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The role of starbursts in the formation and evolution of galaxies

... or what I could figure out about that in three weeks in Tenerife ...

Outline

1. Introduction and open questions
2. Previous work on the field COSMOS
3. Overview of fields and data (photometry and spectra)
4. Sample selection and current work
5. Future developments

1. Introduction

- Star forming bursts play a key role in the evolution of galaxies
- The processes involved in the formation of disks aren't yet completely clear
- Bulge formation could be caused by massive clumps of star formation
- Star formation feedback is a fundamental parameter in numerical simulations

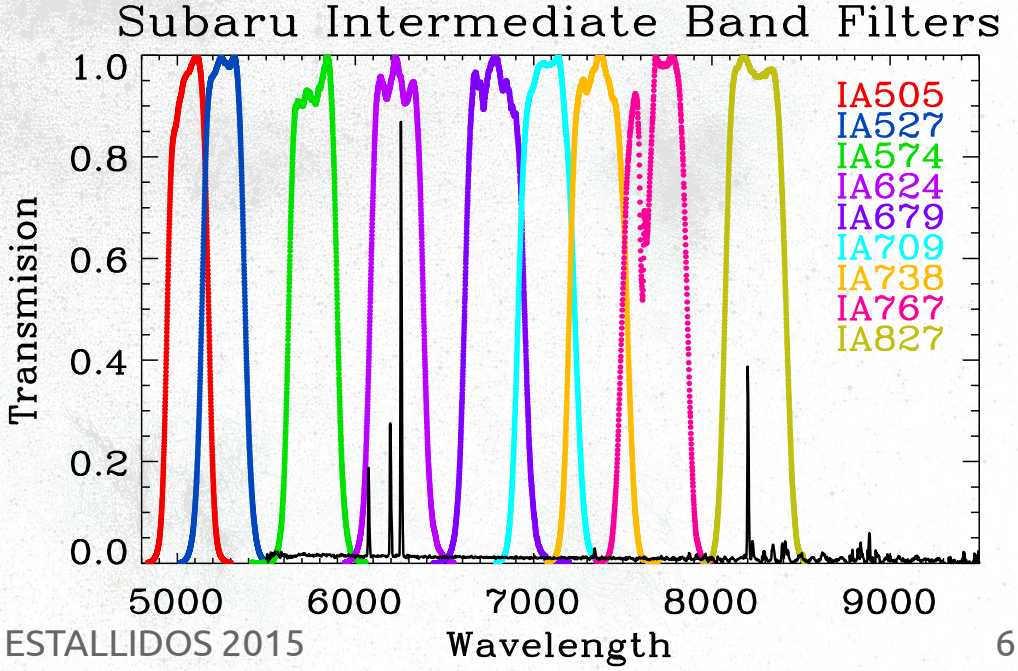
1. Open questions

- Do starbursts trace disk formation?
- Do they experience positive or negative feedback?
- Are they triggered by pristine gas or halo gas inflows?
- How do their number and properties evolve with cosmic time?
- Are there relations between the parameters (mass, number, density) of the star forming knots and those of the host galaxy?

Hinojosa-Goñi et al. 2015 (to be submitted)

2. Previous work on the field COSMOS

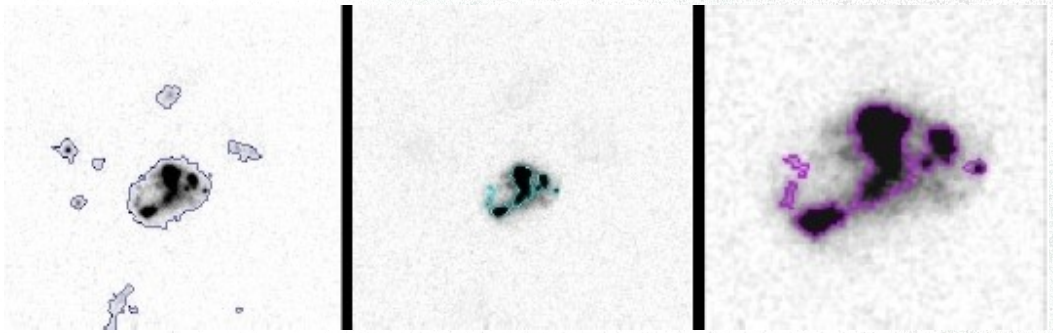
- Equatorial field
- 2 sq degrees
- 9 Subaru intermediate band filters (gaps)
- HST deep imaging
- zCOSMOS spectroscopic catalog

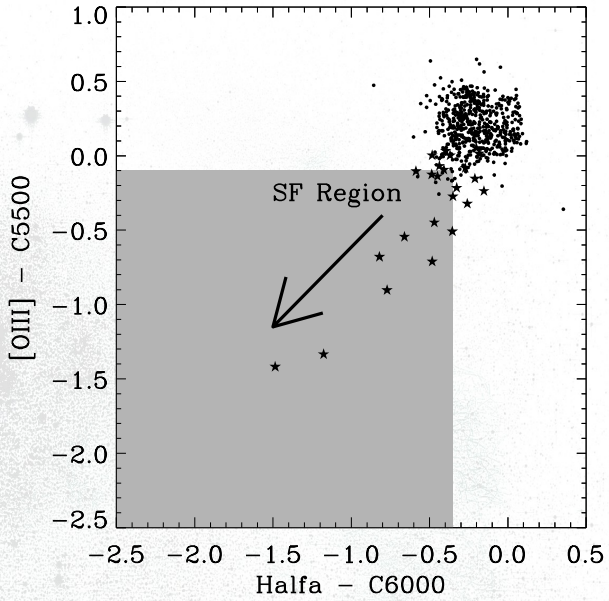


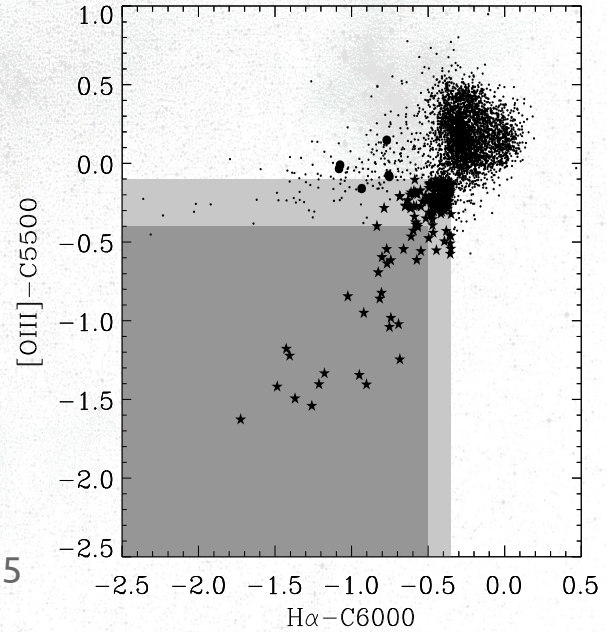
Hinojosa-Goñi et al. 2015 (to be submitted)

2. Previous work on the field COSMOS

- EW>80 A for Hα and OIII in zCOSMOS
- Define colours (depending on z) for OIII and Halpha
- Z∈(0.007 – 0.074), (0.124 – 0.177) and (0.23-0.274)
- Photometric and morphological analysis of SF knots



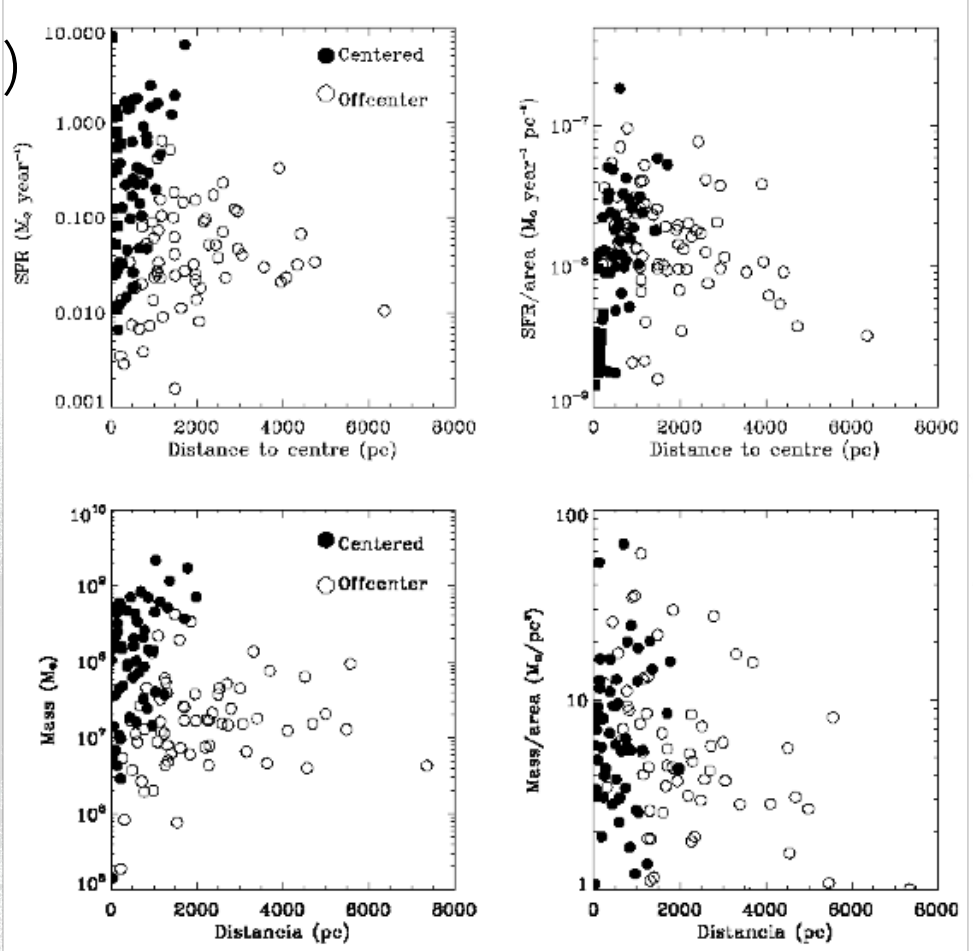


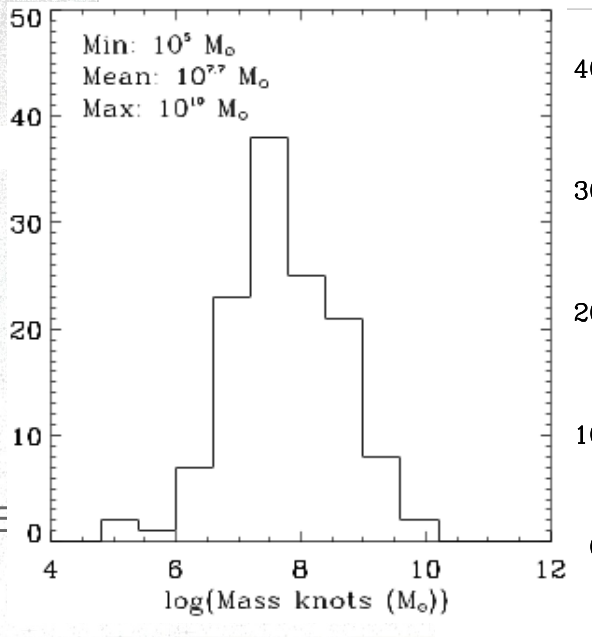


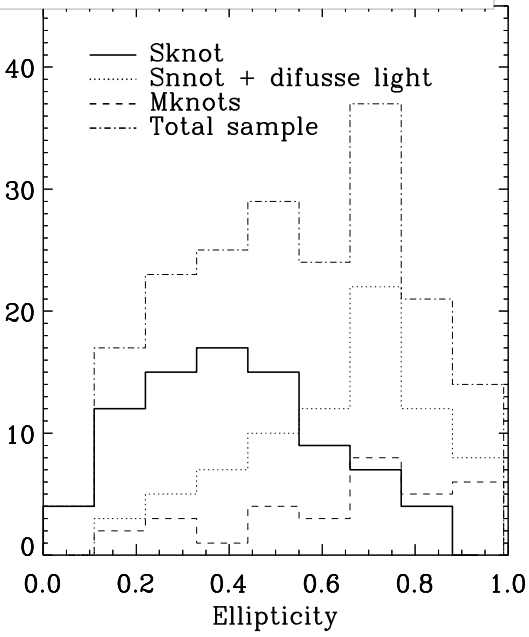
Hinojosa-Goñi et al. 2015 (to be submitted)

2. Previous work on the field COSMOS

- Starburst galaxies in COSMOS have mean masses of log (M)=8 Msun.
  - 83/220 are Sknot
  - 79/220 are sknot+ difuse light
  - 32/220 are mknots
- The knots are “similar” (SSFR)
- The more massive are bigger and they are in the centre of the galaxy.

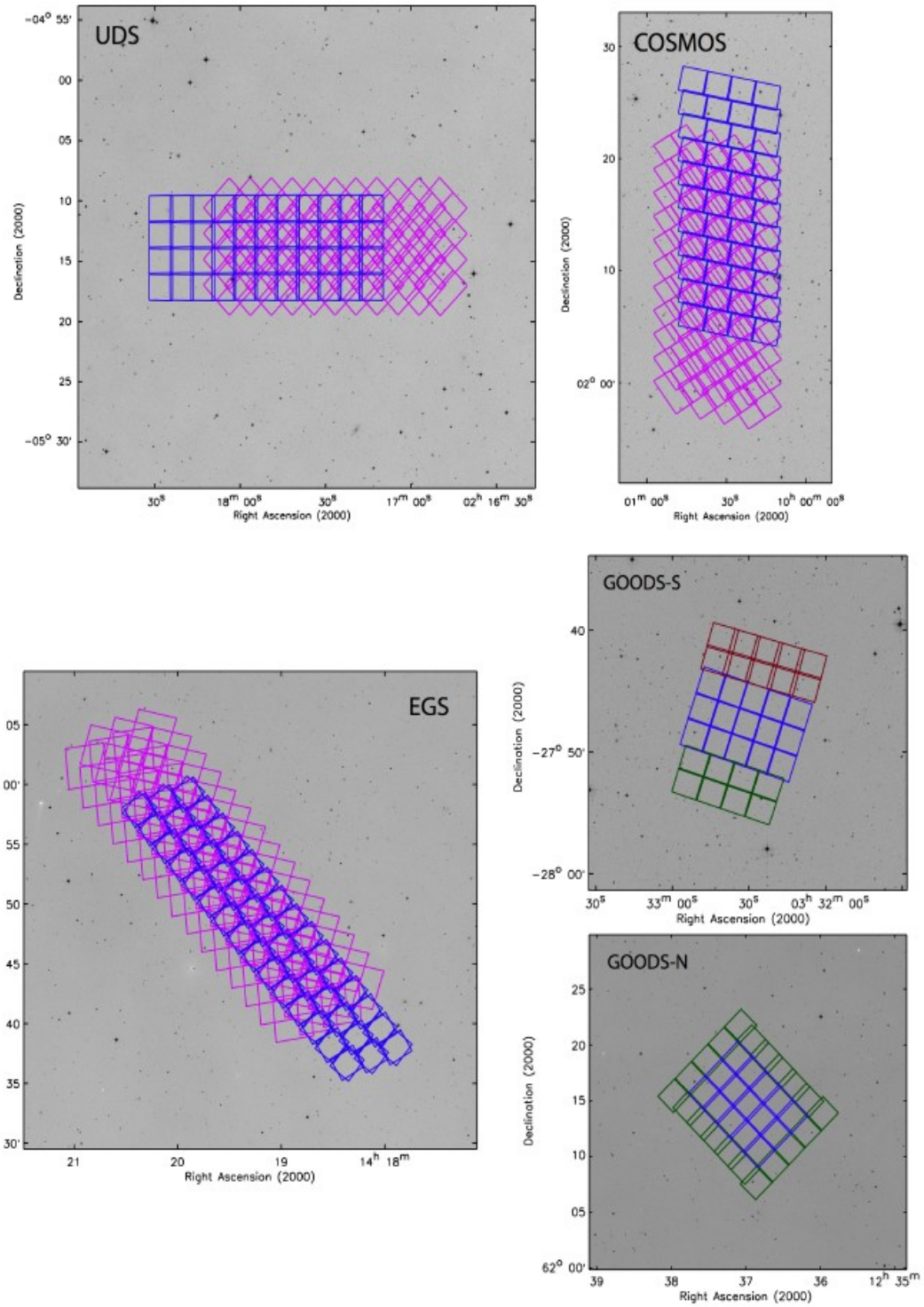






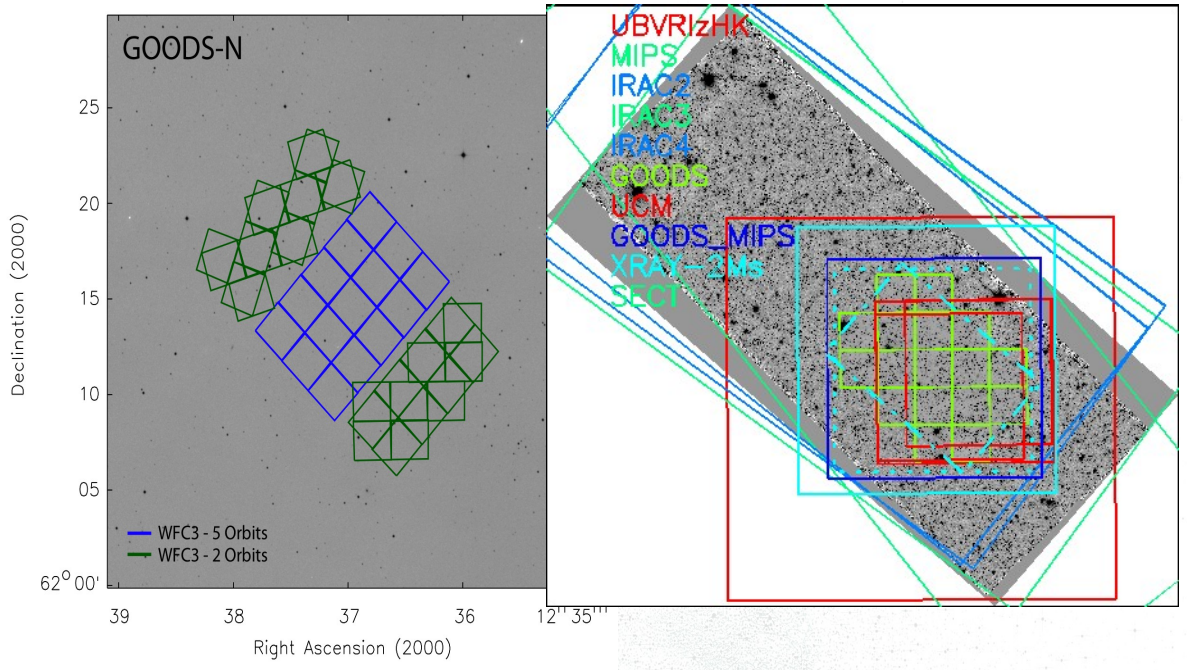
3. Deep fields CANDELS

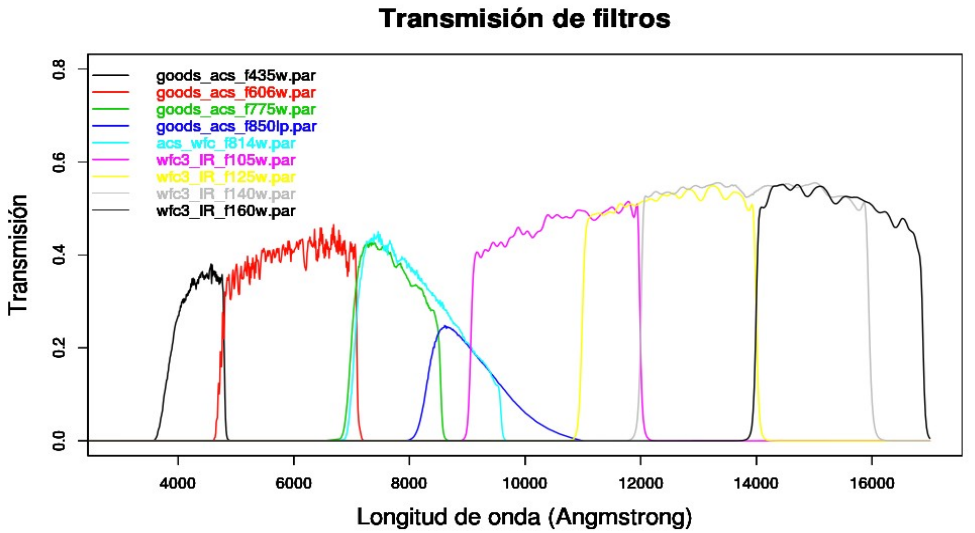
- To use this approach, we need
  - Deep imaging
  - HST observations for morphological analysis
  - Wide spectral coverage
  - Narrow band filters (Subaru-like)
  - Spectral data on a subset of sources



3. GOODS - North

- HST wide band deep images
- Wide spectral range (IR)
- Substanial amount of sources with spectra
- Observable from La Palma
- No intermediate band filters observations from Subaru

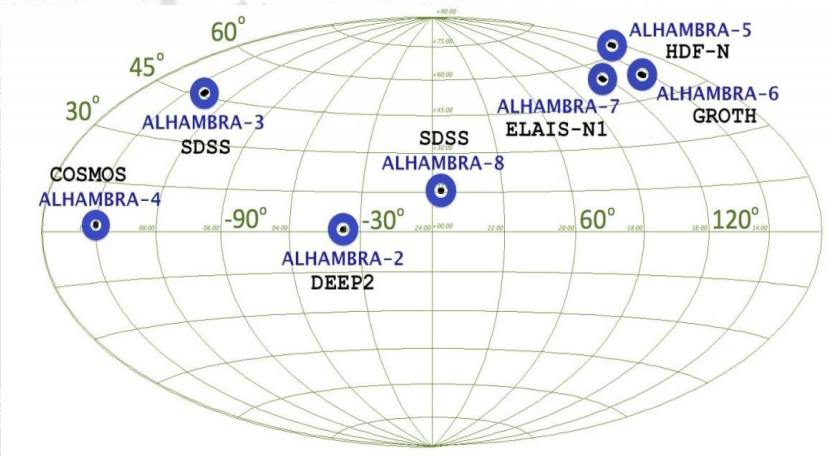


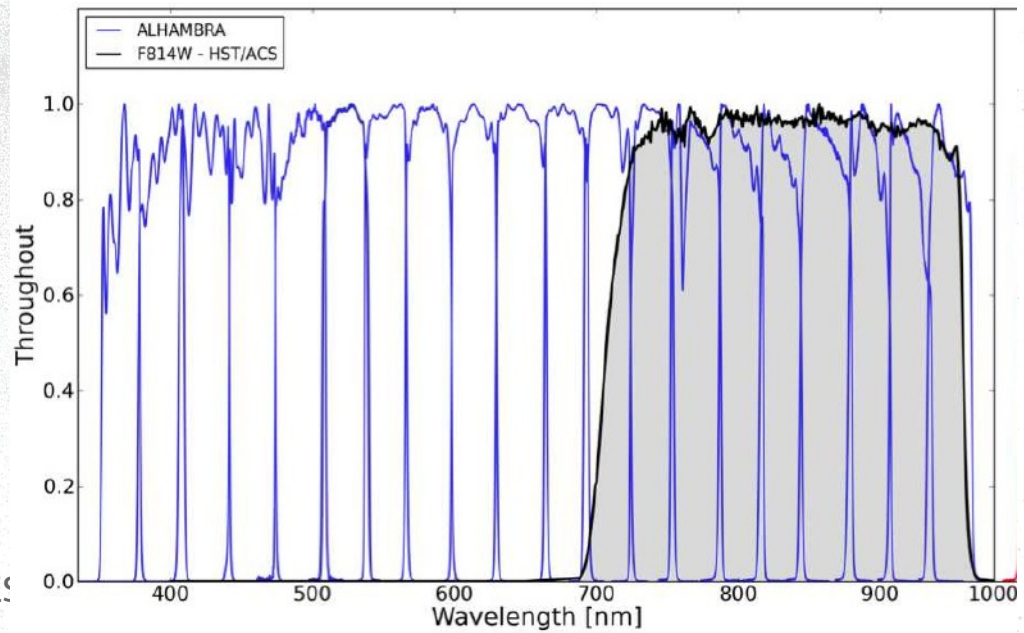


Gold Catalogue (Molino et al. 2013)

3. ALHAMBRA survey (very appropiate)

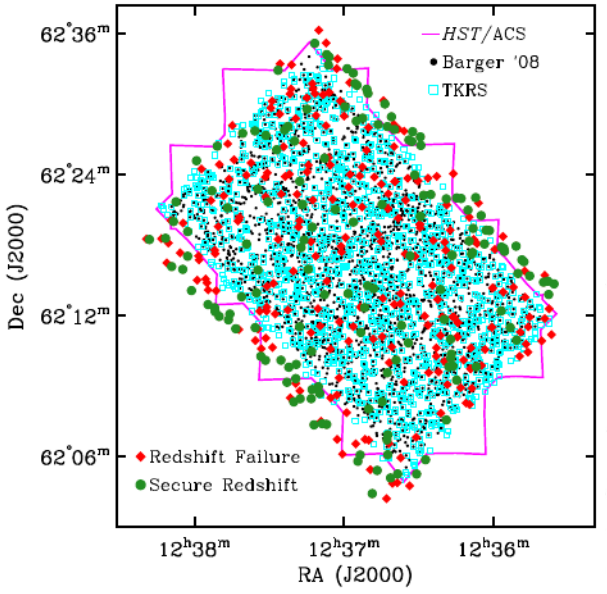
- 8 fields (overlap with GOODS-N)
- 20 contiguos, equal width, medium band (~300 A) filters
- Shallower than CANDELS (but enough)
  - Complete to 24 mag, we set cut in 23.5 mag
- Good photo-z ($\sigma_z \sim 0.01$)





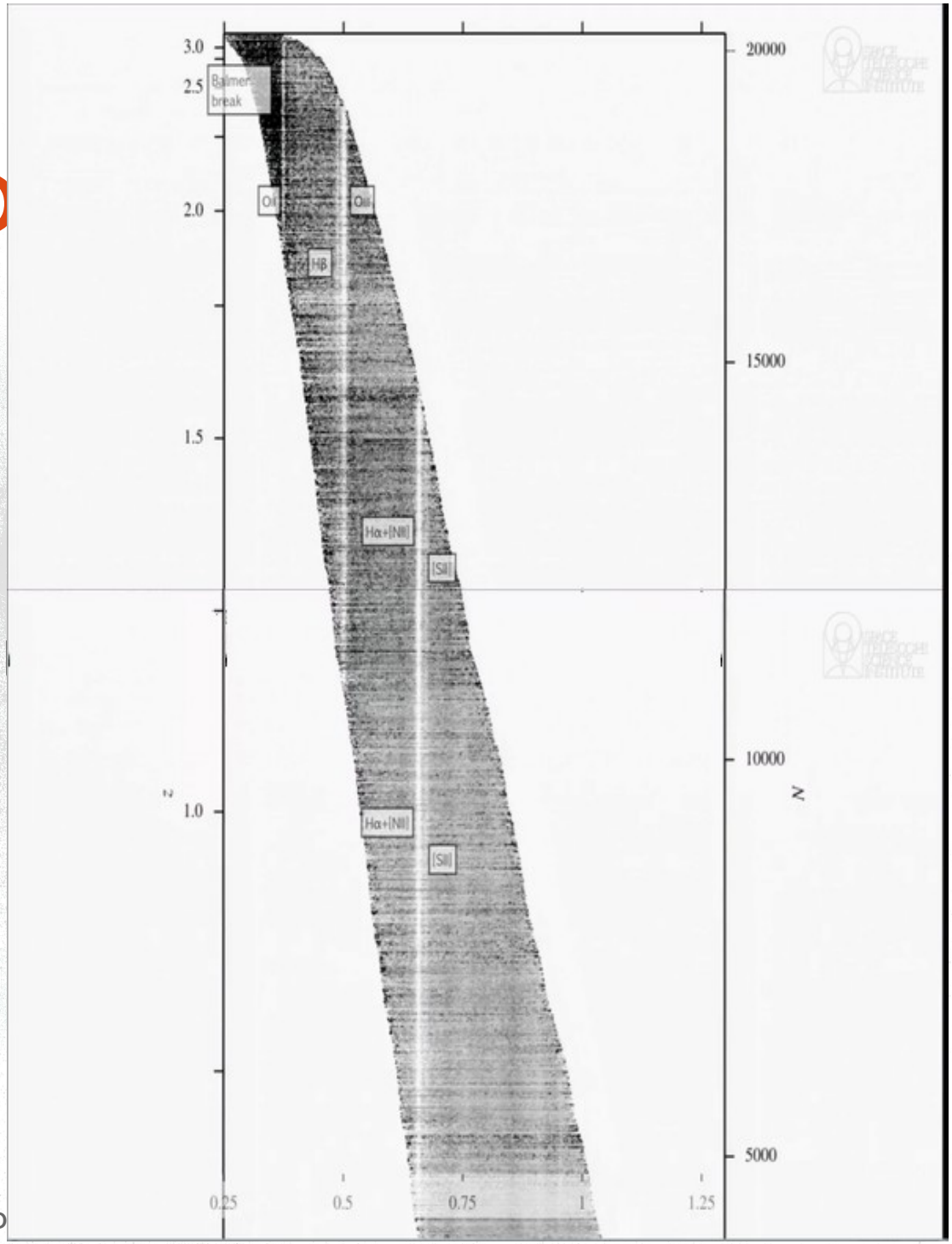
3. Spectra on GOODS-N

- Barger et al. 2008 (TKRS, DEEP1, ...)
  - DEIMOS on Keck
  - ~ 2400 sources
  - ~ 4000 – 9000 A
- DEEP-3 (~ 135). Cooper et al. (2011)
- 3D-HST (Momcheva et al. 2015 in prep.)
  - HST Grism
  - 1.1 – 1.8 micron
  - ~ 5000 sources
  - June 2015 ?



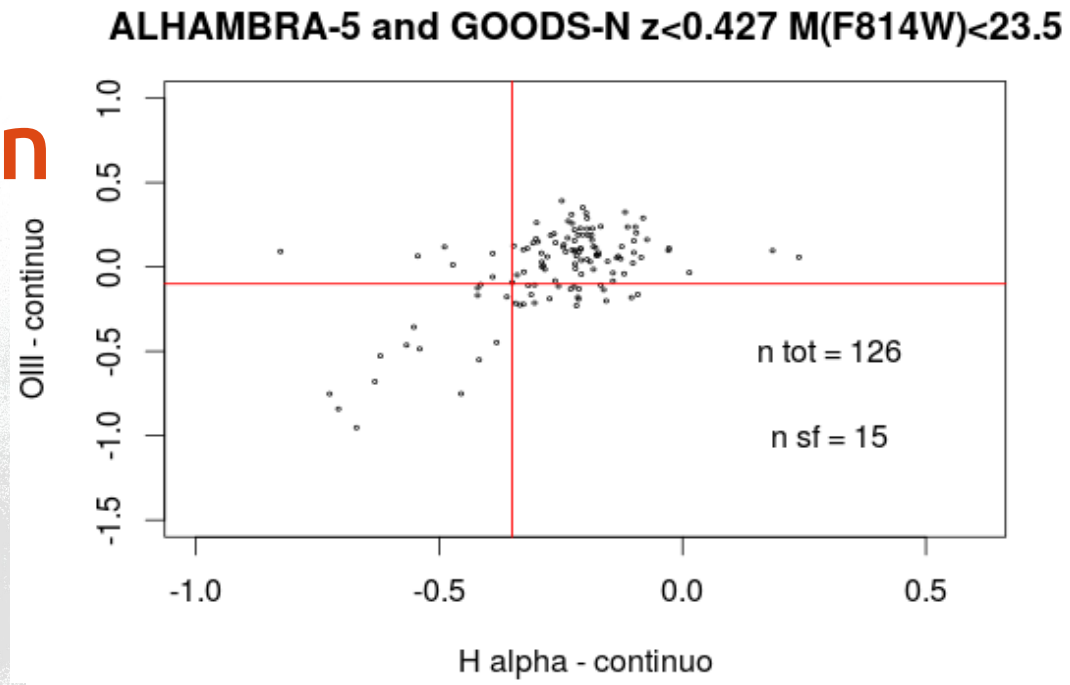
3. Spectra on GOO

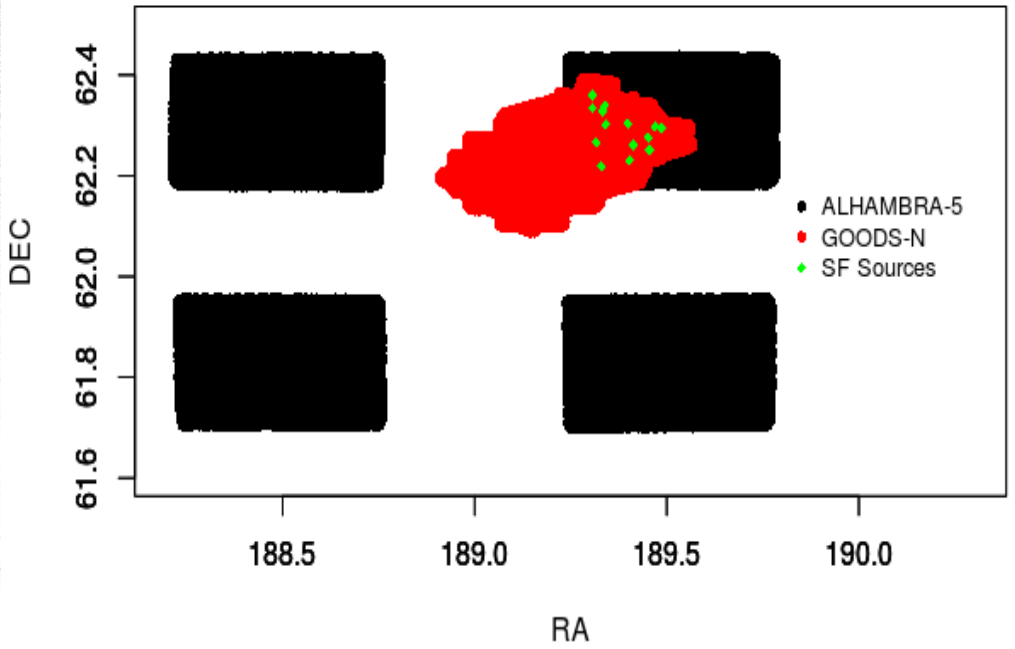
- Barger et al. 2008 (TKRS, DEEP1, ...)
  - DEIMOS on Keck
  - ~ 2400 sources
  - ~ 4000 – 9000 A
- DEEP-3 (~ 135). Cooper et a (2011)
- 3D-HST (Momcheva et al. 2015 in prep.)
  - HST Grism
  - 1.1 – 1.8 micron
  - ~ 5000 sources
  - June 2015 ?



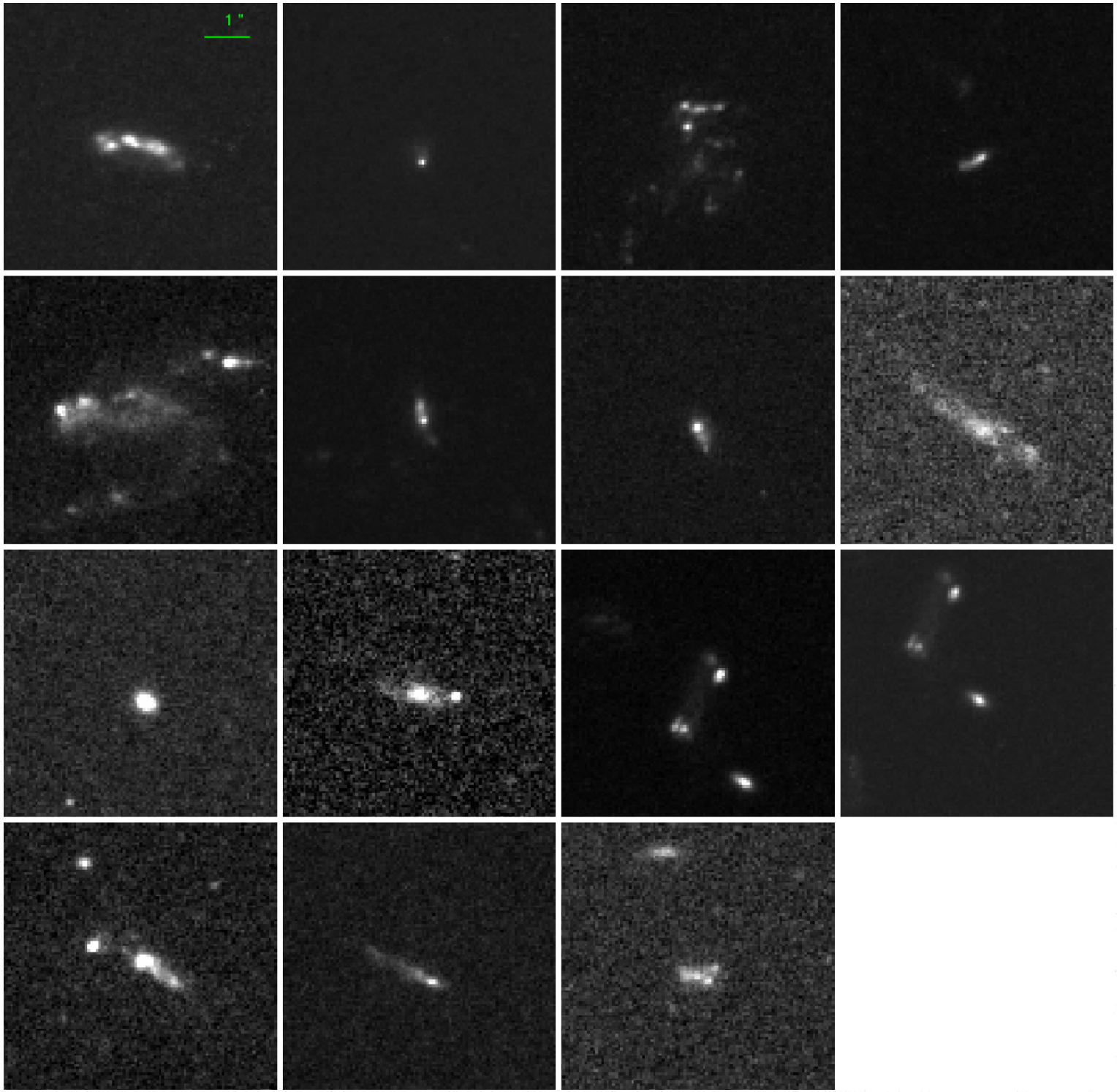
4. Sample selection

- Starting with colour criteria defined by Rodrigo
- Testing feasibility with ALHAMBRA
  - 0 < z < 0.42 (bigger)
  - Small overlap (less than 50%)
- 18 sources – photo z
- 15 sources – spec z

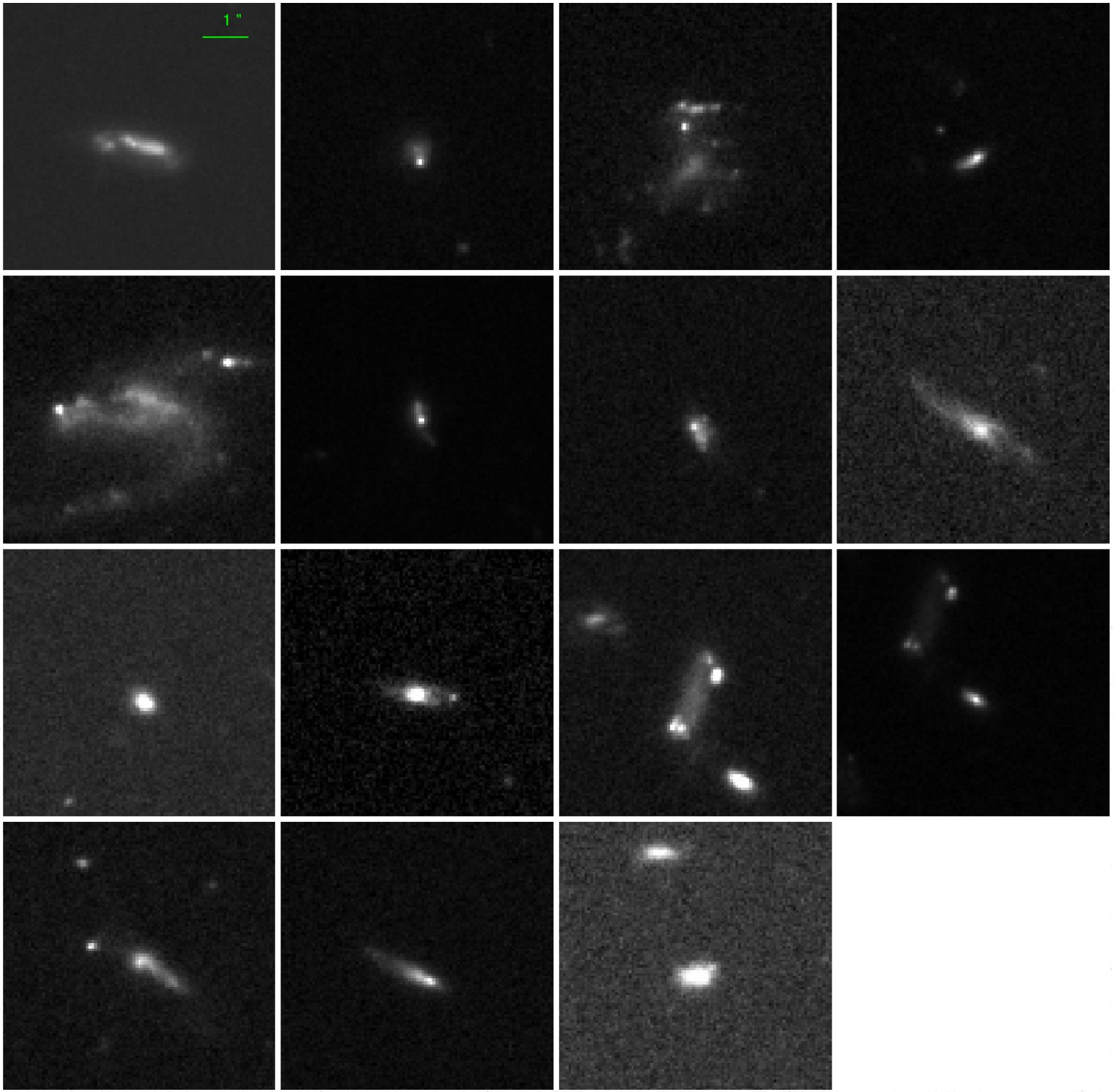




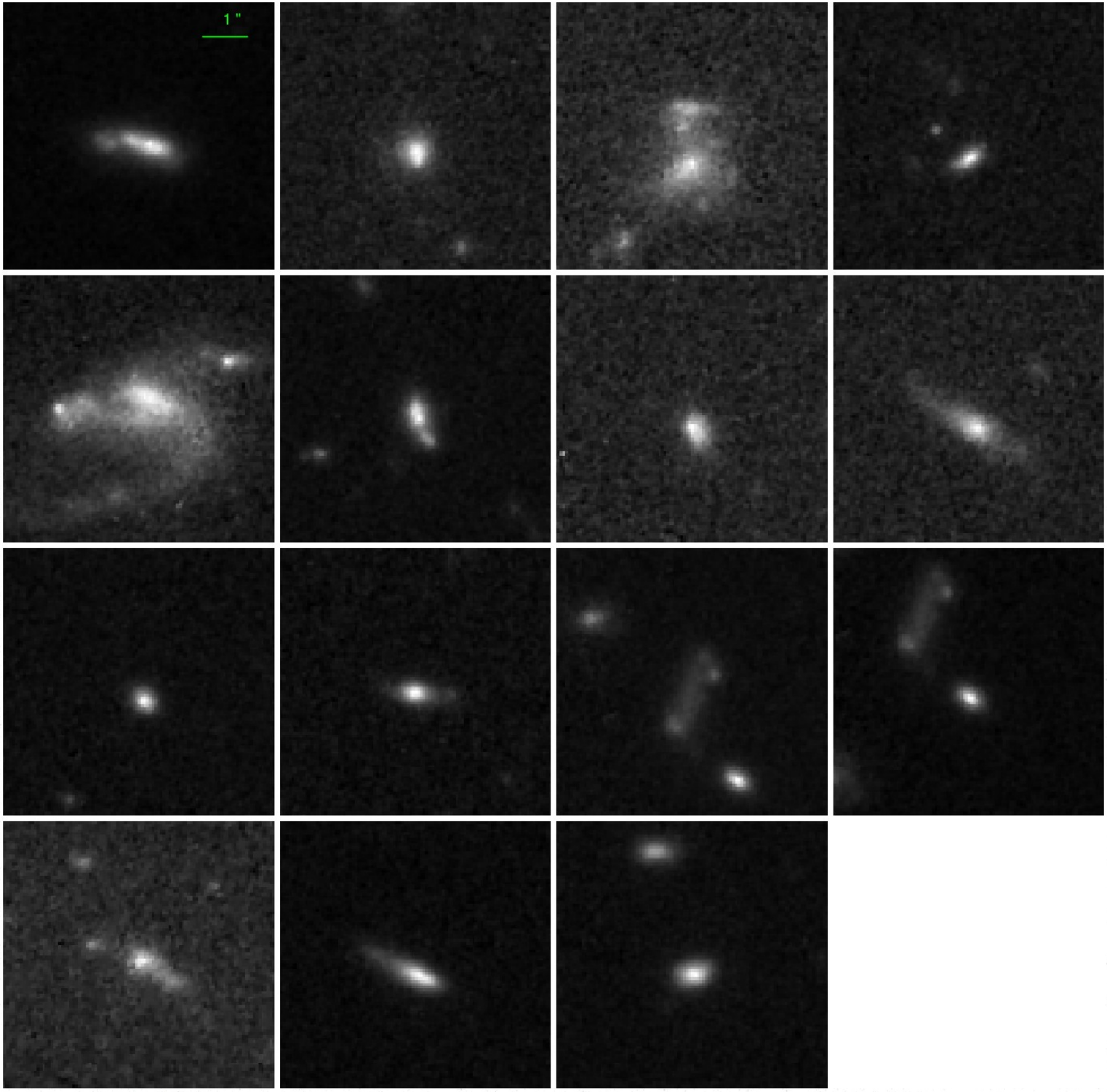
- F435W



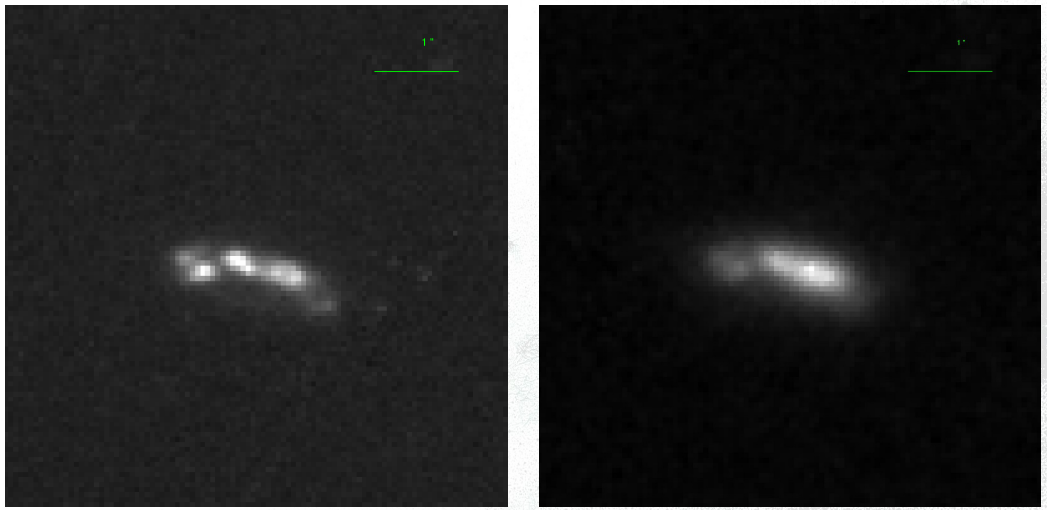
- F775W

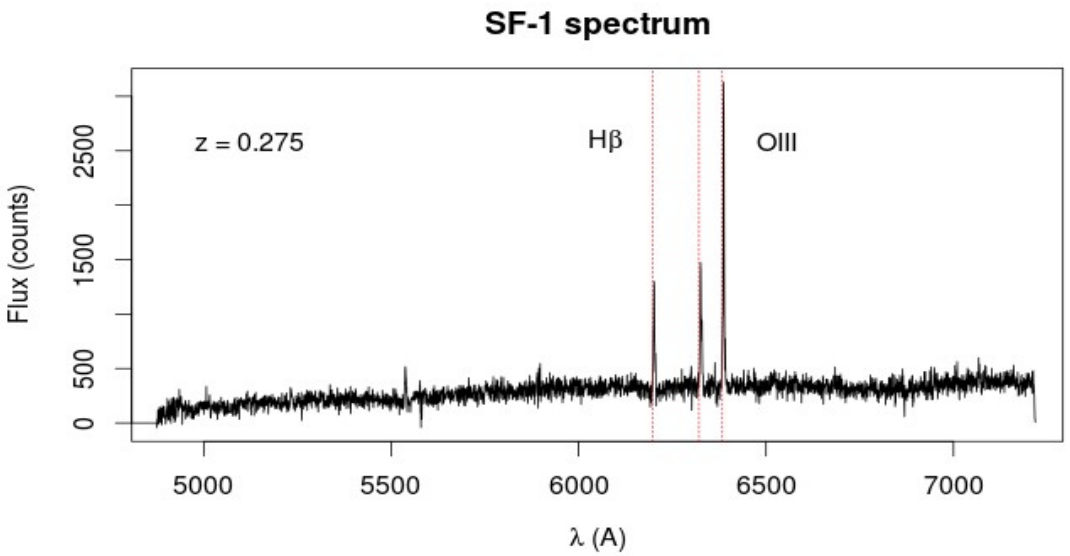


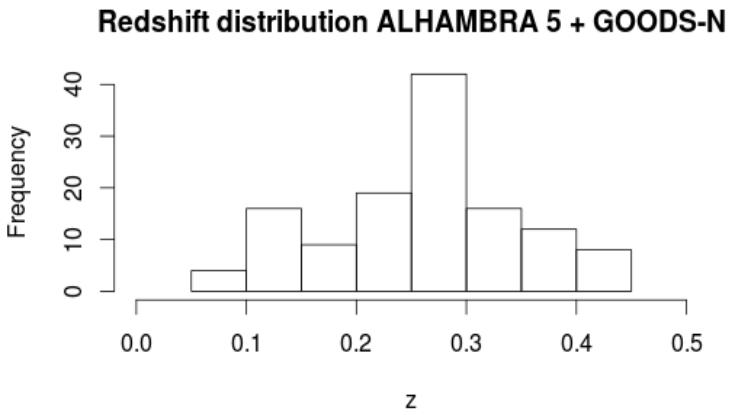
- F160W

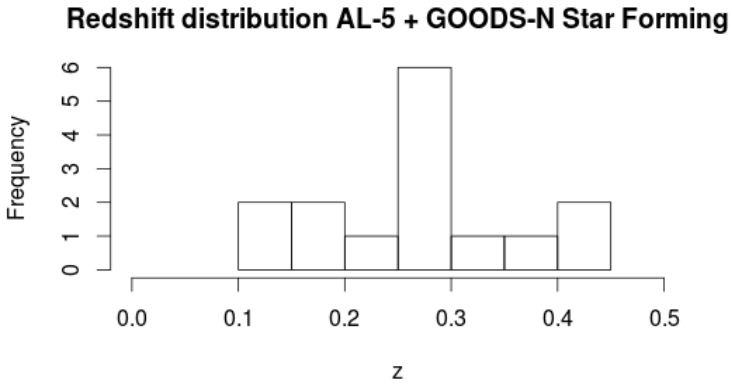


4. Example and redshift histograms









4. Upcoming work

- Build a new colour-colour criterium (for ALHAMBRA) using the available spectra
- Analysis of knots: number, distribution, mass, density, ...
- Surface brightness fitting of host galaxies
- SED analysis of star forming galaxies
  - To be used as selection criterium
- Evolution with redshift

4. Challenges

- Small number of objects
  - Using more and wider fields?
- Wrong photometric redshifts (spurious detections)
  - Colour-colour selection
- Discrepancies between colour-colour criteria in COSMOS and ALHAMBRA results for those galaxies
  - Wrong redshift determination?

5. ... and beyond

- Higher redshift?
  - Other emission lines
  - 3D-HST spectra
- More fields?
- Dynamical analysis of galaxies in the sample
- Compare with numerical simmulations

Stay tuned for more!

Estallidos 2017 ?