

Spectrophotometric characterization of young galaxies

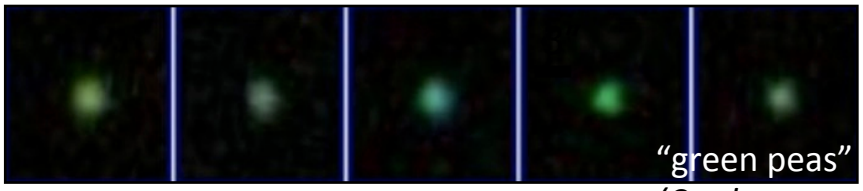
....and...

Prospects for the HST Frontier Fields

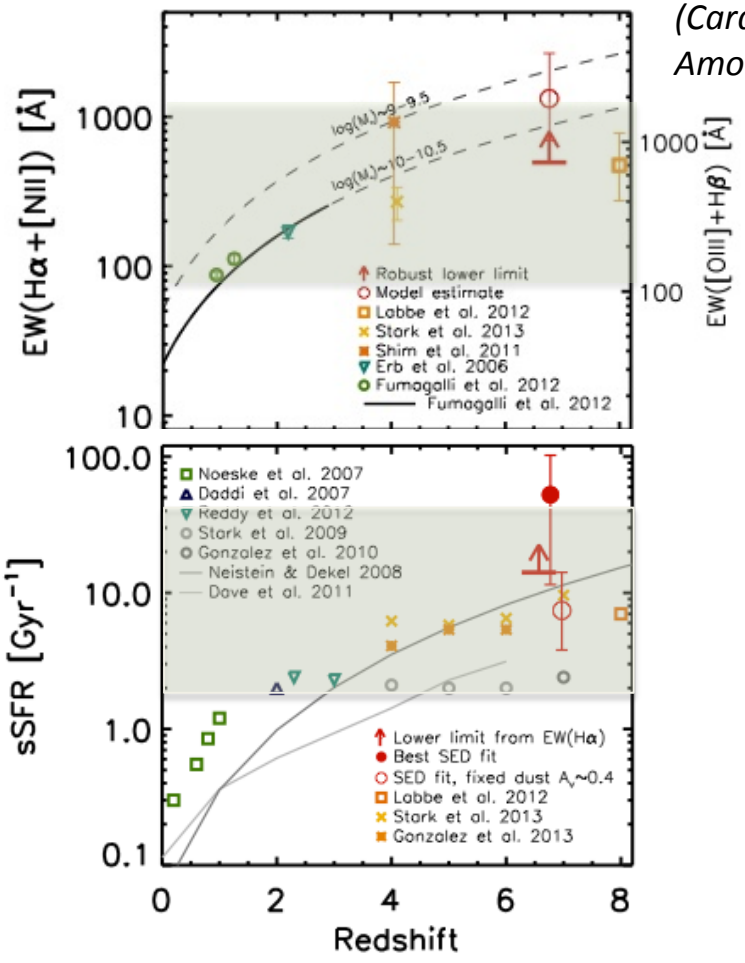
Ricardo Amorín
(INAF-OAR)
Internal meeting. París. Jan 2014

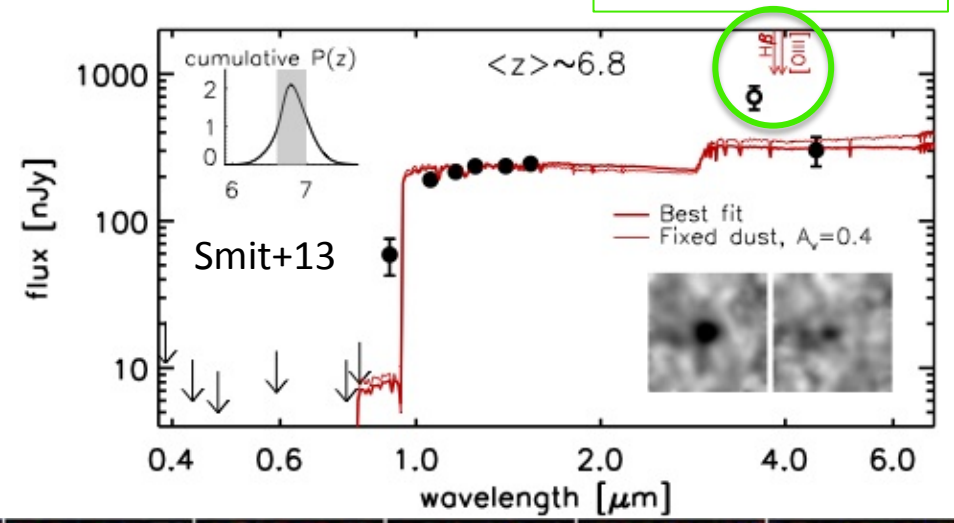
Low-mass galaxies with extremely high EWs and SFR/M_* are rare at low-z, but can be ubiquitous at high-z

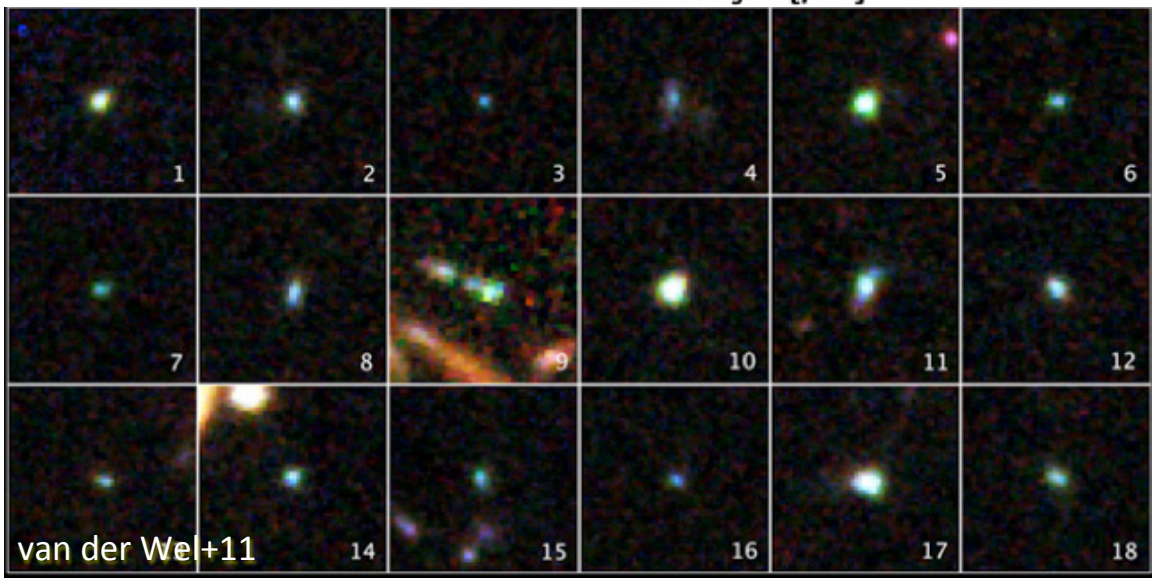
EW[OIII]~1000A



"green peas"
(Cardamone+09
Amorin+10,12)





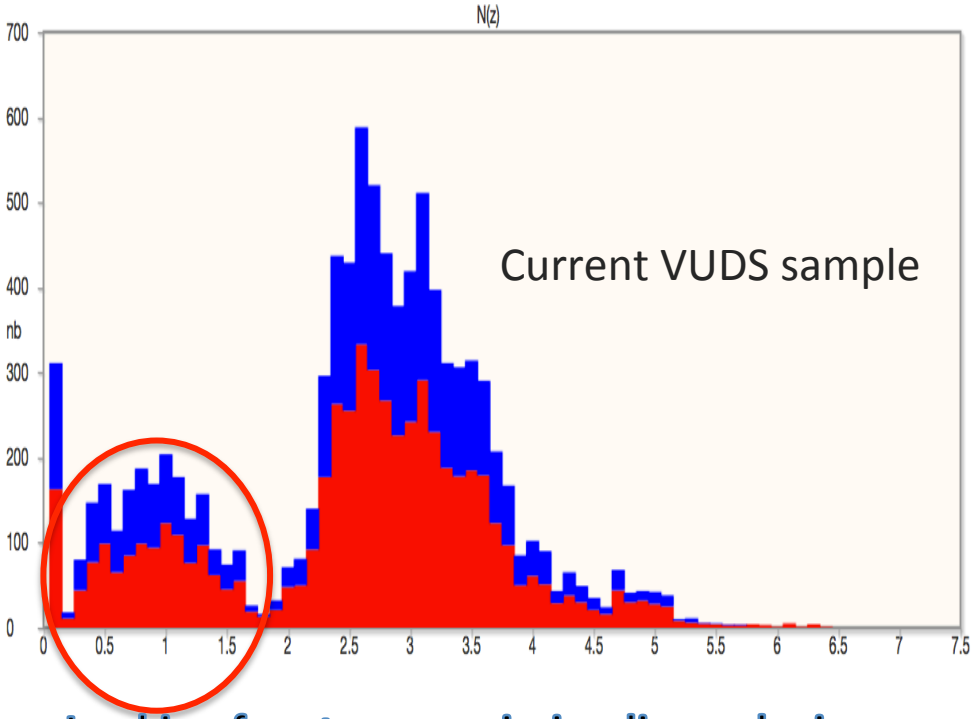


Extreme Emission Line Galaxies in GOODS
Hubble Space Telescope • WFC3/IR ACS/WFC

Vimos Ultra Deep Survey

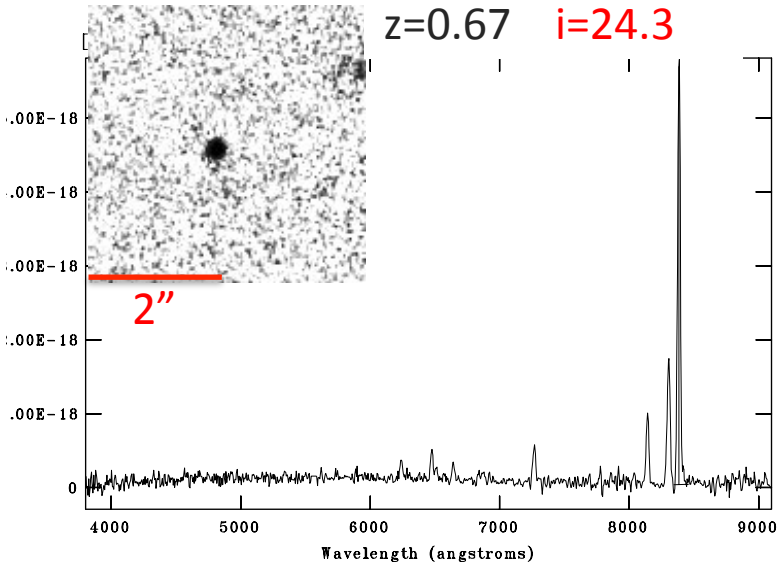
A Legacy Survey of ~10,000 galaxies observed with VLT/VIMOS to make a complete census of the star-forming galaxy population at $2 \leq z \leq 6.7$ (PI: Le' Fevre)

3 Deep Fields: COSMOS, VVDS-2h, ECDFS. 12-14 hr of VIMOS spectra per galaxy…



Looking for strong emission line galaxies among low-z interlopers in VUDS

Goal: spectrophotometric characterization of low-mass, young starbursts. Benchmark for comparison with studies of analogs at high-z

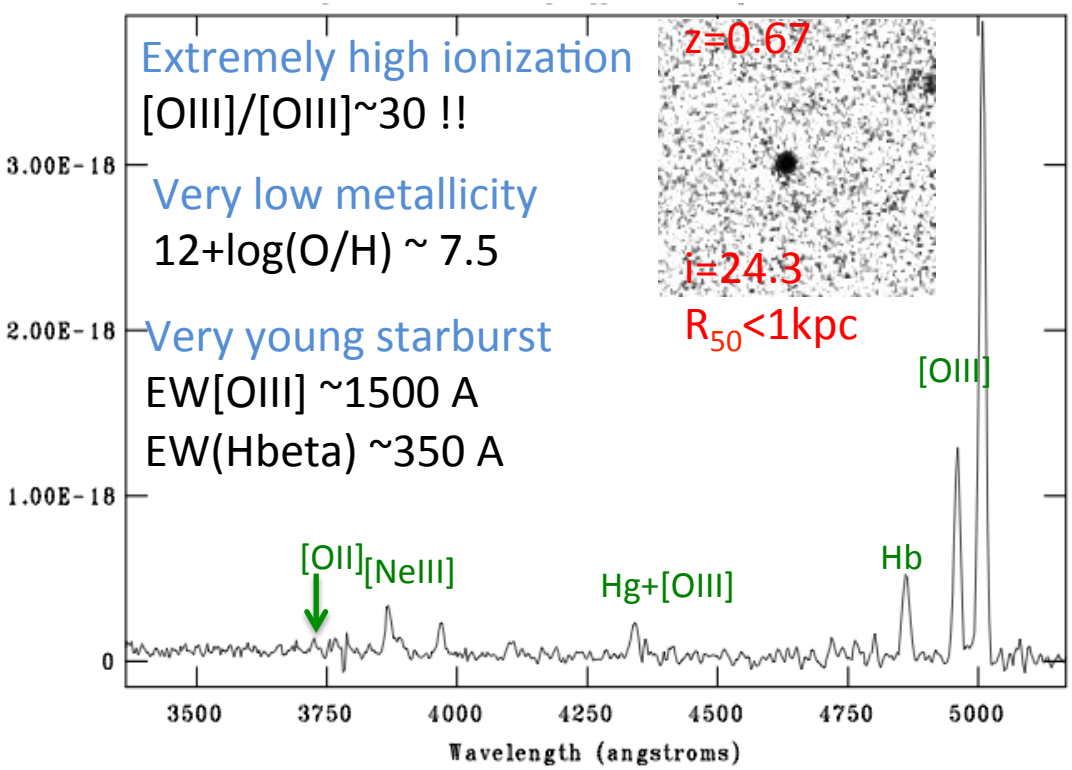


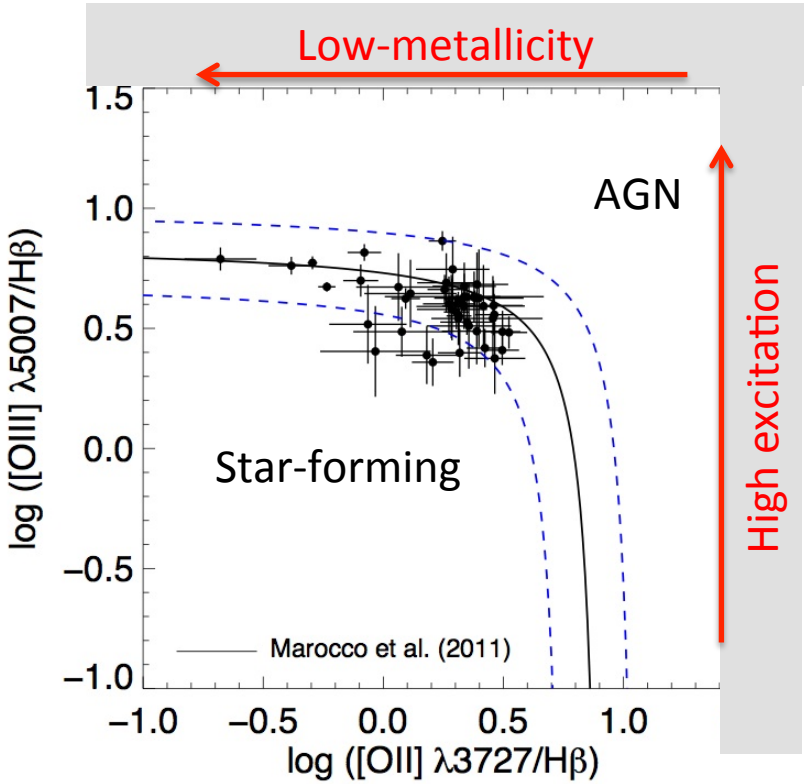
SIGNIFICANT STEP FURTHER compared to previous studies at these redshifts

For example, we find galaxies 2-3 mag fainter (I ~ 24.5) than zCOSMOS samples (Amorin+14)

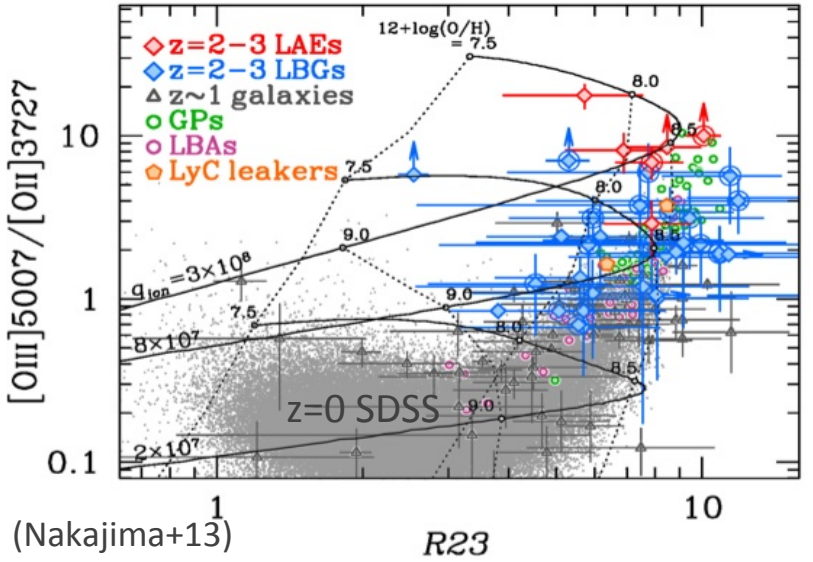
-> we can study a genuine dwarf galaxy population ($M_I > M^*+2.5$ ~ -18.5) out to z~1.

Selection by strong EW[OIII]>100A lead to high Ionization, high SSFR galaxies
No clear AGN signatures in the sample



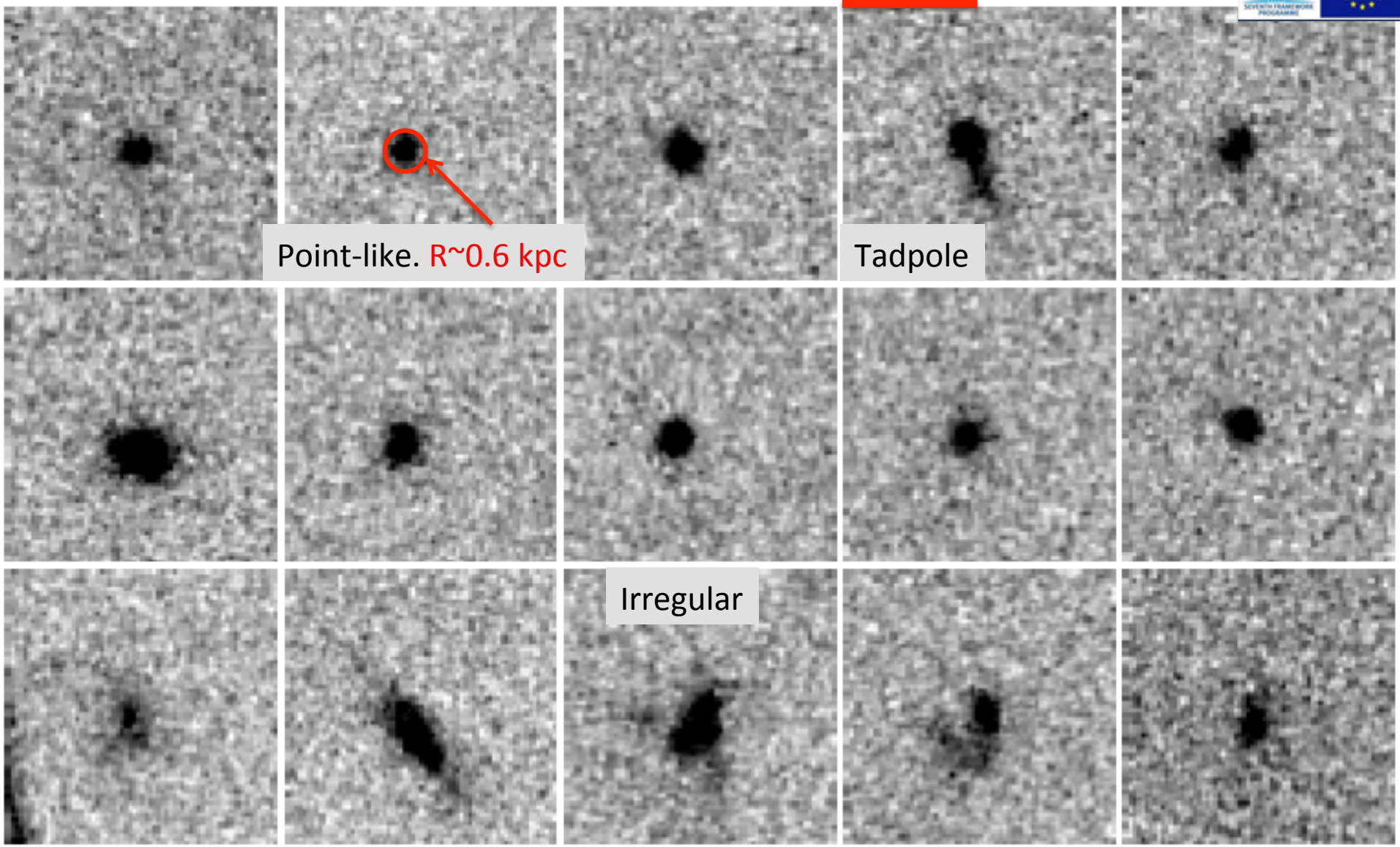


Low-luminosity and more distant analogs of "green pea" galaxies and other local HII galaxies (cf. e.g. Amorin+10,12; Izotov+11)



(Nakajima+13)

Extremely compact and irregular morphologies ($R_{I\text{-}ACS} \leq 1$ kpc)

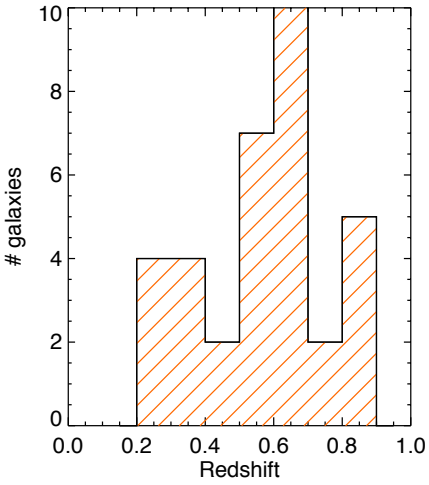


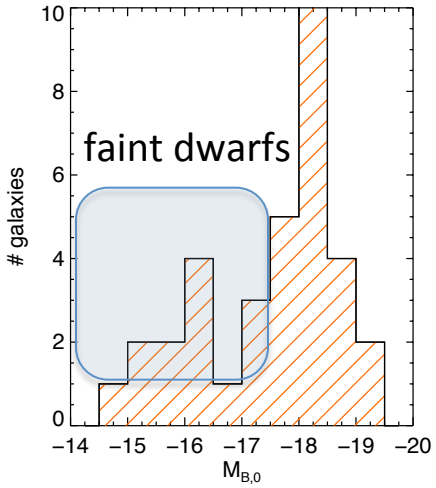
Distribution of properties

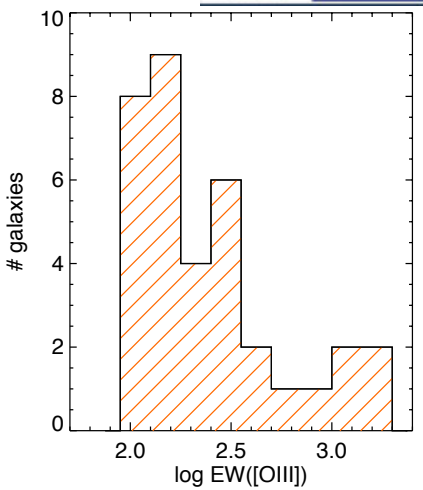
Masses & abs. magnitudes from (still preliminary) SED fitting (neb lines included)

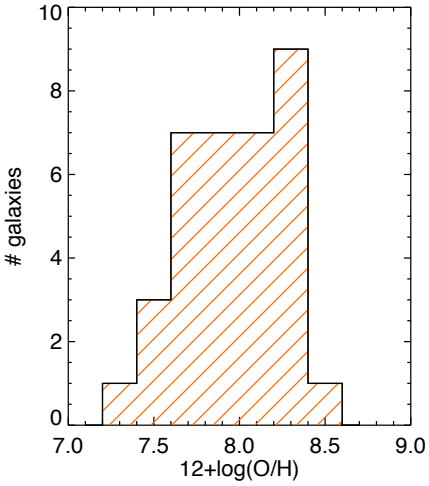
SFR from extinction corrected Halpha or Hbeta

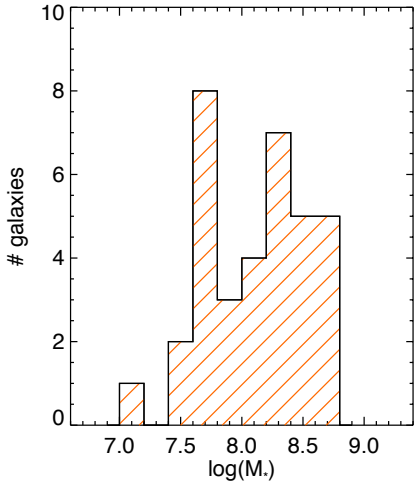
metallicity in the framework of the direct method

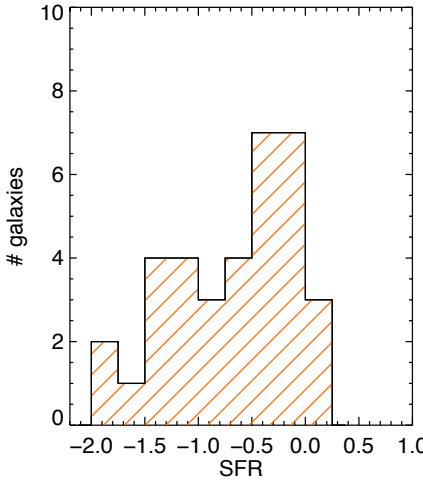






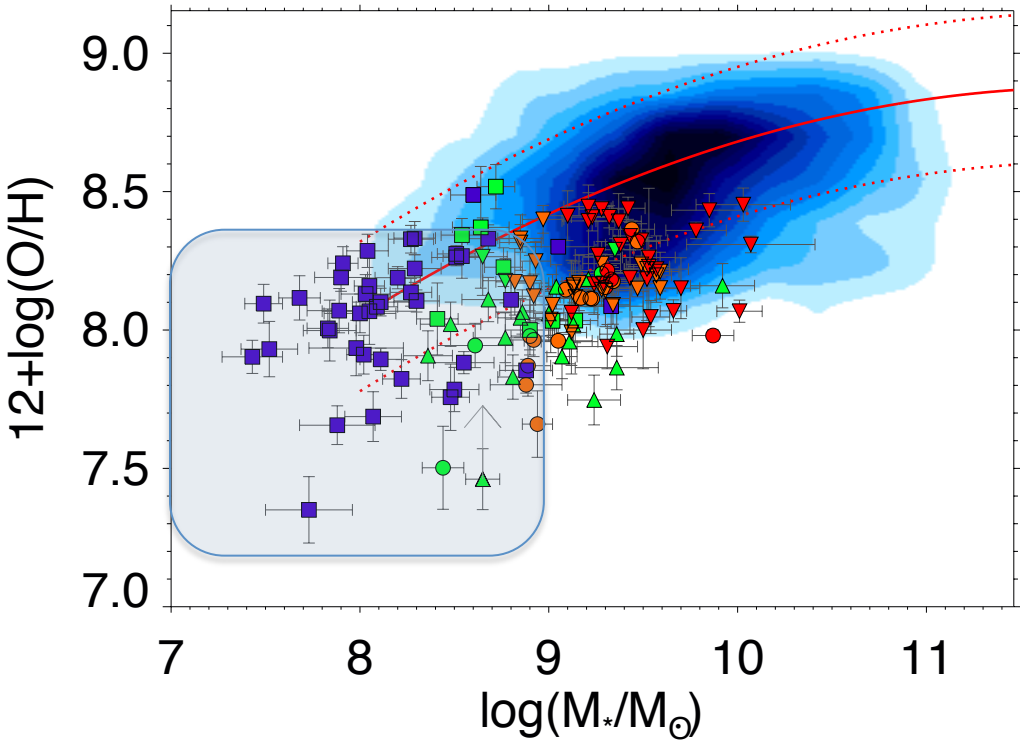


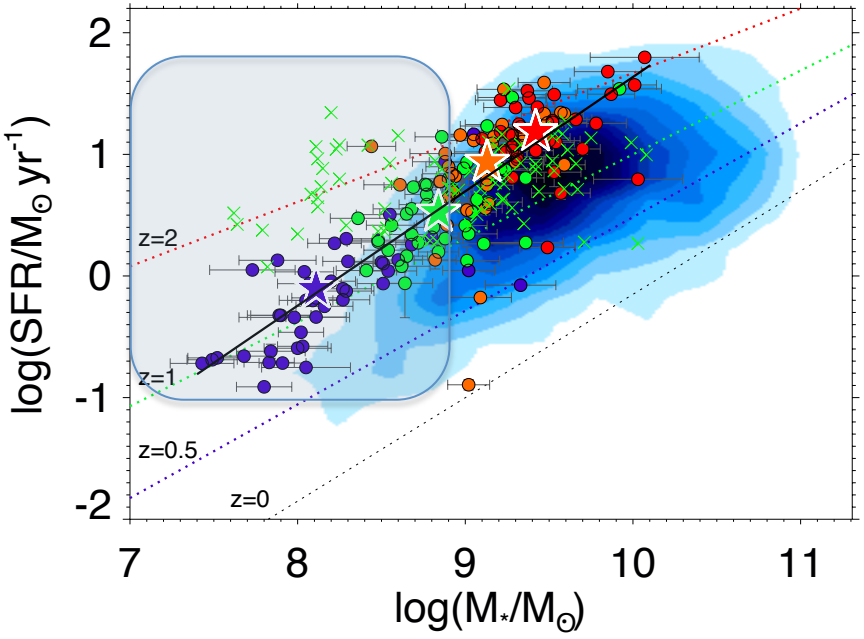


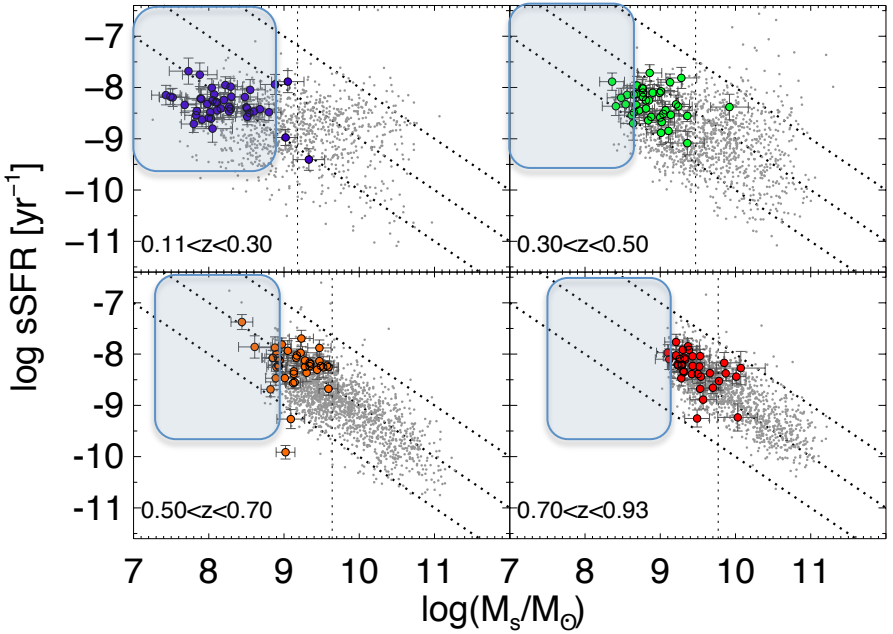


PROBING THE LOW-MASS END OF FUNDAMENTAL RELATIONS BETWEEN SFR, MASS AND METALLICITY OUT TO z~1

Comparison with extreme emission line galaxies from zCOSMOS (Amorin+14, submitted)

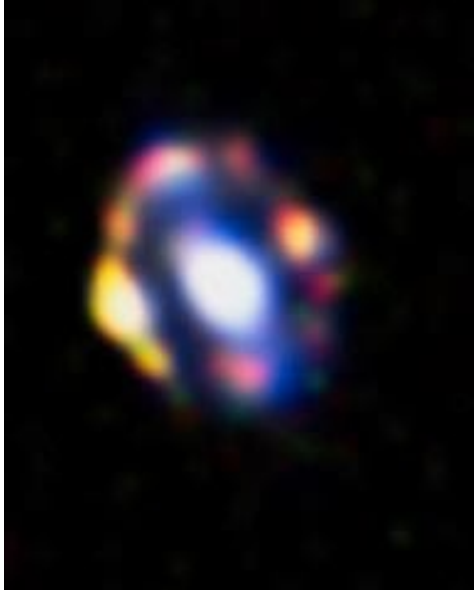




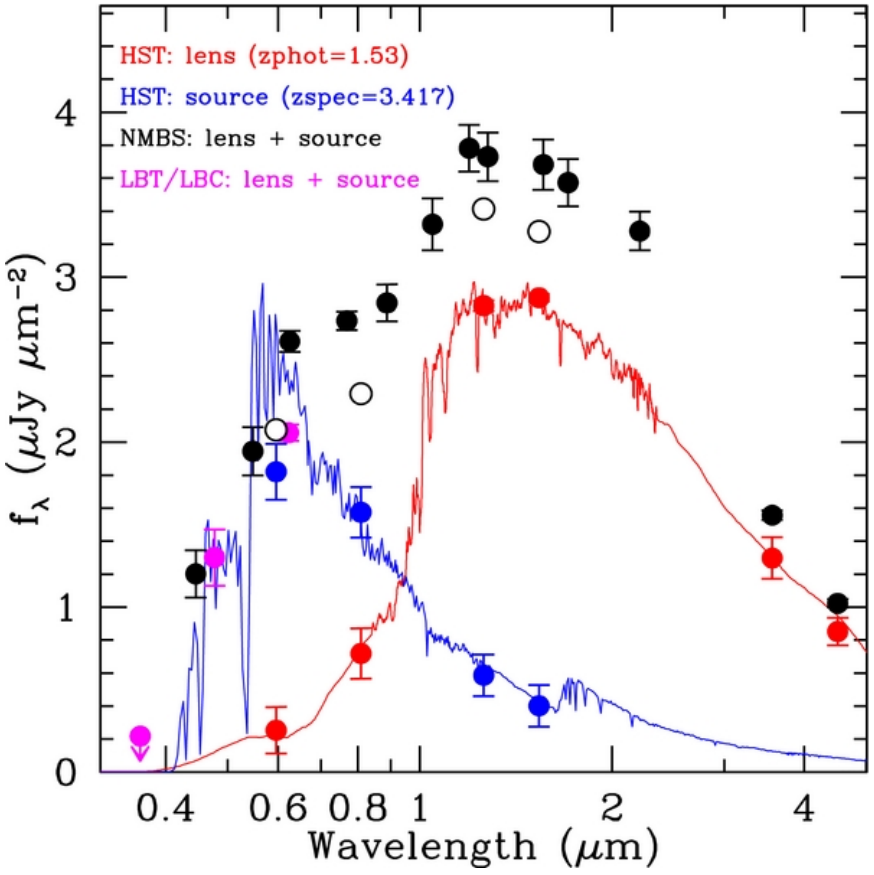


A QUADRUPLE GALAXY LENS IN CANDELS WITH A RECORD LENS REDSHIFT z = 1.53

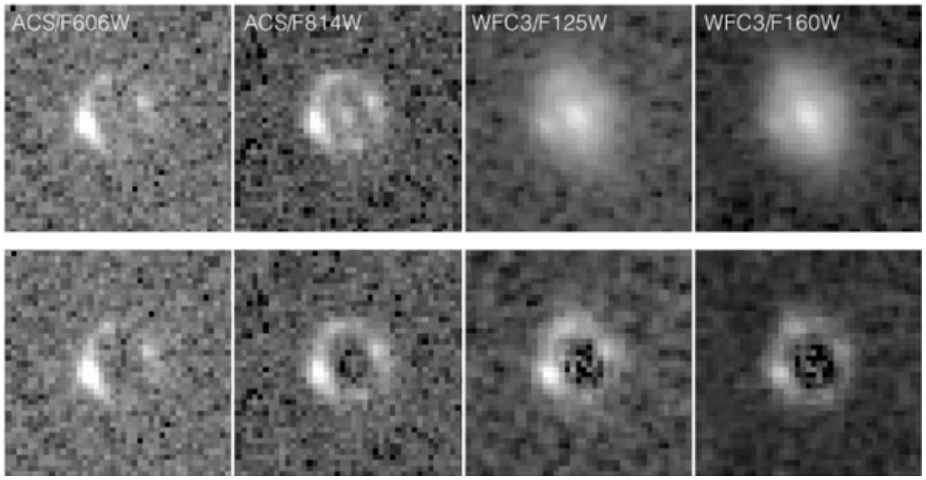
Van der Wel et al. (2013)

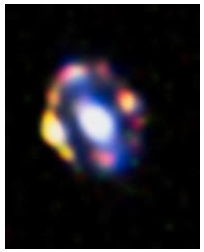


Very unusual. Discovered by chance in the COSMOS field



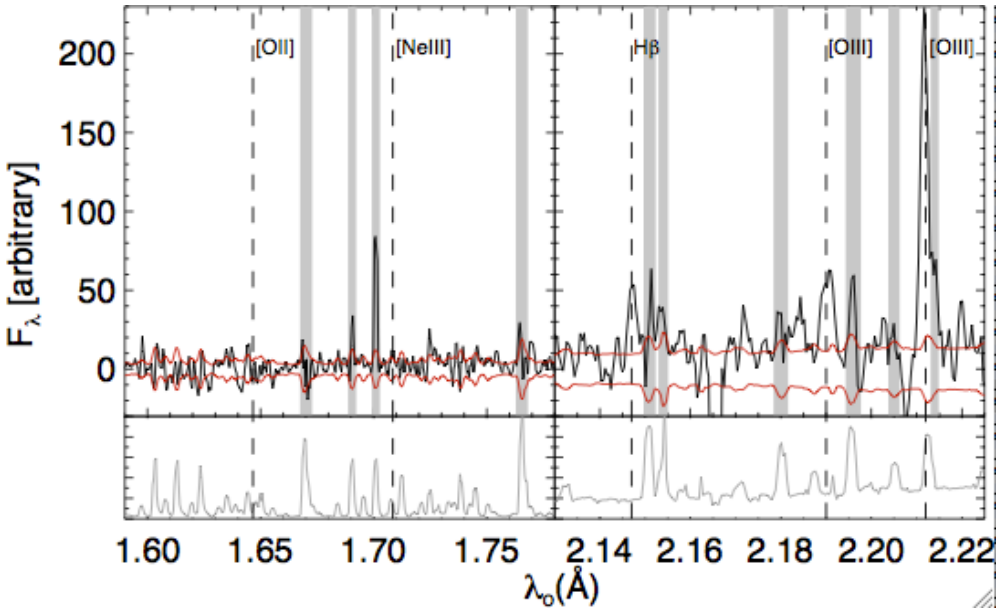
The lens is a massive (~$10^{10.4}$ M_*) red galaxy
The source is a young low mass (~10^8 M_{sol}) galaxy at z=3.4





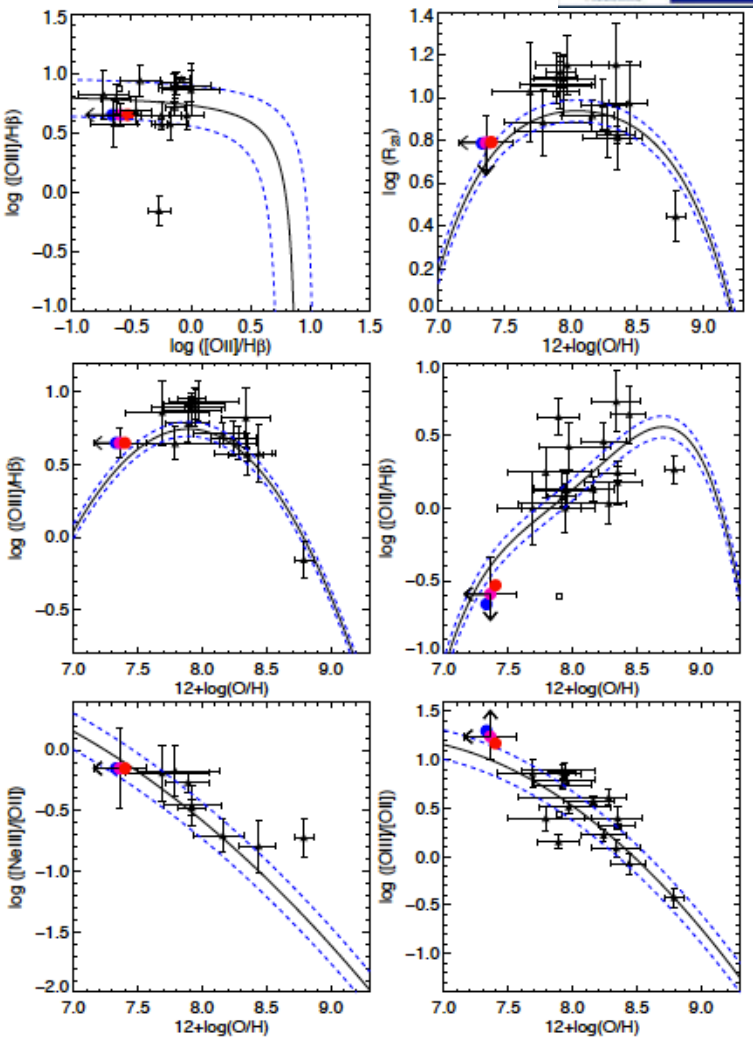
THE NATURE OF THE SOURCE AT Z=3.417

Amorín et al. (2014, in prep)

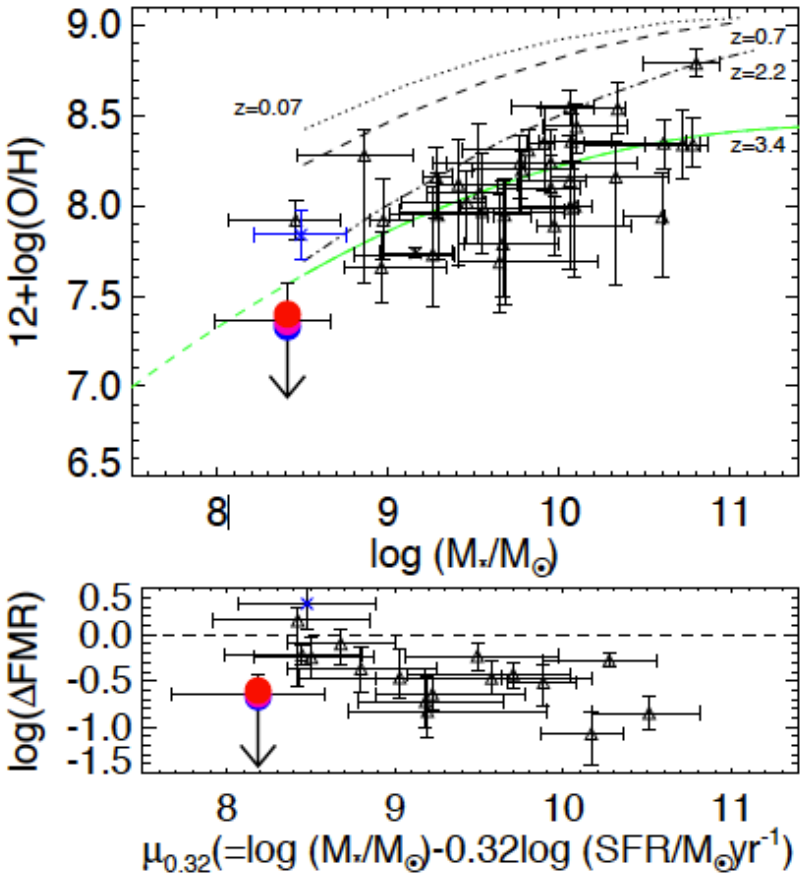


LBT/LUCI H+K spectrum (3hr)
[OII] not detected at 3σ

The source is a young starbursting dwarf galaxy (M_*/SFR ~ 100Myr) with unusually high nebular content (EW([OIII]~1000A), strong ionization ($\log(q_{ion})$=8.5) and very low metallicity, 12+log(O/H)<7.4 (< 5% solar).



Ionization and metallicity diagnostics and comparison with LBGs at z~3 (Troncoso+13)

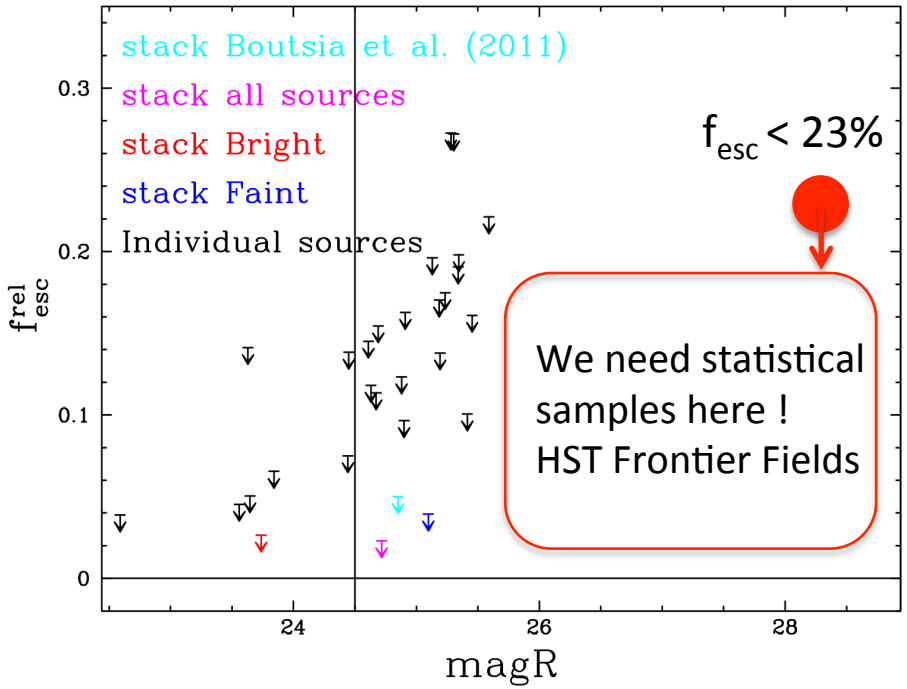


A new constraint to the low-mass end of the MZR at z=3.4

The source follow the trend of LBGs at z>3
→ offset from the lower-z MZR

Offset >0.5 dex from the FMR
Possible indication of gas flows
e.g. pristine gas accretion feeding the recent starburst

Unique object to derive first limits to the LyC escape fraction at z>3 in the regime of very low intrinsic luminosity (L~0.05L*)

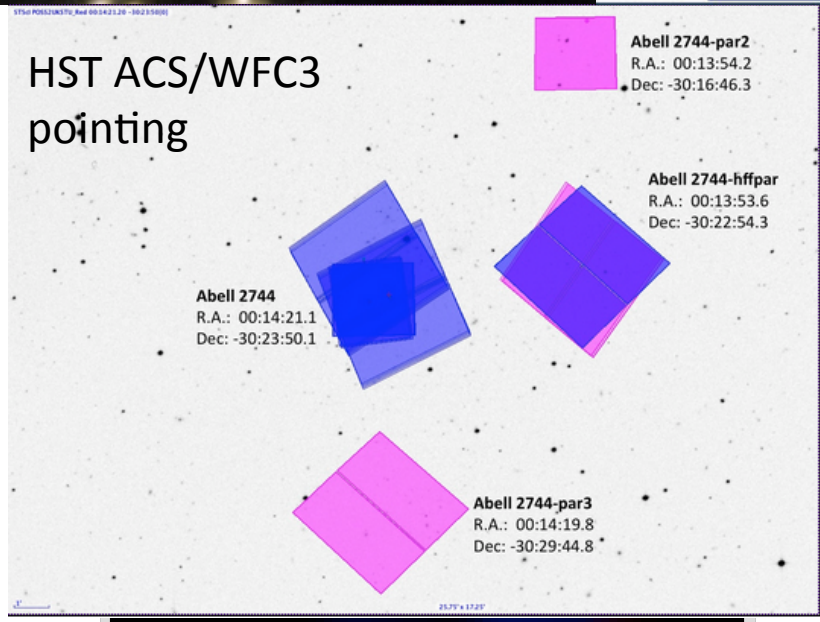


The HST Frontier Fields

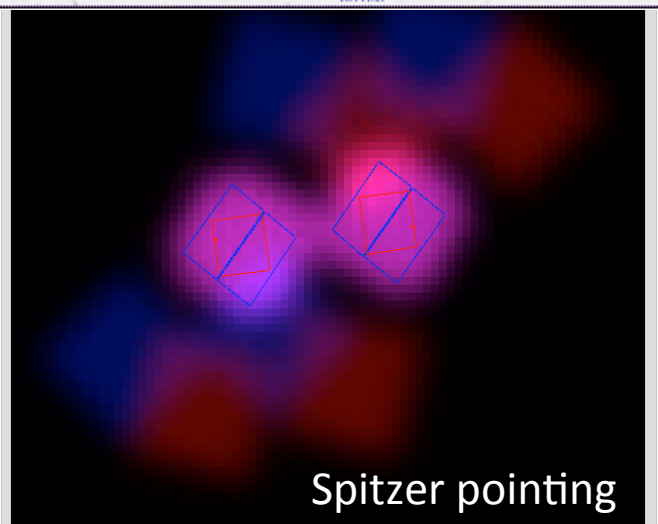
DDT extremely deep field HST observing program aimed at producing the deepest observations of clusters and their lensed galaxies ever obtained

HST and Spitzer multi-epoch (3 years) observations of six high-magnification clusters and nearby blank fields

- Studying distant galaxy populations ~10-100 times fainter than any previously observed
- Improve our statistical understanding of galaxies during the epoch of reionization
- Provide unprecedented measurements of the dark matter within massive clusters.

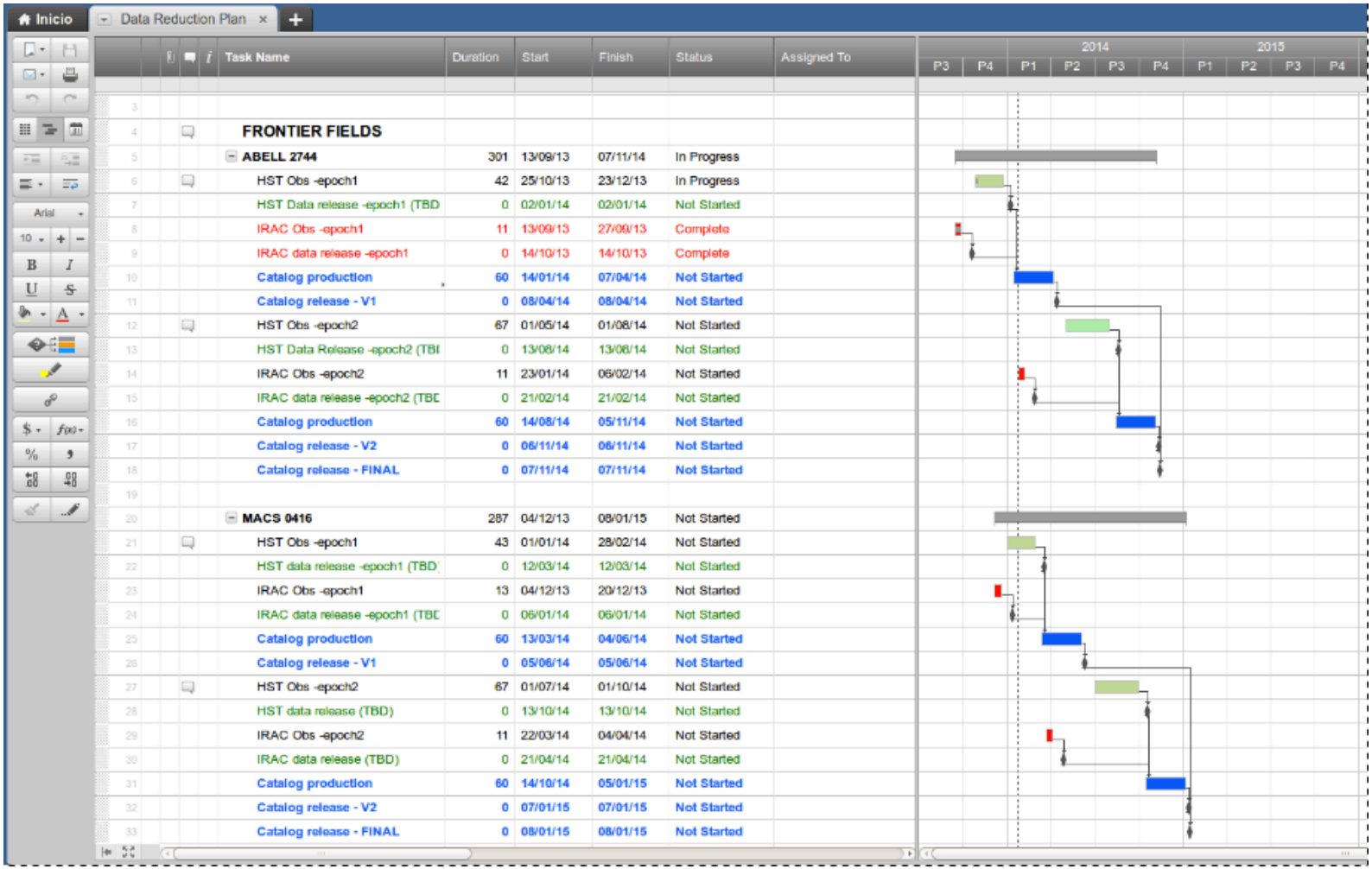


ACS: (70 orbits per position)			WFC3/IR: (70 orbits per position)		
Filter	Orbits	AB_mag	Filter	Orbits	AB_mag
F435W	18	28.8	F105W	24	28.9
F606W	10	28.8	F125W	12	28.6
F814W	42	29.1	F140W	10	28.6
			F160W	24	28.7



THE HST FRONTIER FIELDS

Plans for implementation, data reduction and catalogue production for data from Cycle 21 and 22 (4 clusters + 4 BF)



Inicio | Data Reduction Plan

	Task Name	Duration	Start	Finish	Status	Assigned To
4	FRONTIER FIELDS					
5	ABELL 2744	301	13/09/13	07/11/14	In Progress	
6	HST Obs -epoch1	42	25/10/13	23/12/13	In Progress	
7	HST Data release -epoch1 (TBD	0	02/01/14	02/01/14	Not Started	
8	IRAC Obs -epoch1	11	13/09/13	27/09/13	Complete	
9	IRAC data release -epoch1	0	14/10/13	14/10/13	Complete	
10	Catalog production	60	14/01/14	07/04/14	Not Started	
11	Catalog release - V1	0	08/04/14	08/04/14	Not Started	
12	HST Obs -epoch2	67	01/05/14	01/08/14	Not Started	
13	HST Data Release -epoch2 (TBI	0	13/08/14	13/08/14	Not Started	
14	IRAC Obs -epoch2	11	23/01/14	06/02/14	Not Started	
15	IRAC data release -epoch2 (TBI	0	21/02/14	21/02/14	Not Started	
16	Catalog production	60	14/08/14	05/11/14	Not Started	
17	Catalog release - V2	0	06/11/14	06/11/14	Not Started	
18	Catalog release - FINAL	0	07/11/14	07/11/14	Not Started	
19						
20	MACS 0416	287	04/12/13	08/01/15	Not Started	
21	HST Obs -epoch1	43	01/01/14	28/02/14	Not Started	
22	HST data release -epoch1 (TBD	0	12/03/14	12/03/14	Not Started	
23	IRAC Obs -epoch1	13	04/12/13	20/12/13	Not Started	
24	IRAC data release -epoch1 (TBI	0	06/01/14	06/01/14	Not Started	
25	Catalog production	60	13/03/14	04/06/14	Not Started	
26	Catalog release - V1	0	05/06/14	05/06/14	Not Started	
27	HST Obs -epoch2	67	01/07/14	01/10/14	Not Started	
28	HST data release (TBD)	0	13/10/14	13/10/14	Not Started	
29	IRAC Obs -epoch2	11	22/03/14	04/04/14	Not Started	
30	IRAC data release (TBD)	0	21/04/14	21/04/14	Not Started	
31	Catalog production	60	14/10/14	05/01/15	Not Started	
32	Catalog release - V2	0	07/01/15	07/01/15	Not Started	
33	Catalog release - FINAL	0	08/01/15	08/01/15	Not Started	

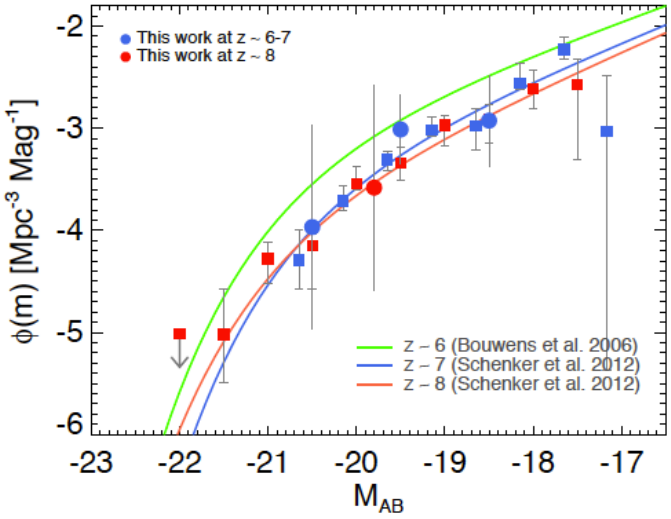
HST FF

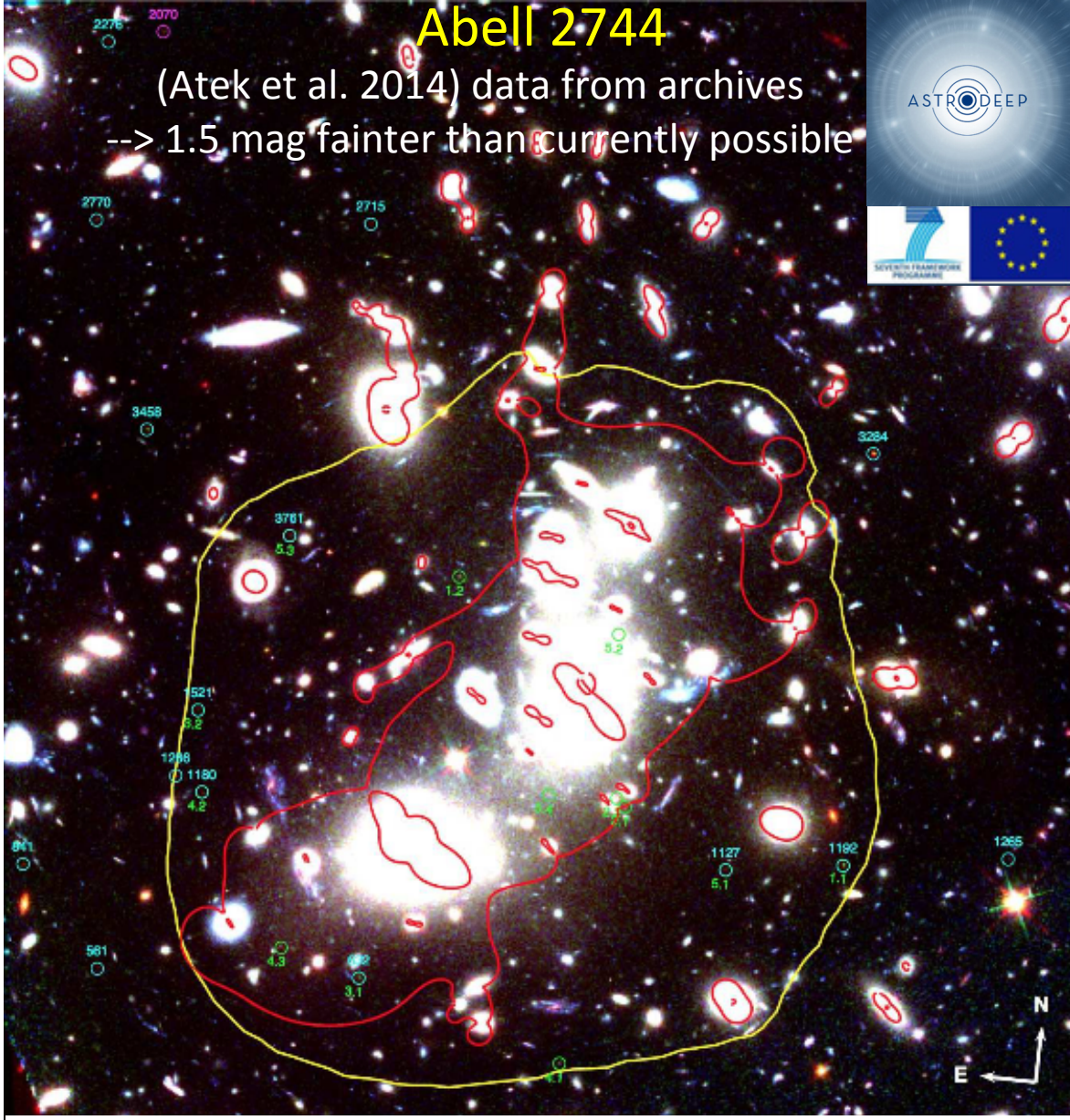
Data release v1.0 of Epoch1 HST +Spitzer obs. for the first cluster, Abell 2744, completed by Dec 2013

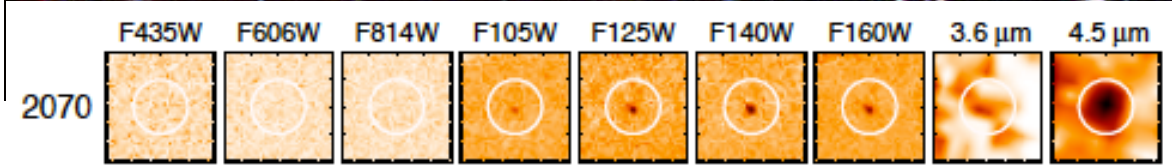
Tasks within ASTRODEEP:

- Produce photometric catalogues (ongoing)
- Sample's selection, e.g. dropouts
- Analysis

Example:
Rest-frame UV luminosity function
Full HFF will reach 1.2 mag deeper than e.g. UDF







Y_{108}-dropout at z~8