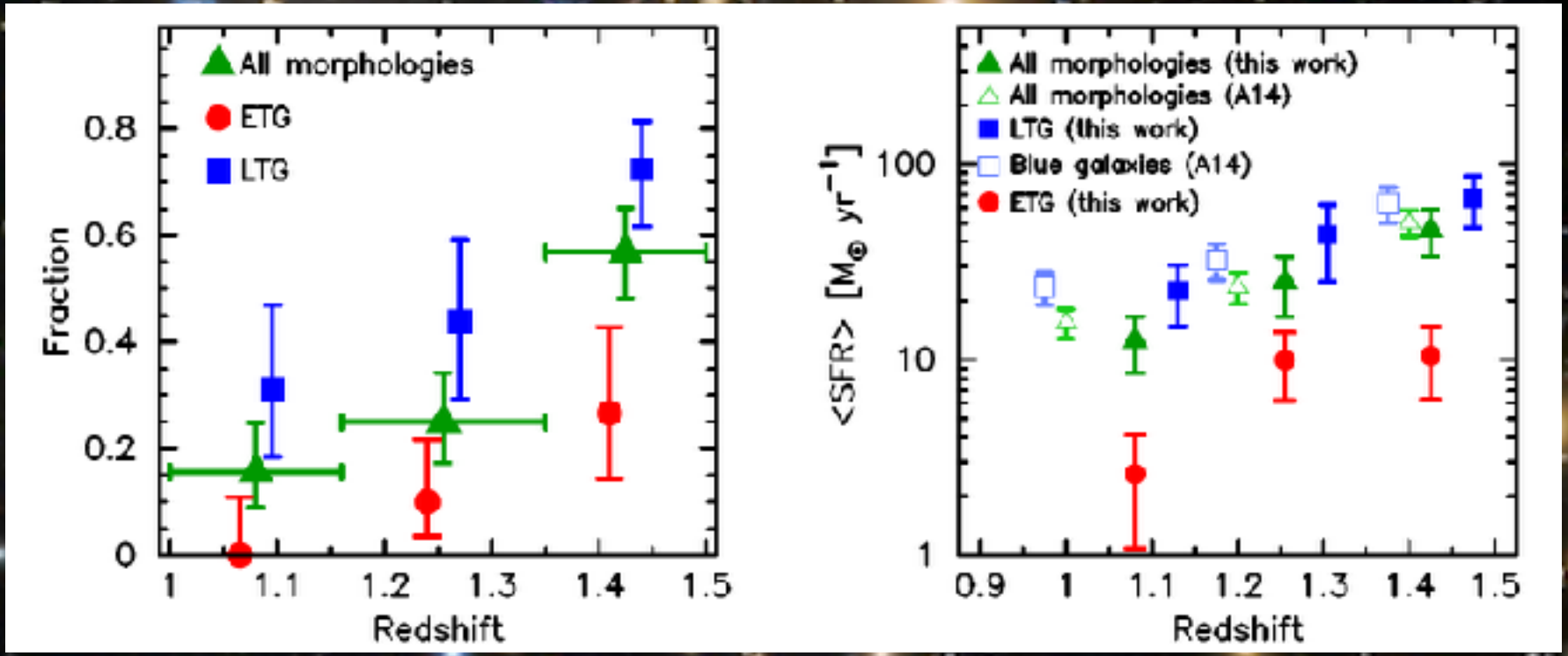
Koyama et al. (2012) found Hα emitters at z~2.1 (MOIRCS @ SUBARU)

Hα emitters found along ~10Mpc scale filaments around two proto-clusters at this redshift.

Same SFR – Mstar relation as for field galaxies.



Scientific motivation



The fraction of SF galaxies and the average SFR in clusters increase with redshift (Wagner et al. 2015).

MACS J0717+3745 (credits NASA/ESA and the HFF team)

Goals

To determine the cosmic evolution of SFR and metallicity of cluster galaxies:

- Which are the mechanisms regulating the SFR and the metallicity evolution of galaxy clusters?

- Comparison with field galaxies at high redshifts (Steidel et al. 2014).
- Is z~1.2 the limit between two different regimes of mass assembly of massive galaxies?

NIR spectroscopy with EMIR of distant dense galaxy structures at different redshifts (Wen et al. 2011; Söchting et al. 2012; COSMOS; UDS; IDCS; etc…).

Instrumental setup

MOS spectroscopy with YJ grism of clusters at 0.95<z<1.35.

Esperamos unas 4000 emisores en Halfa por grado cuadrado (~15 dentro del campo de EMIR), from Zeinmann et al. (2012) con f/Halpha)>10^-16 erg s^-1 cm^-2

Suponiendo que son fuentes puntuales, necesitaríamos un tiempo de ~2x1800s para obtener SNR<5 para f(Halpha)>10^-16 erg s^-1 cm^-2

