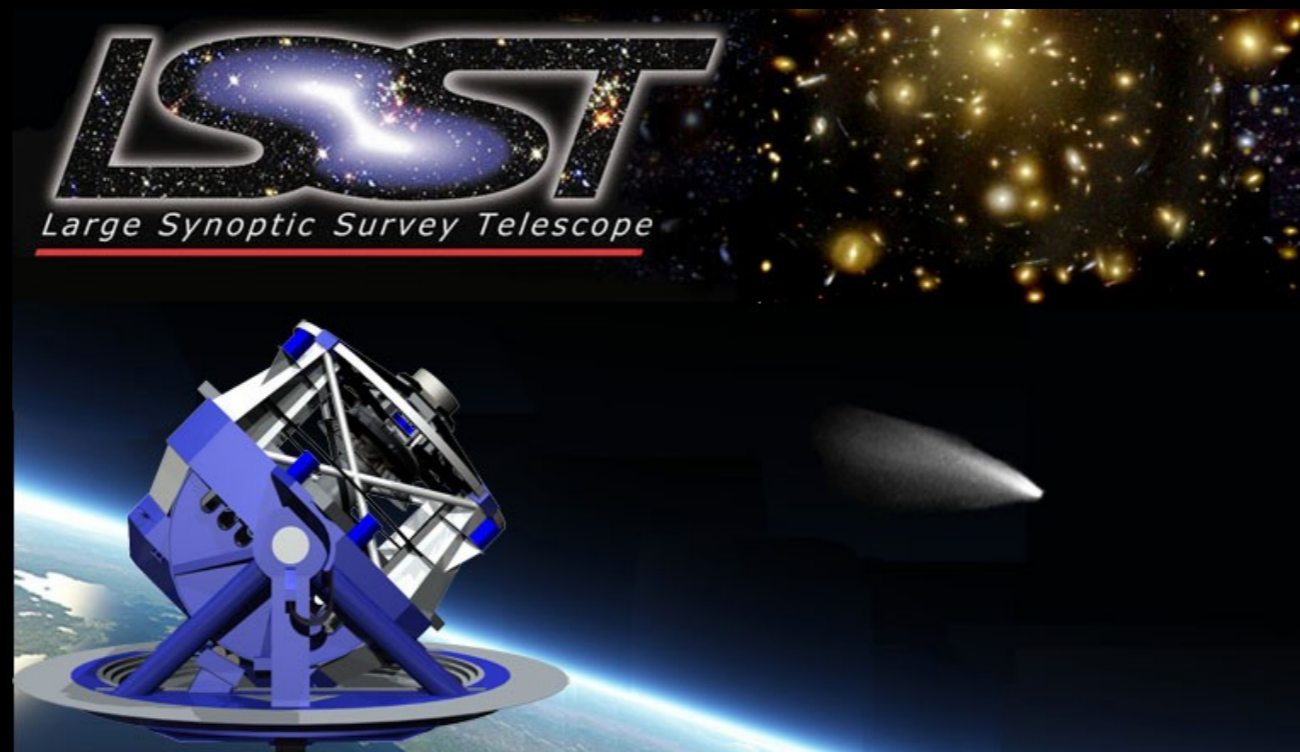


# High-z Galaxies and AGNs: approaching the Reionization Epoch with LSST

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**On behalf of the Extragalactic group at OAR**

**LSST Meeting, 14 July 2016 Roma (Italy)**



# LSST Surveys

1-Single-Visit Depth (point like sources, 5 sigma):

u:23.9 g: 25.0 r: 24.7 i: 24.0 z: 23.3 y: 22.1 AB mag

Area=18000 sq. deg.

2-Coadded Depth (point like sources, 5 sigma):

u:26.3 g: 27.5 r: 27.7 i: 27.0 z: 26.2 y: 24.9 AB mag

Area=18000 sq. deg. Visits: 70-230 per field; in 10 years

3-Deep Drilling fields (point like sources, 5 sigma):

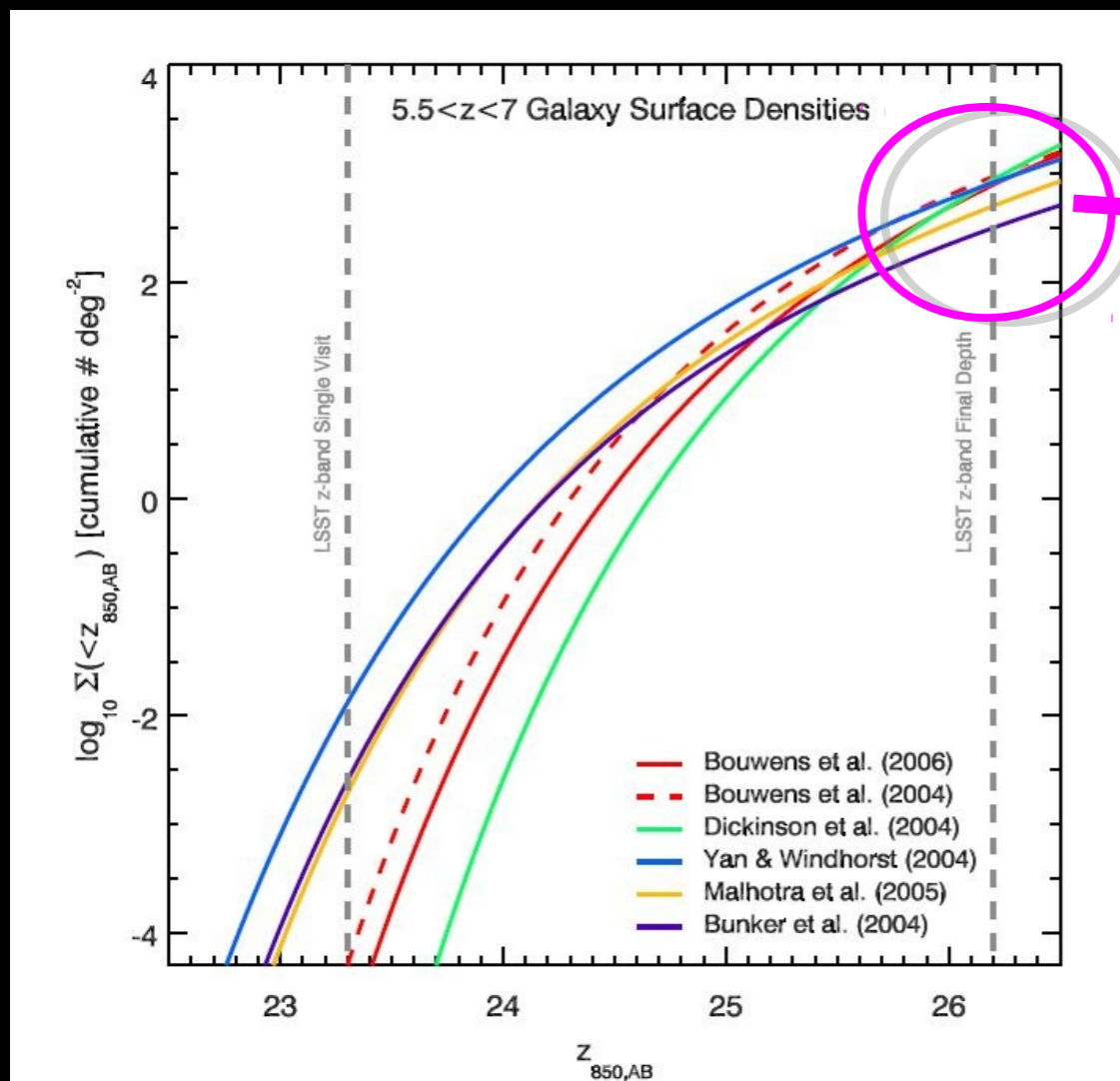
u:28.0 g: 28.0 r: 28.0 i: 28.0 z: 28.0 y: 26.8 AB mag

Area=50 sq. deg.

# Galaxy Formation and Evolution

Galaxy formation and Black Hole accretion are stochastic processes: large statistical samples are important for making further progresses.

Statistical properties (Luminosity Function, Mass Function, clustering) of Galaxies at high redshift require Deep Fields.

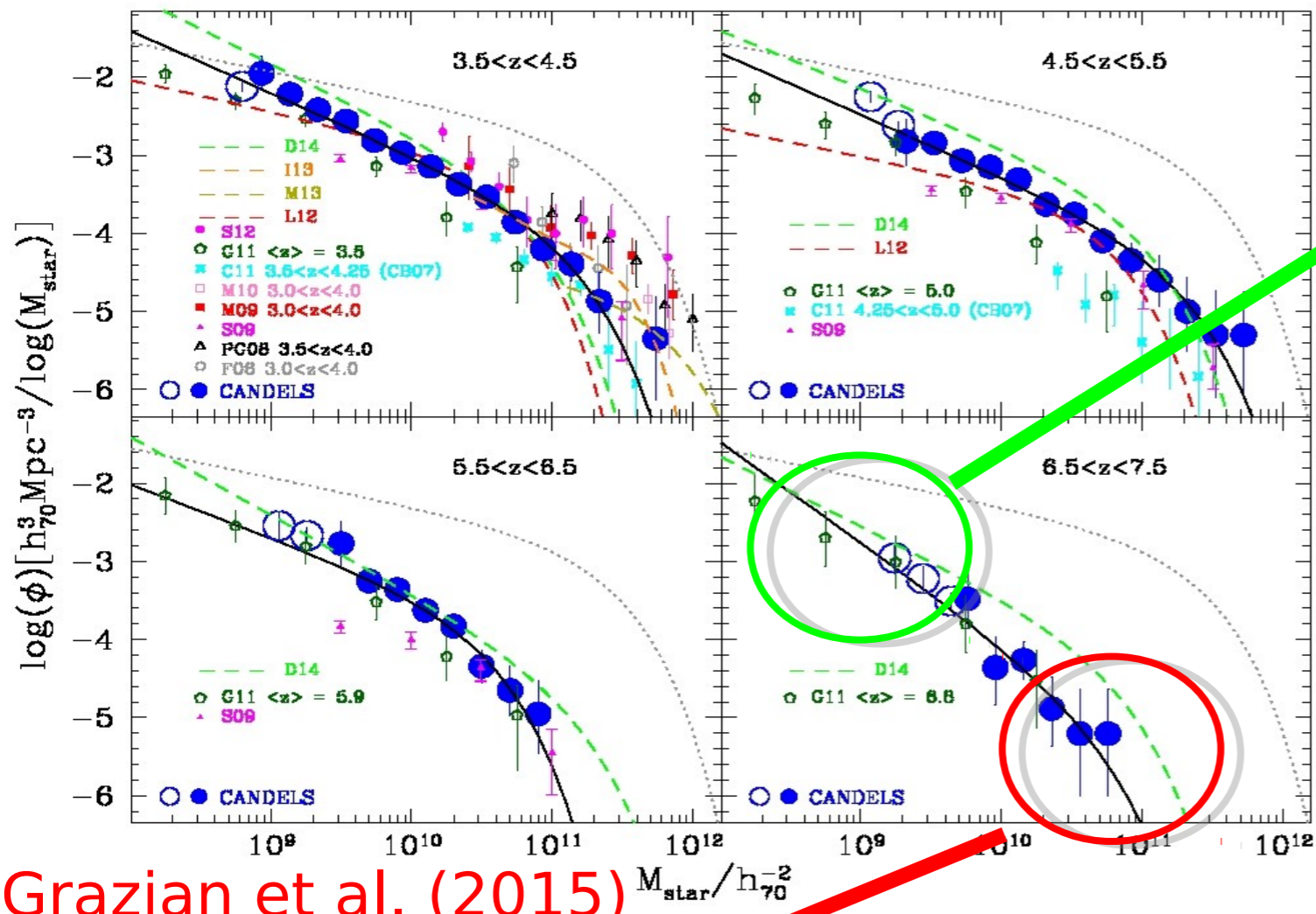


250-630 galaxies/sq.deg.  
expected at redshift  
 $5.5 < z < 7.0$

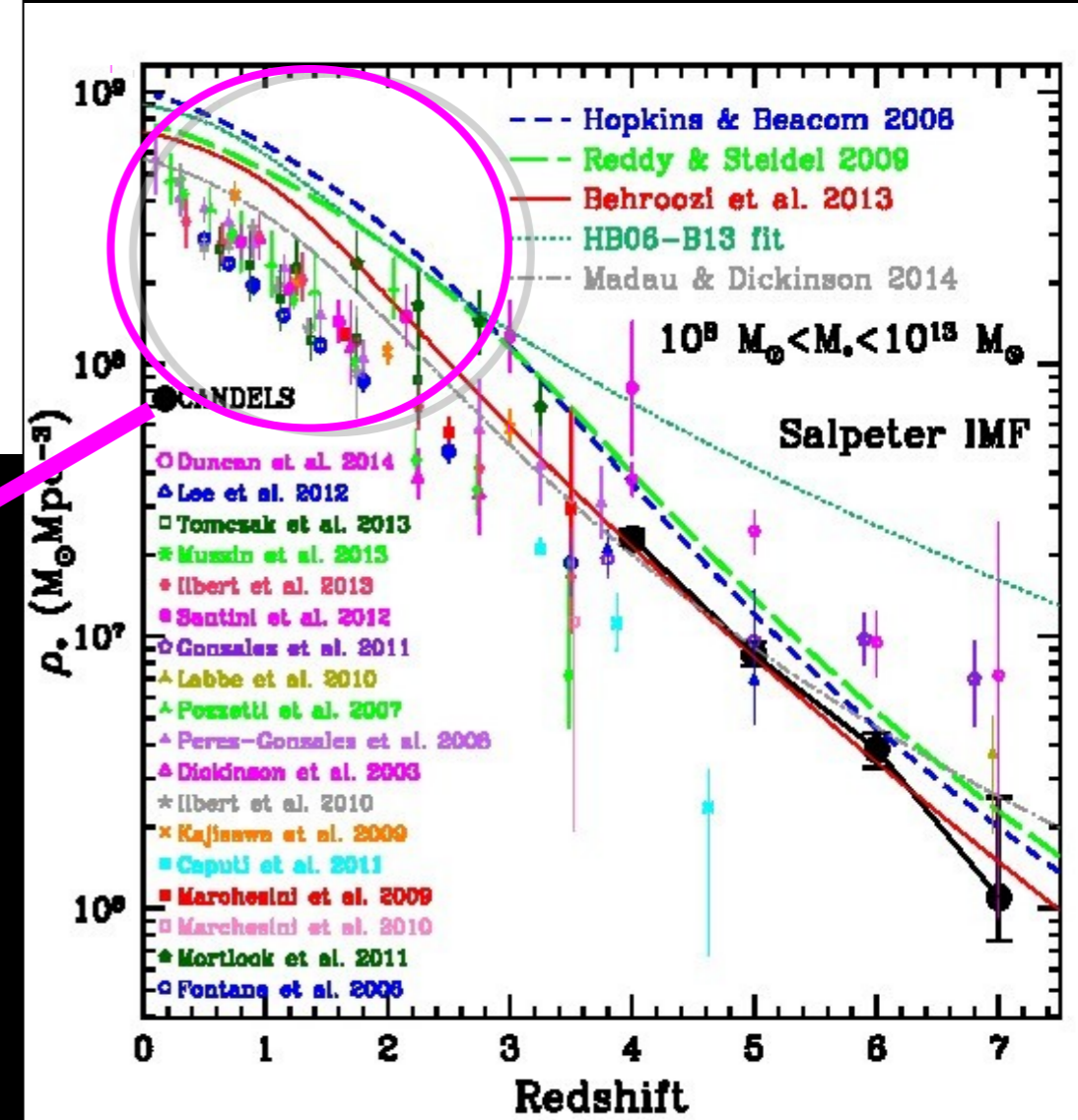
Survey area ~ 10000  
sq.deg.

Follow-up observations  
with ALMA, VLT, LBT,  
TNG, JWST and E-ELT

# Galaxy Mass Assembly at high redshift



Deep Fields are needed to probe the low mass end of GSMF at high-z (20 galaxies)



Grazian et al. (2015)

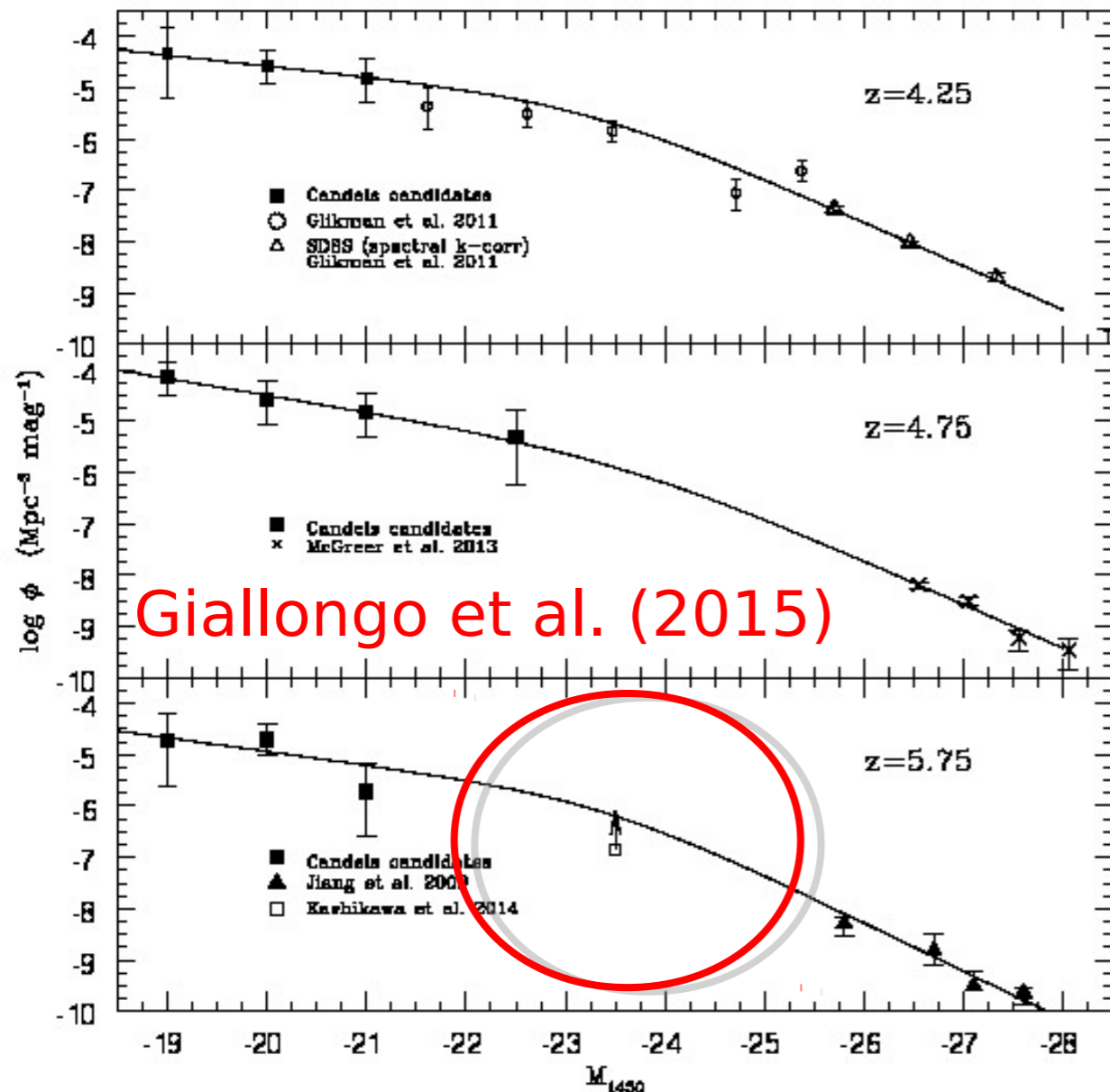
Red&Dead galaxies at high-z

SFR and stellar mass do not agree: IMF ?

# Reionization: Galaxies or AGNs ?

Planck 2016: late reionization  $z < 9$ ;

Faint AGNs can reionize the Universe, if numerous at high- $z$  and if they emit lots of LyC photons.

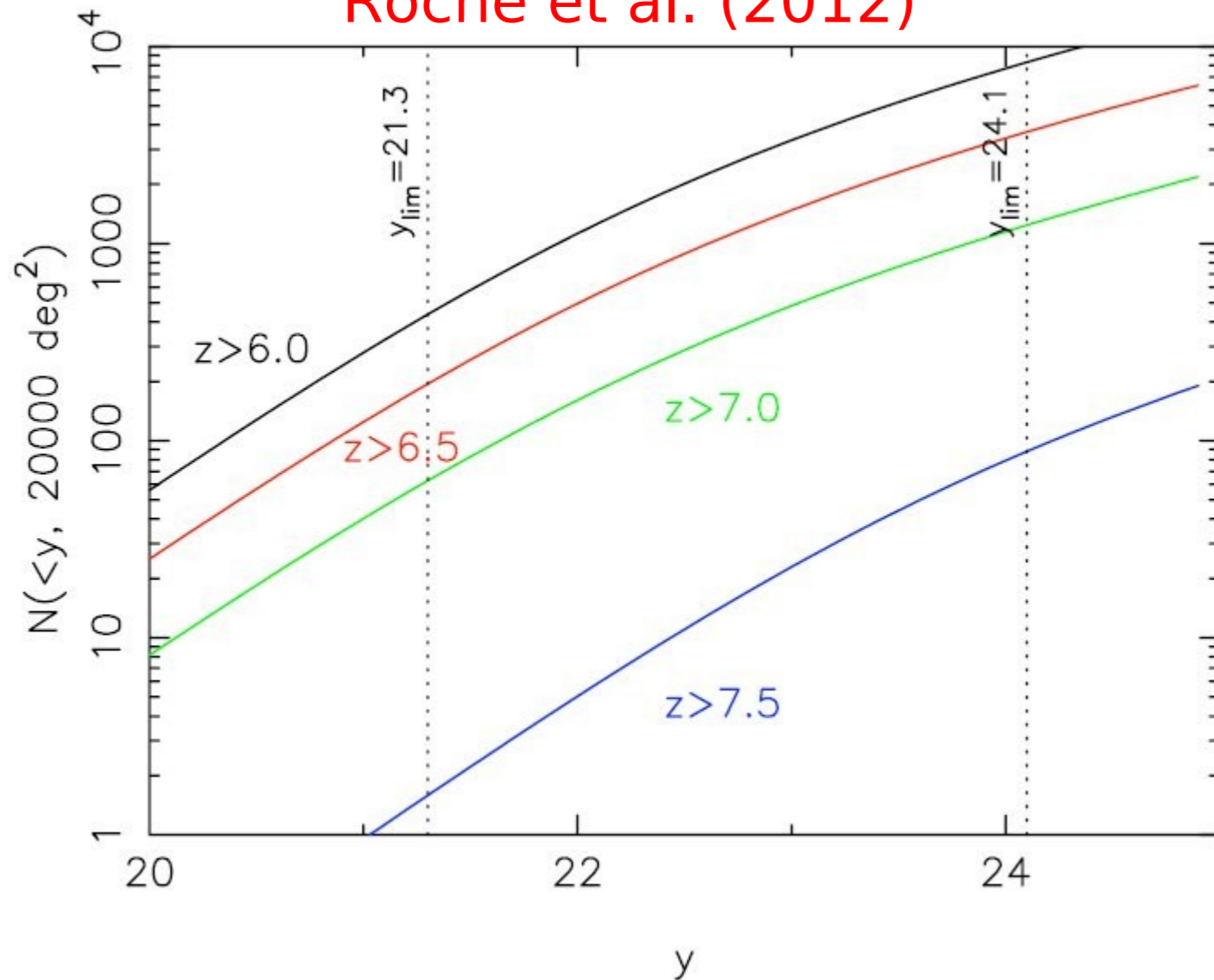


Current search for high- $z$  Bright QSOs or Faint AGNs is very inefficient: large areas or deep X-ray data are required.

LSST+Euclid will open a new window on high- $z$  Universe: QSOs at  $z > 8$

# High-z AGNs

Roche et al. (2012)



100 AGNs at  $z > 7.5$  with  $Y < 24.1$  (Euclid Wide Survey) in 20000 sq. deg.

Euclid: spectroscopic confirmation

LSST: color selection, variability, lack of proper motion.

- 1-AGNs at  $z > 7$  are important to study the seeds of SMBHs.
- 2-Stack a large number of faint AGNs at high- $z$  to study LyC escape fraction.
- 3-Clustering analysis requires a large number of AGNs.

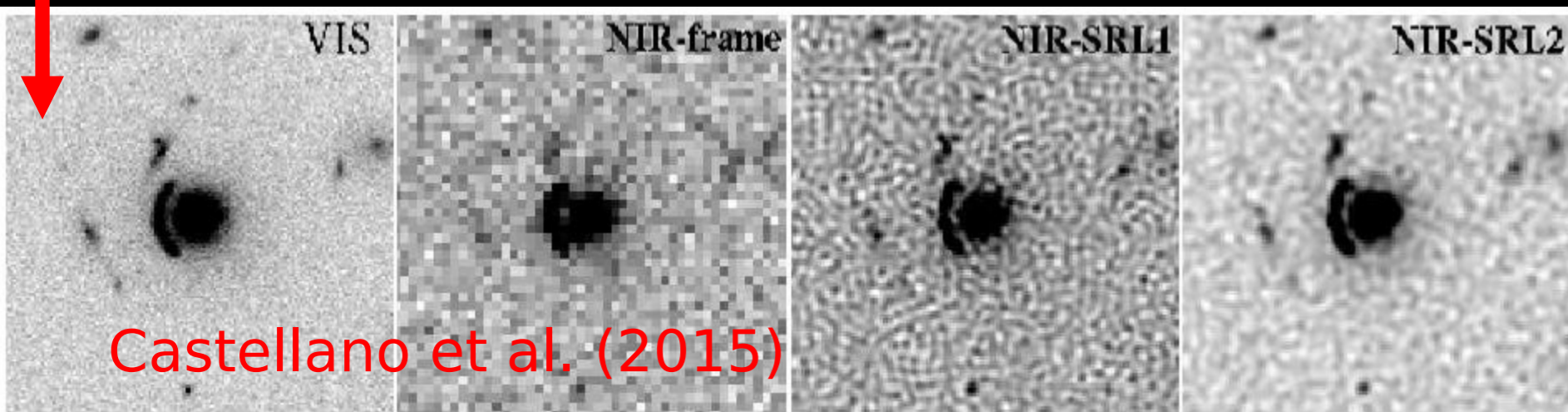
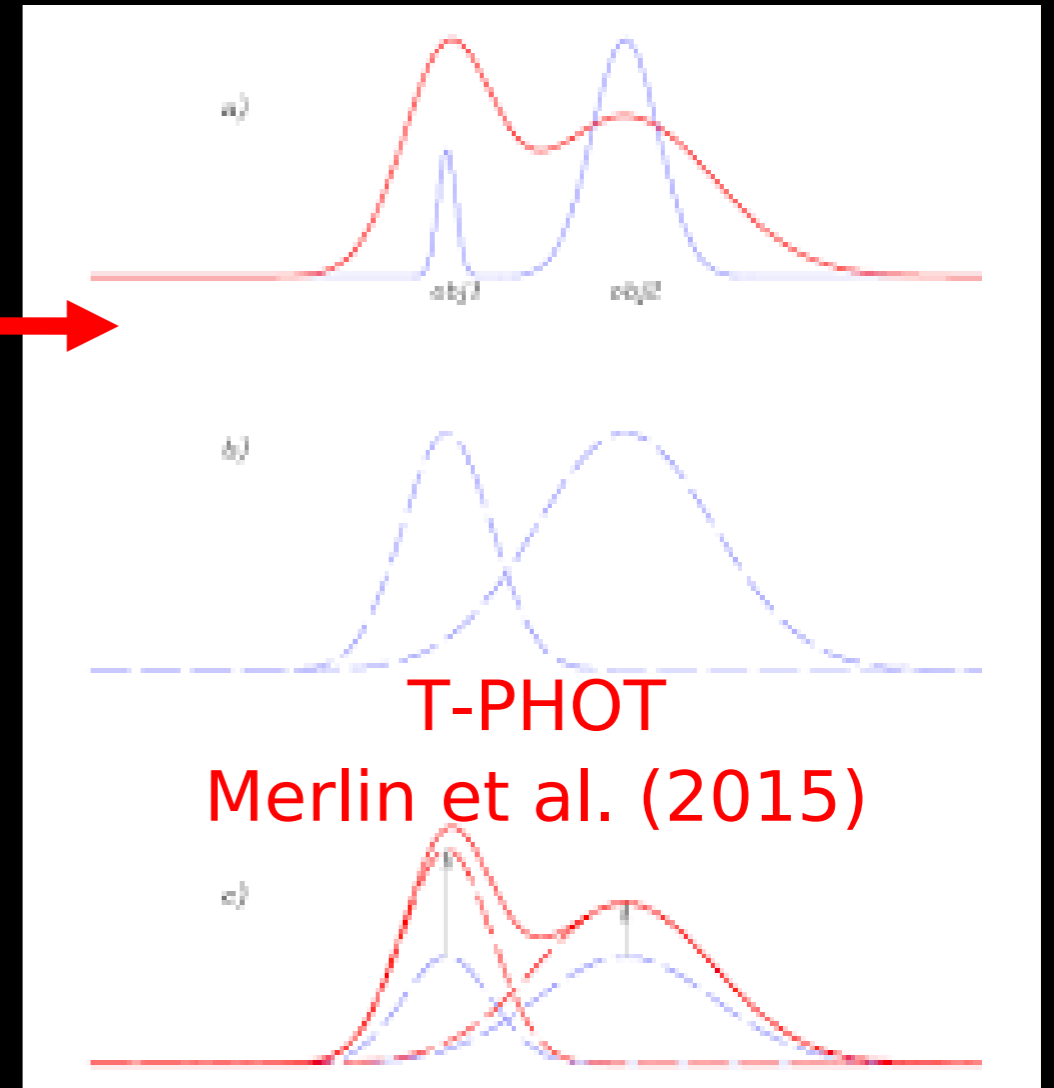
# Software Development

1-zphot: develop new techniques

2-Innovative techniques for  
Multiwavelength Catalog production

3-Super-resolution: 70-230 visits

4-Multiwavelength cross-correlation  
with ALMA, JWST, e-Rosita, SKA....



# Current Activities

1-Use HST and ground-based data over large sky areas (CANDELS, HFFs, COSMOS, XMM-XXL, etc) in order to prepare the SW tools to analyse Euclid and LSST data.

2-Simulations of LSST data and verification of developed algorithms.

# Human Resources

AG can dedicate a significant fraction of FTE on this project.

Other staff at OAR are interested on this project.

8 postdocs at OAR/ASDC can be involved in this project.