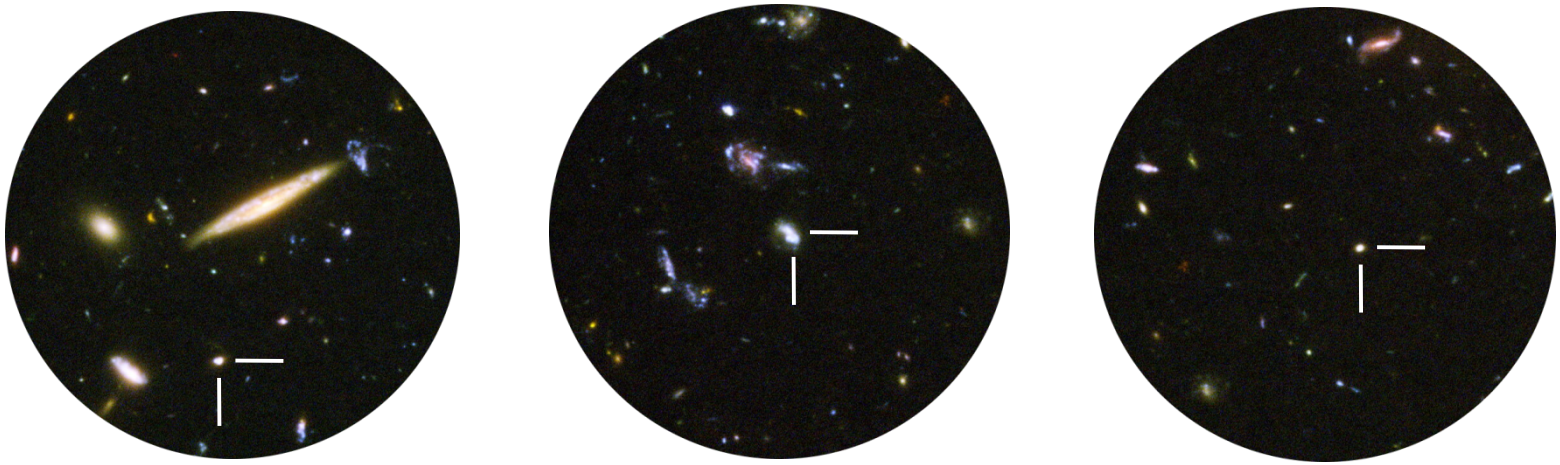
Proposal SHARDS007
LowMZ: Low-metallicity star-forming galaxies at intermediate redshift
(work in progress)



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Contents

- Scientific rational.
- Proposal.
- Feasibility.

Scientific rational

Low metallicity Galaxies:

-Gas-phase oxygen established by interplay of gas flows and SF

-Chemical evolution of galaxies provides constraints for models of galaxy evolution (Davé et a.. 2011; Zahid et al. 2012)

Their study has been biased to **local universe** or **clusters**.

Evolved stellar populations hamper accurate estimations of age

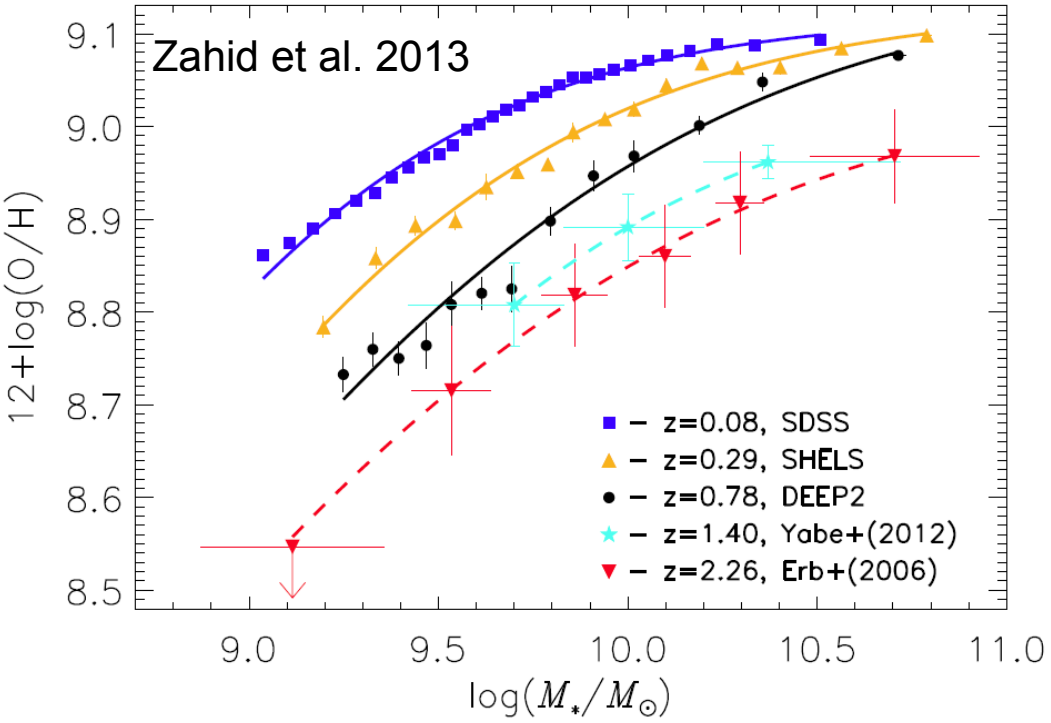
Evolution dominated by interactions with near neighbors.

→ **WE NEED SAMPLES OF FIELD INTERMEDIATE REDSHIFT LOW-z GALAXIES**

Scientific rational

Low metallicity Galaxies: Mass-Metallicity (MZ) relation

- First observed by Lequeux et al (1979)
- Established by the SDSS in the local universe (Tremonti 2004)
- Extended out to at least z~3 (Erb et al. 2006 and many others)



Moustakas et al. 2011

$$12 + \log(\mathrm{O/H}) = Z_o - \log\left[1 + \left(\frac{M_*}{M_o}\right)^{-\gamma}\right].$$

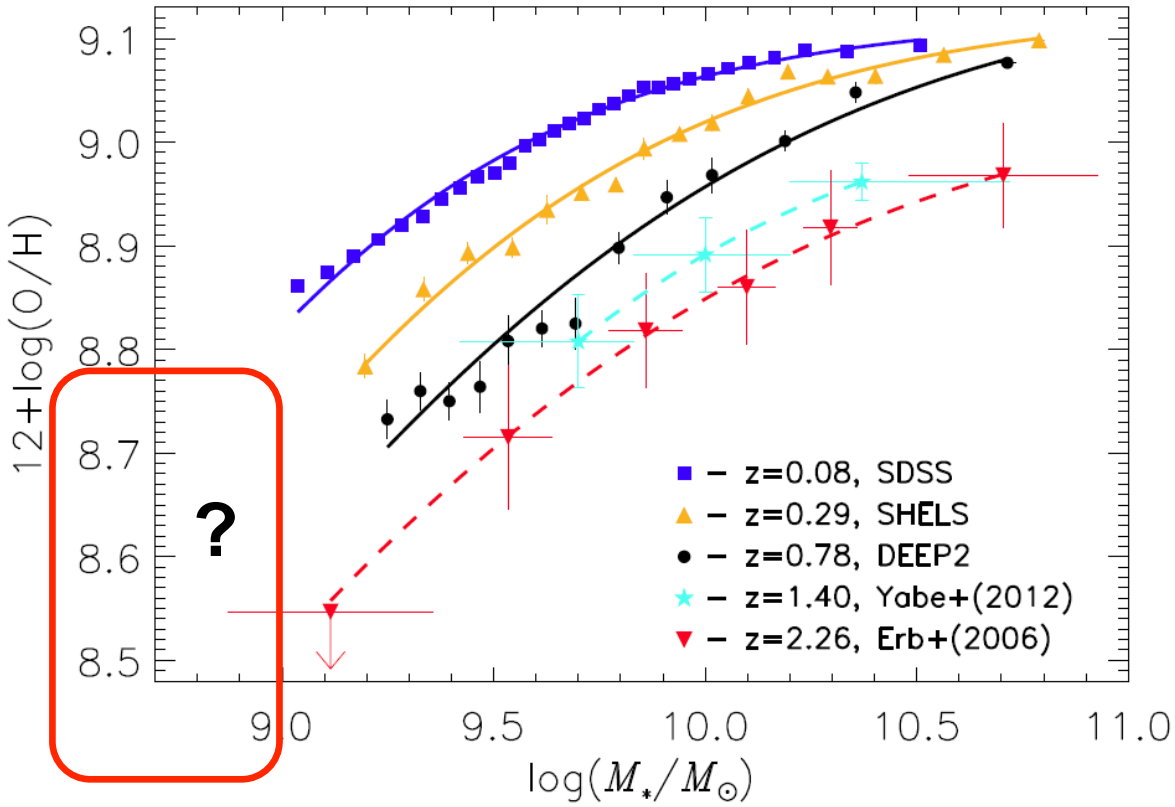
Metallicities of galaxies increase with stellar mass AND metallicities at all stellar masses decrease with redshift.

Proposal:

To fully exploit

- SHARDS depth
- SHARDS wavelength coverage
- SHARDS / Rainbow SEDs, phot-z's and stellar masses

To build a series of representative and complete samples of low-metallicity / low-mass galaxies at intermediate redshifts.



Tracers for metallicity:

There is no way to obtain an accurate metallicity without spectroscopy

To explore

- Stellar mass
- Absolute luminosity
- Size, color
- SHARDS Synthesized EWs
- SHARDS indexes, Synthesized R23

Feasibility study for GOODS-N

- IRAC-GOODSN field **RAINBOW** sample. ACSb<29.0 (1298 galaxies)

(A) Stellar mass
from Rainbow SEDs

Sample of dwarfs

$M_* < 10^8\ M_{Sun}$

$0.5 < z < 1.3$

GOODS-North
Multi-wavelength phot.

128 dwarfs

(B) BCD phenomena as complementary tracer of low MZ star-forming galaxies

Sample of BCDs

$M_{B,0} > -18.5$ mag

$(B-V)_0 < 0.6$ mag

$\mu_{eff,B,0} < 23$ mag arcsec^2

$0.5 < z < 1.3$

GOODS-North
Multi-wavelength phot.

247 BCDs

~ 8 arcmin^{-2}

Feasibility study for GOODS-N

128 dwarfs

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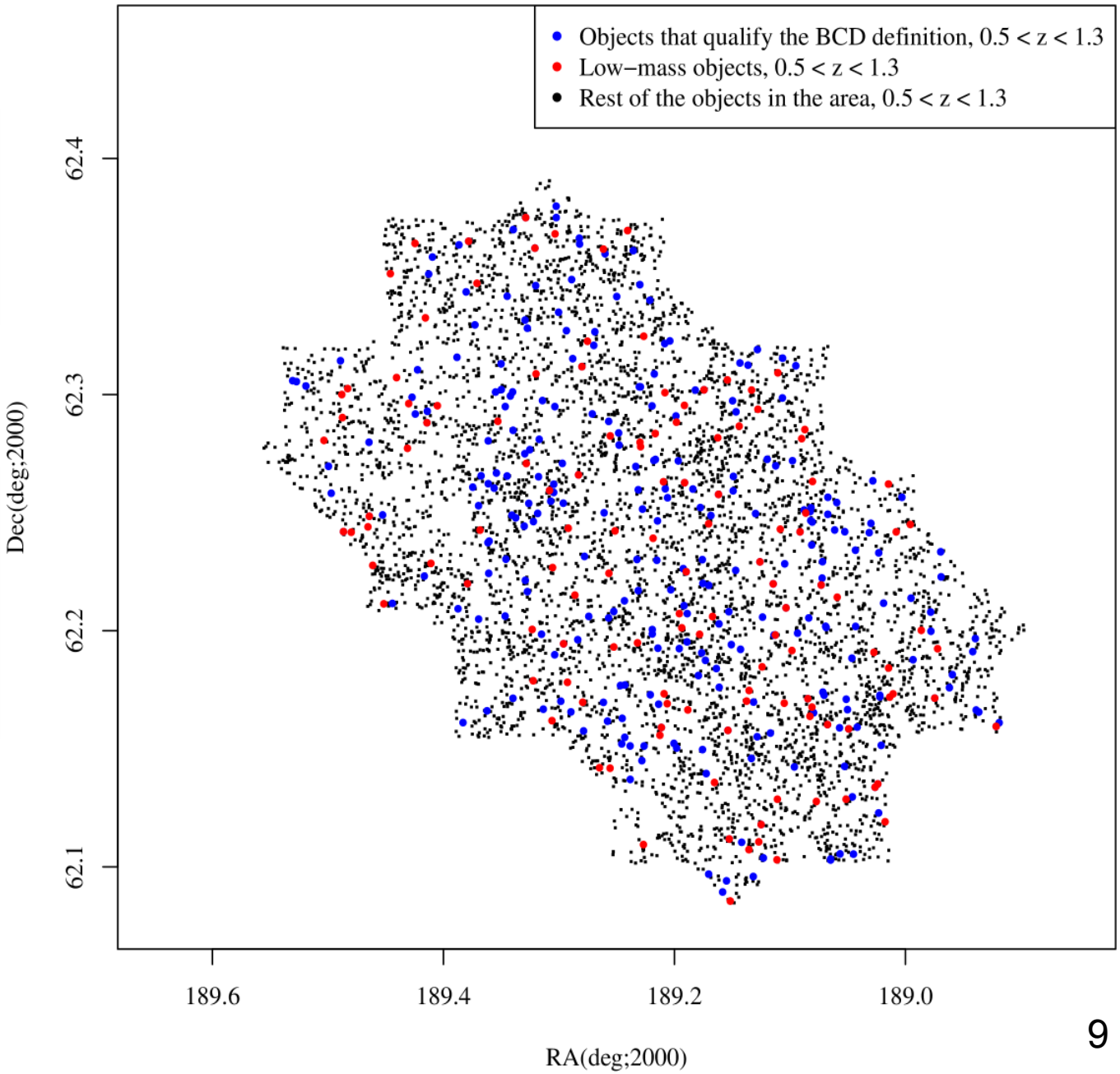

Feasibility

128 dwarfs

$M_* < 10^8 M_{Sun}$

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247 BCDs

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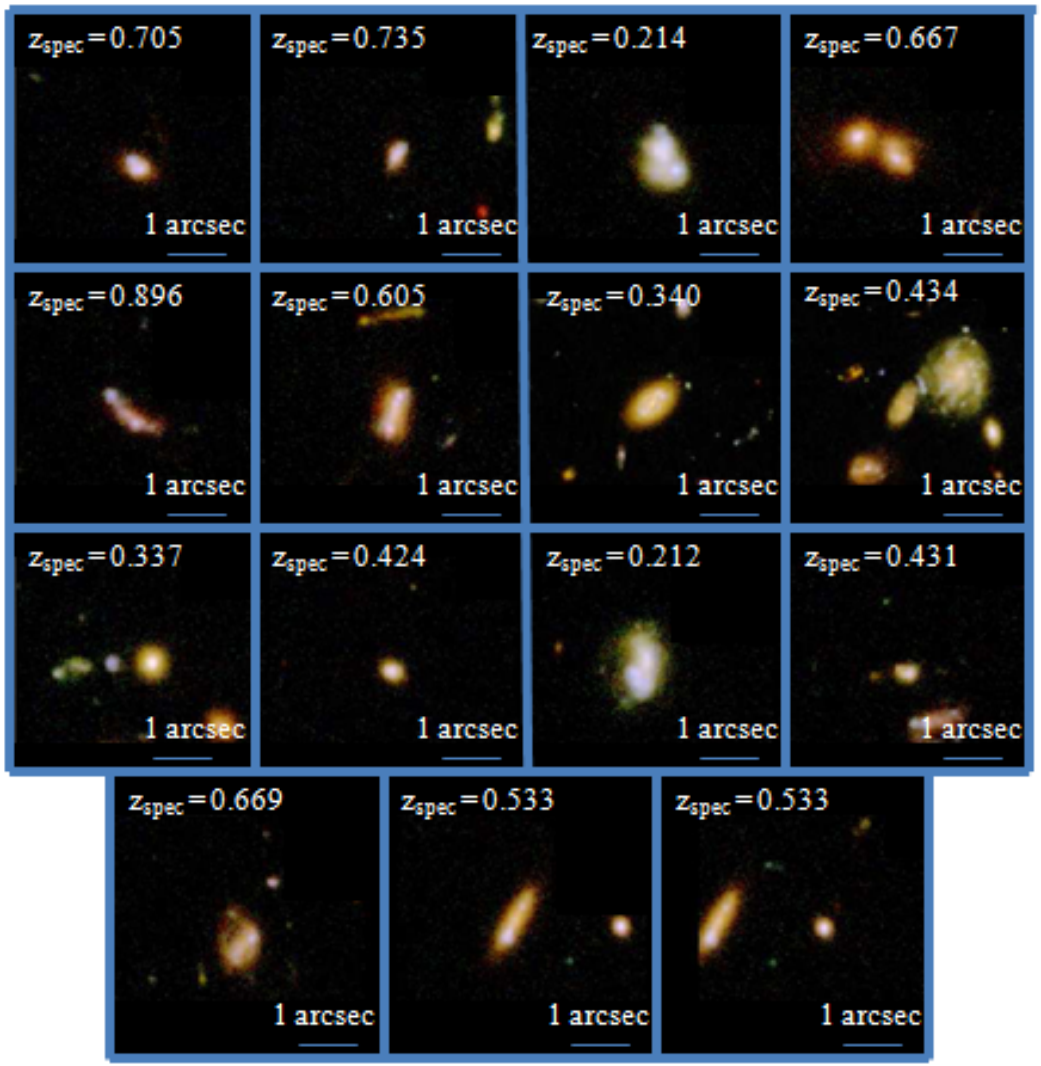
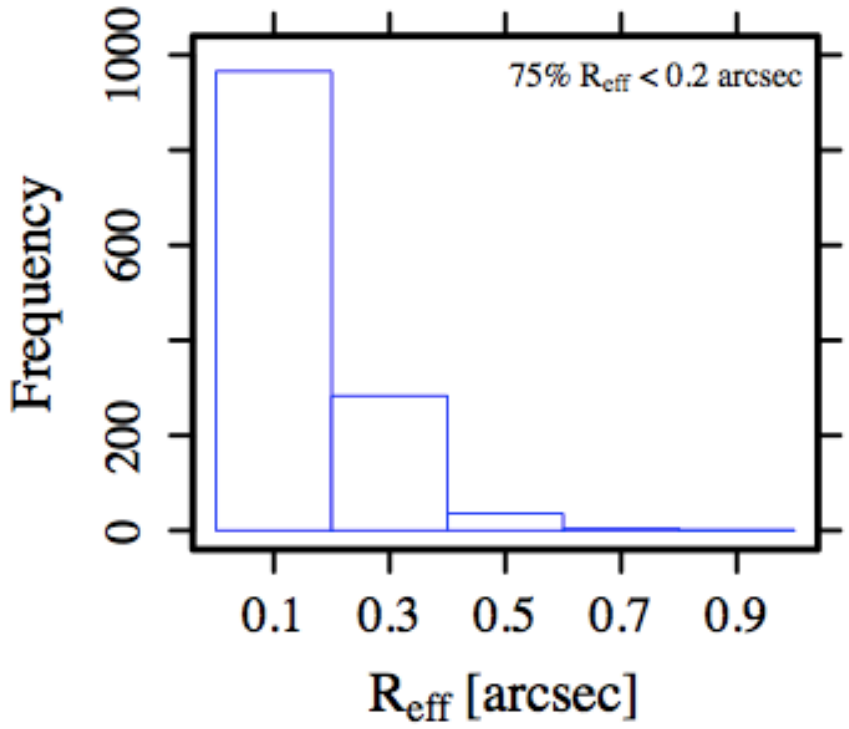
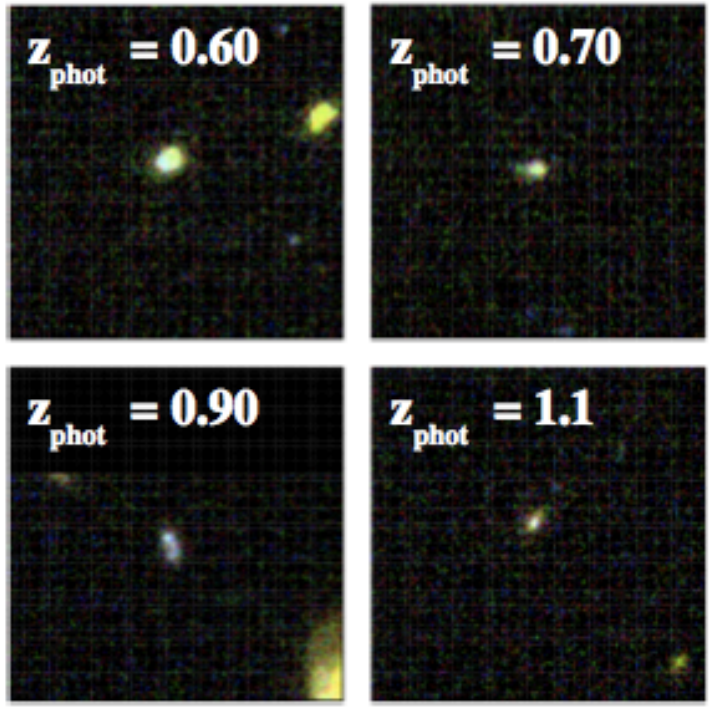
~ 2 arcmin^{-2}



(Gil de Paz et al. 2013, ApJ in prep)

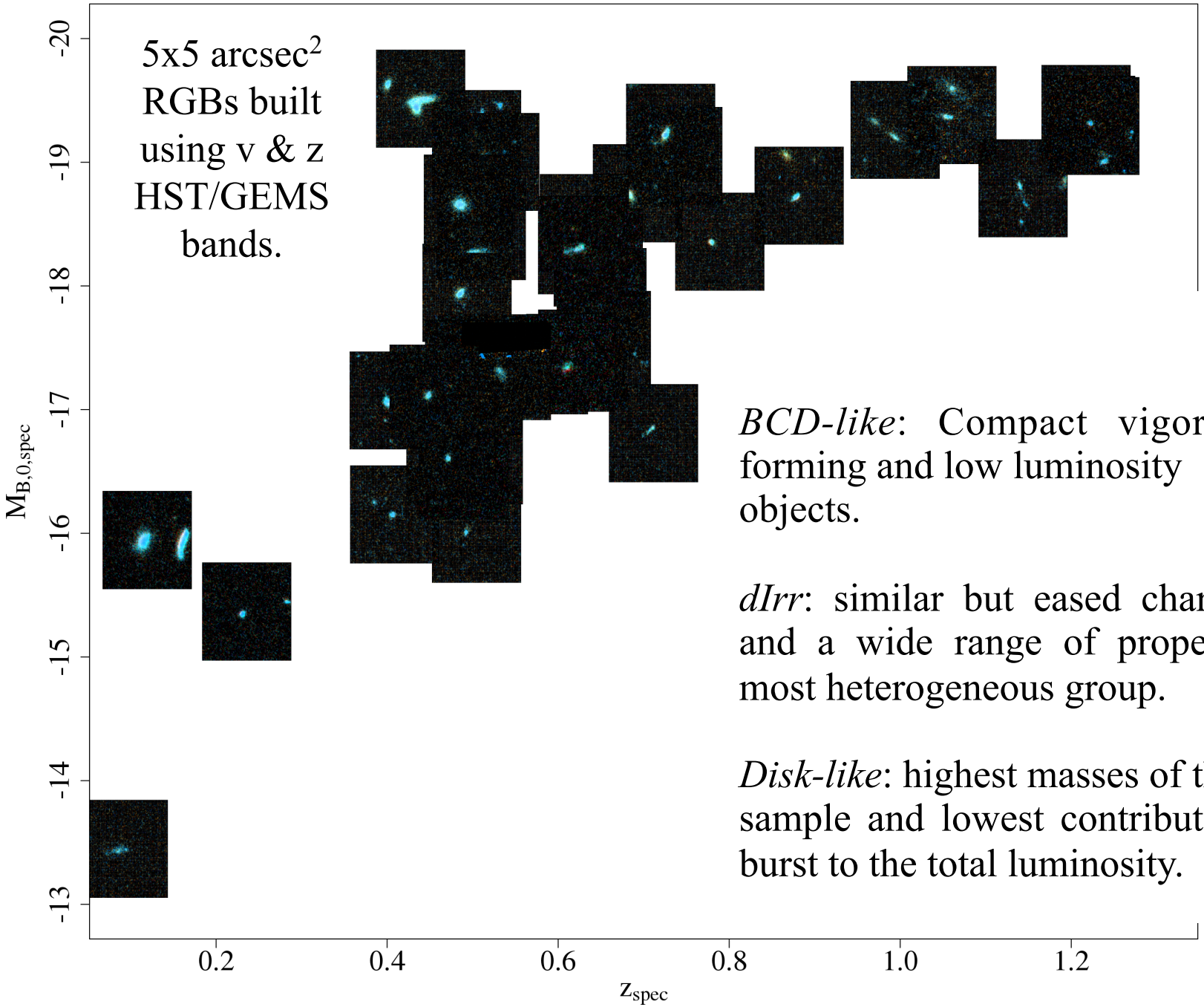


(a) Distribution of R_{eff} (i band GOODS-N; see text for reference) for the BCDs in our sample.



(b) 5" x 5" RGB images of a subsample of BCDs, created combining ACS images using software developed by our group.

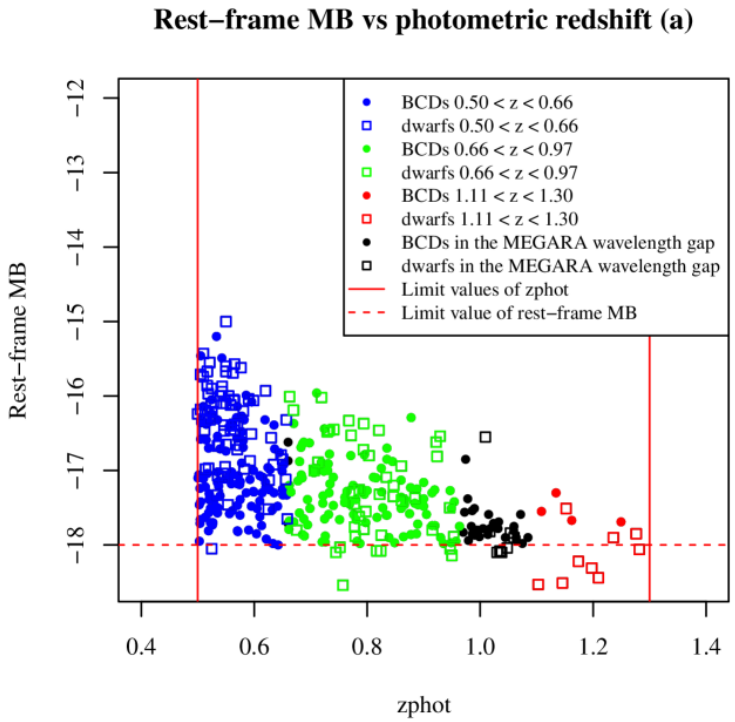
Properties: Morphology

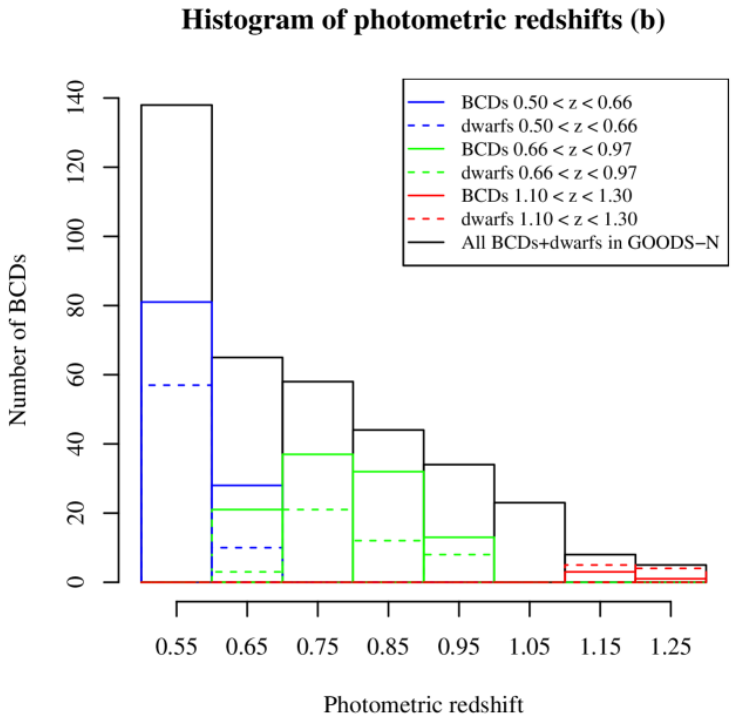


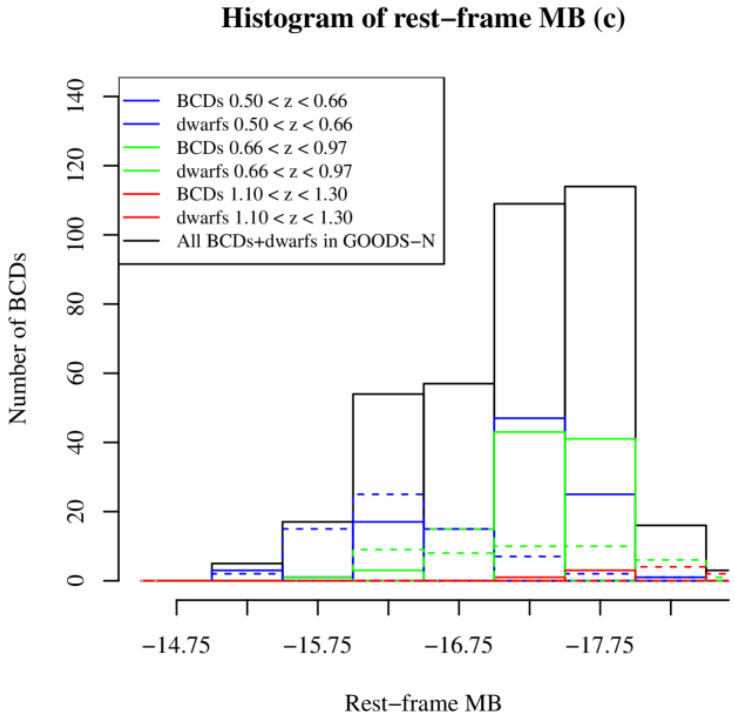
BCD-like: Compact vigorous star-forming and low luminosity objects.

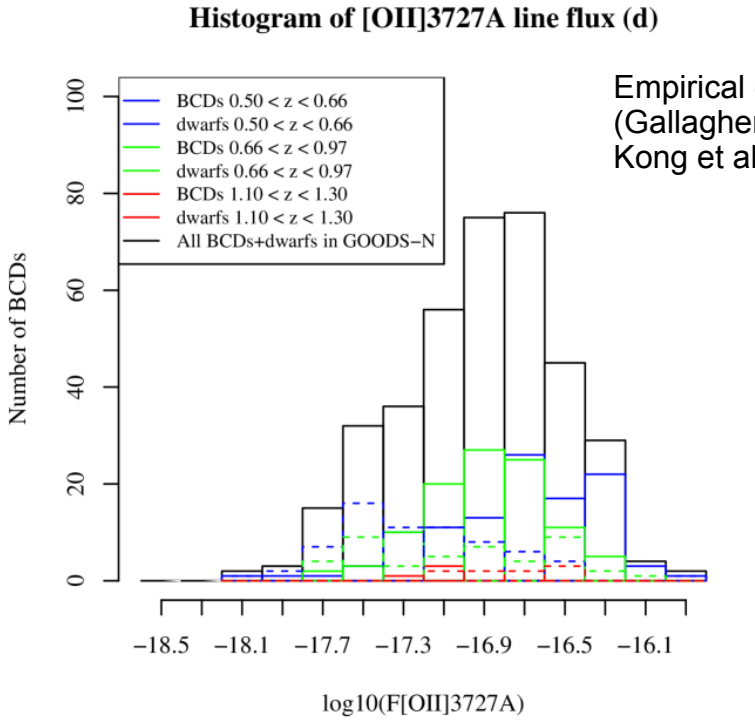
dIrr: similar but eased characteristics and a wide range of properties. The most heterogeneous group.

Disk-like: highest masses of the sample and lowest contribution of the burst to the total luminosity.





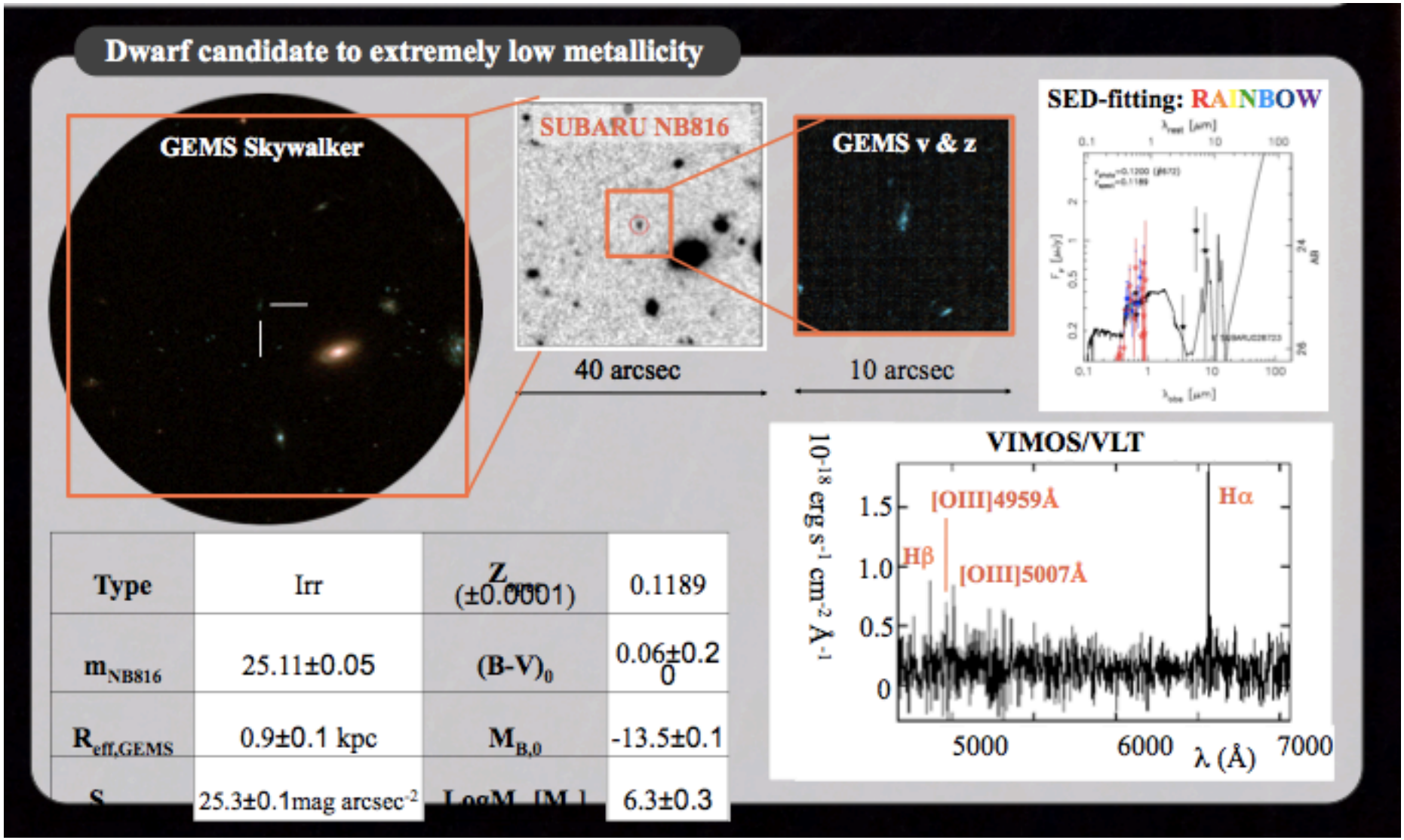




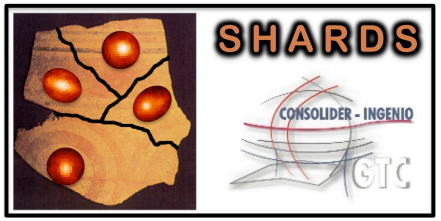
Empirical expressions (Gallagher et al. 1989; Kong et al. 2004)

Pilot study VIMOS/VLT for GOODS-S

Rodríguez-Muñoz Ph.D. Thesis in prep



Next steps



- To produce samples from SHARDS catalog. M<1e9
- SHARDS indexes sensible to metallicity?
- Priors for metallicity
- Analysis of general properties and metallicity priors
- Follow-ups for accurate metallicities

OSIRIS/MOS SHARDS proposal !