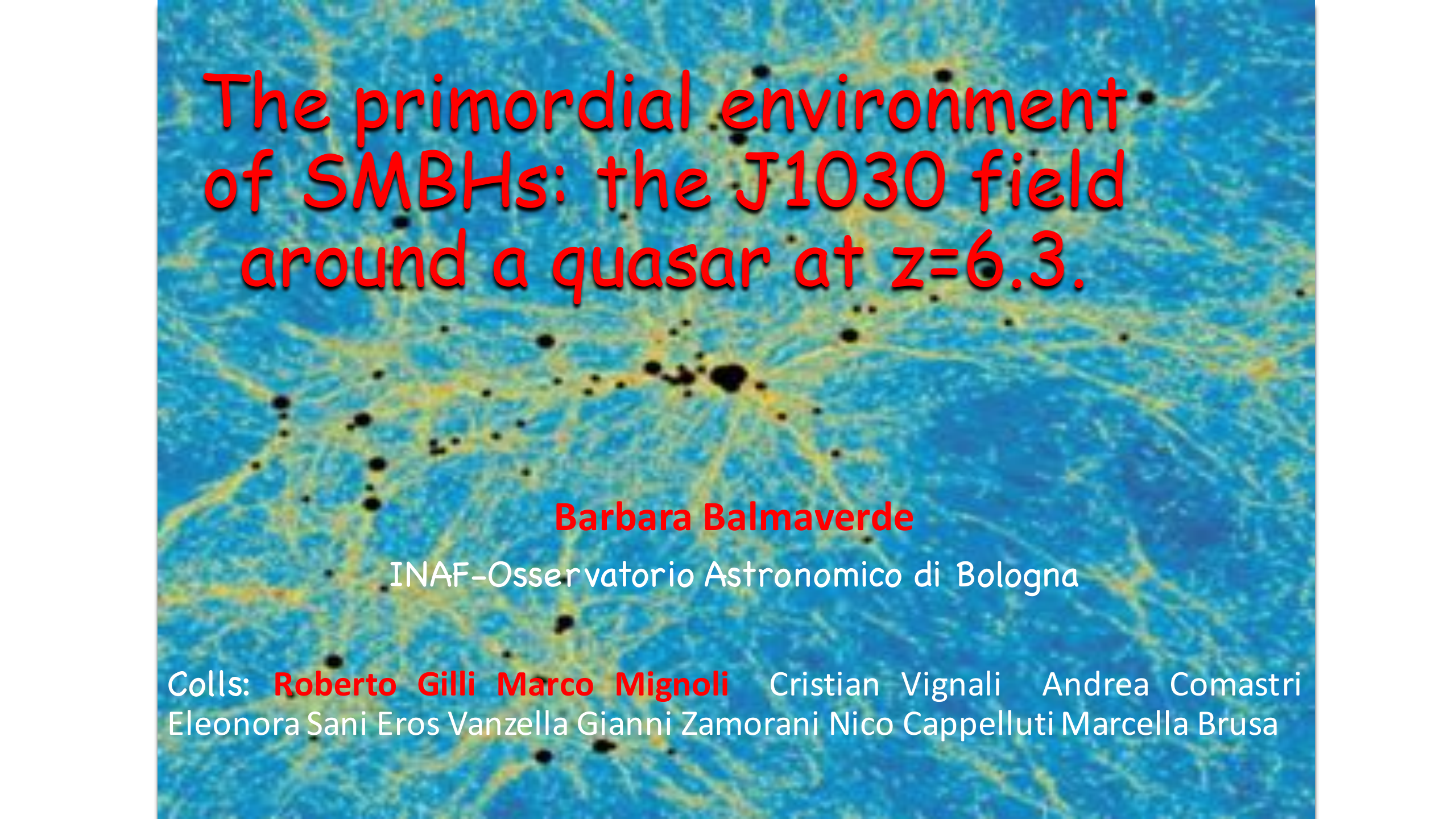




Publication Year	2016
Acceptance in OA	2020-05-11T12:18:33Z
Title	The Primordial Environment Of SMBHs: The J1030 Field Around a Quasar at $z = 6.3$
Authors	BALMAVERDE, Barbara, MIGNOLI, Marco, GILLI, Roberto, Vignali, C., COMASTRI, Andrea, Sani, E., VANZELLA, Eros, Zamorani, G., Cappelluti, N., Brusa, M.
Publisher's version (DOI)	10.5281/zenodo.163518
Handle	http://hdl.handle.net/20.500.12386/24688

A visualization of the cosmic web, showing a complex network of filaments and nodes. The background is a deep blue, with yellow and green filaments representing the distribution of matter. Numerous black dots of varying sizes are scattered throughout, representing galaxies and clusters. The overall structure is highly interconnected and filamentary.

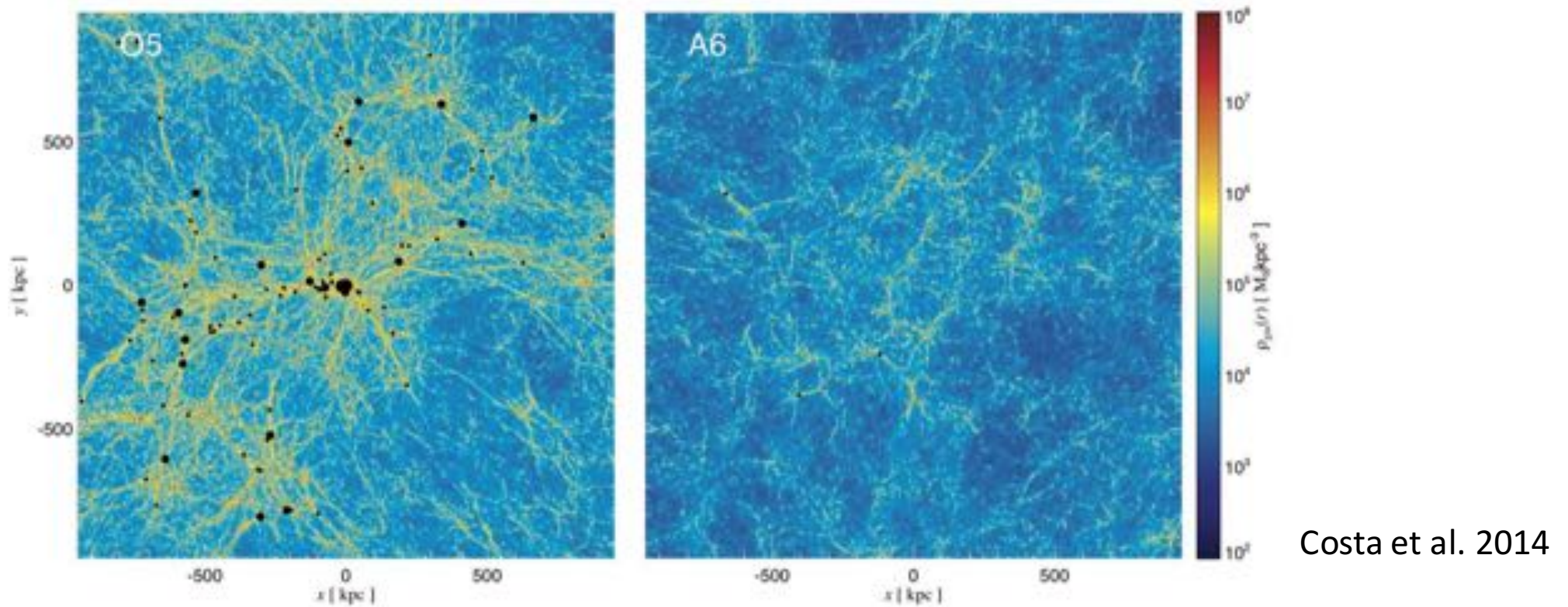
The primordial environment of SMBHs: the J1030 field around a quasar at $z=6.3$.

Barbara Balmaverde

INAF-Osservatorio Astronomico di Bologna

Colls: **Roberto Gilli Marco Mignoli** Cristian Vignali Andrea Comastri
Eleonora Sani Eros Vanzella Gianni Zamorani Nico Cappelluti Marcella Brusa

High- z SMBHs formation and environment



The BH masses measured for the SDSS bright quasars at $z \sim 6$ are of the order of $10^9 M_{\odot}$ grown in less than 1 Gyr.

From theory:

Early SMBHs should only form in the most massive dark matter halos (Overzier09, Di Matteo 12, Angulo13) and should be part of large galaxy over-densities that may extend up to 10 physical Mpc (pMpc).

These regions should be populated by galaxies that are more massive, dusty, and star-forming ($\sim \text{SFR } 700 M_{\odot} \text{ yr}^{-1}$) than those in average-density fields (Yajima et al. 2015).

How is the environment around high- z QSO?

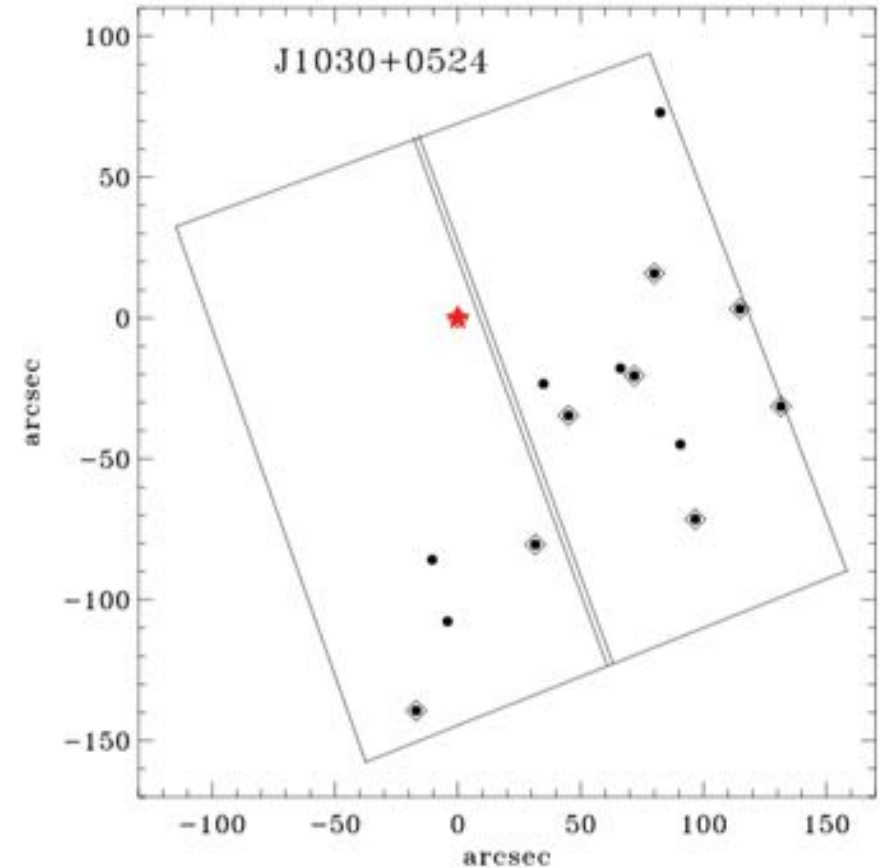
Currently we lack clear observations of the environment in which high redshift QSOs reside....

Observations of galaxies candidates around $z \sim 6$ QSOs seems to show **no evidence of pronounced overdensities in small ACS/HST field $\sim 200 \times 200$ arcsec**

(Stiavelli+05, Kim+09, Husband+13, Banados+13, Simpson+14)

HOWEVER

the HII regions generated by luminous quasars can affect the formation and clustering of galaxies.



Kim et al. 2009.

Field around QSO J1030 at $z=6.3$

The project: investigate the environment in which high redshift QSOs reside at very large scales (~25'X25').

The technique:

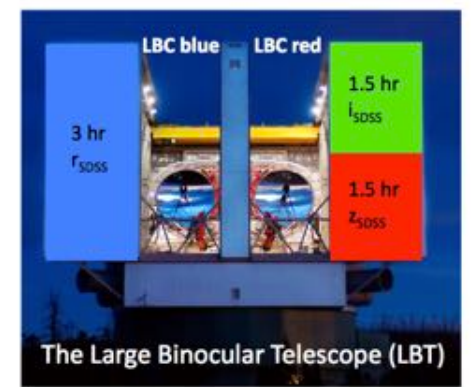
COLOR SELECTION

in Morselli14 we select LBGs candidates with color criteria in the fields around four $z \sim 6$ QSOs in the SDSS: i-dropout in LBT images z , i,r.

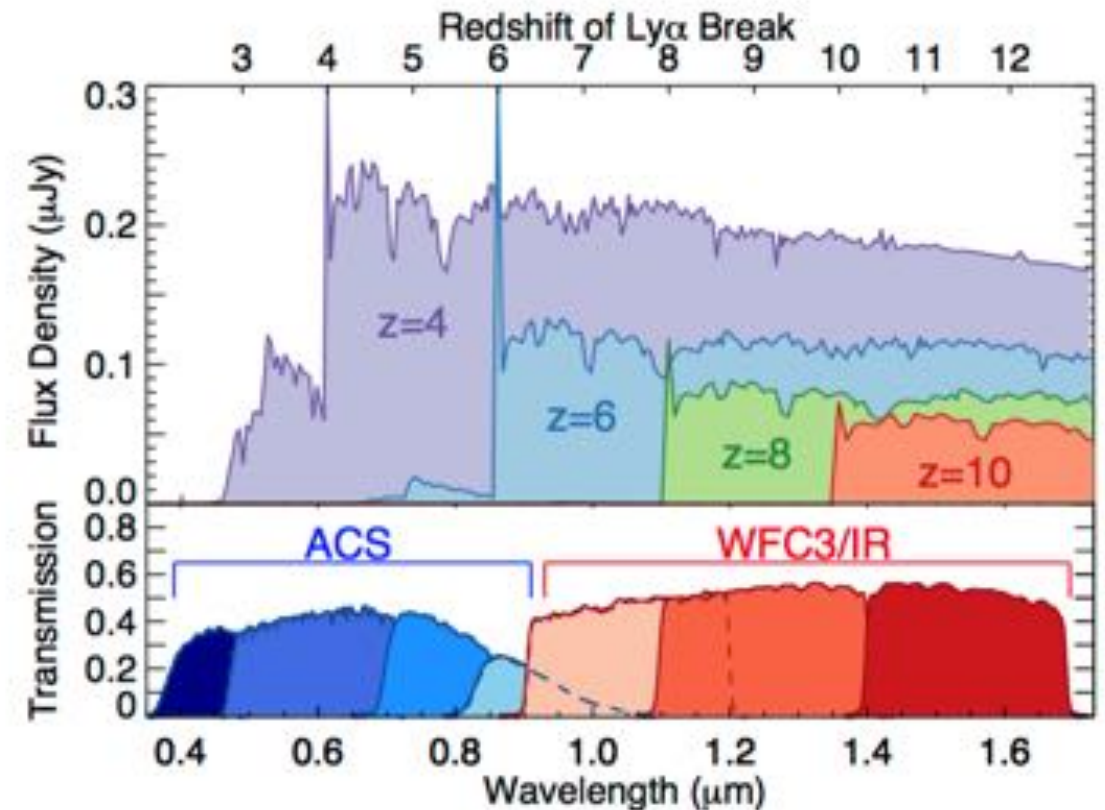
CRITERIUM:

PRIMARY: $(i-z) > 1.3$ & undetected in r

SECONDARY: $1.1 < (i-z) < 1.3$



LBT = 2 x 8.4m telescopes – Mt. Graham (AZ)

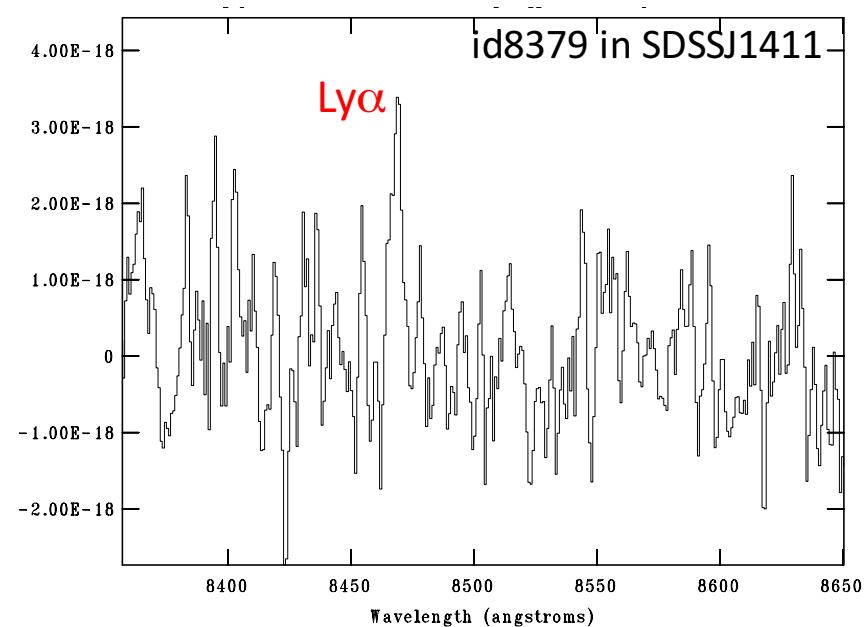
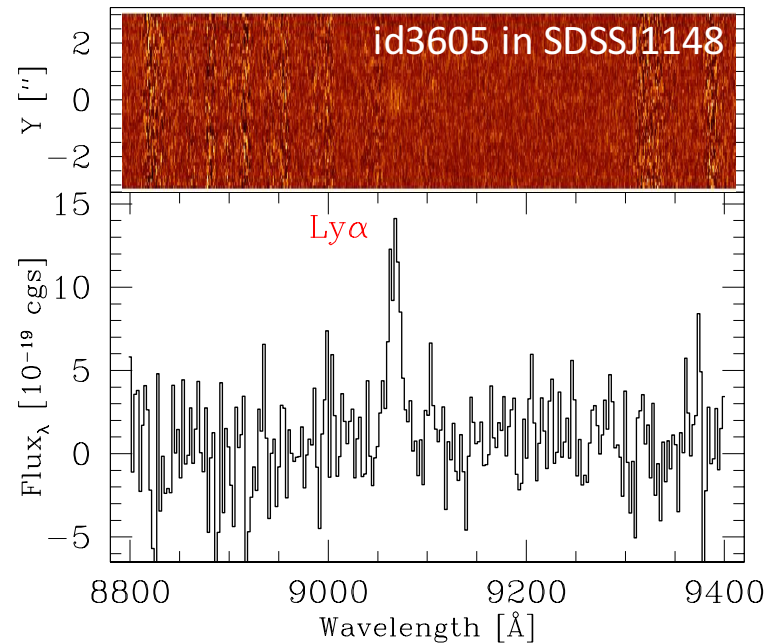


Spectroscopic follow-up with MODS@LBT

16 i-drop observed in 5 masks in the 3 northern fields (SDSS J1048, J1411, J1148), 6hr per mask:



Only 2 LBGs likely within QSO halo



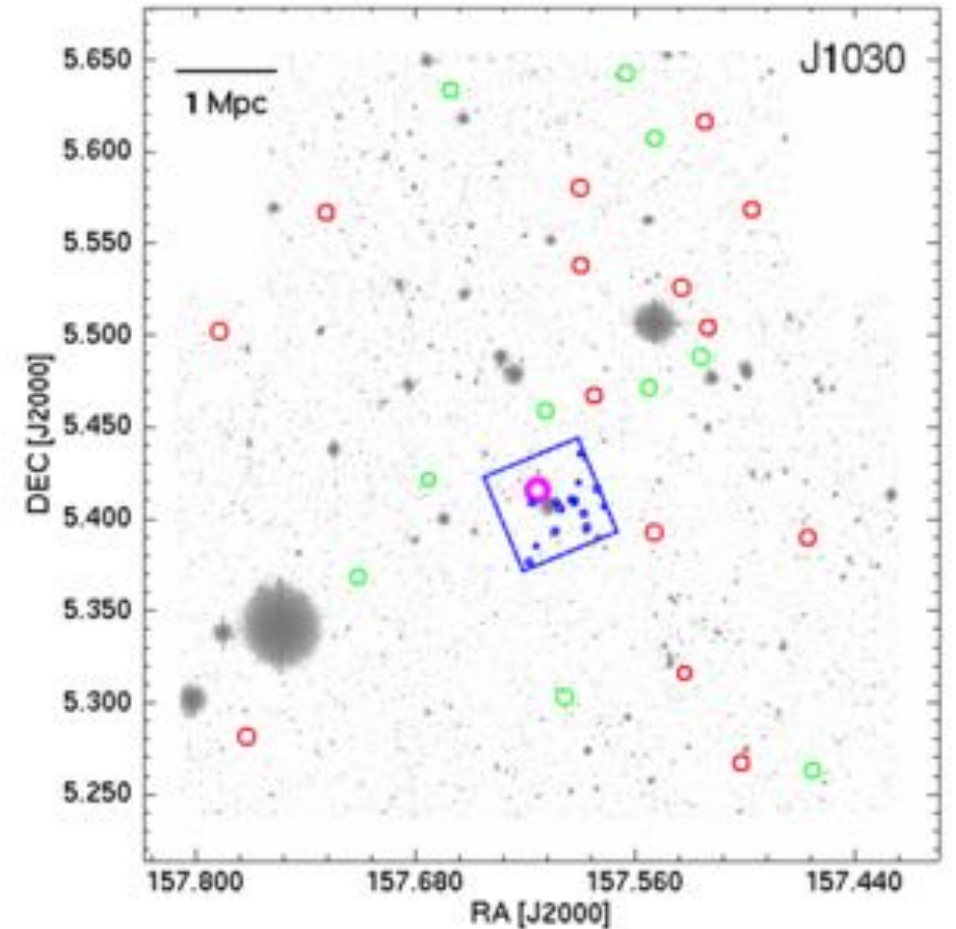
9/26/16 $z_{\text{LBG}} = 6.456, z_{\text{QSO}} = 6.42 \rightarrow d \sim 4 \text{ pMpc}$

Naples-AGN12 $z_{\text{LBG}} = 5.964, z_{\text{QSO}} = 5.903 \rightarrow d \sim 5 \text{ pMpc}$

Towards an accurate selection of LBGs candidates...

In this talk, I focus on the region around the $z = 6.28$ QSO SDSS J1030+0524 (hereafter the **J1030** field), the most overdense one.

Because spectroscopic observations are very time expensive we need to select carefully our candidates.



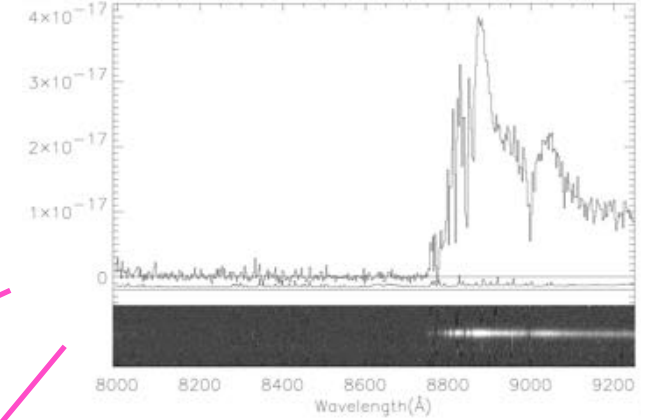
Deep near IR Y and J images around J1030



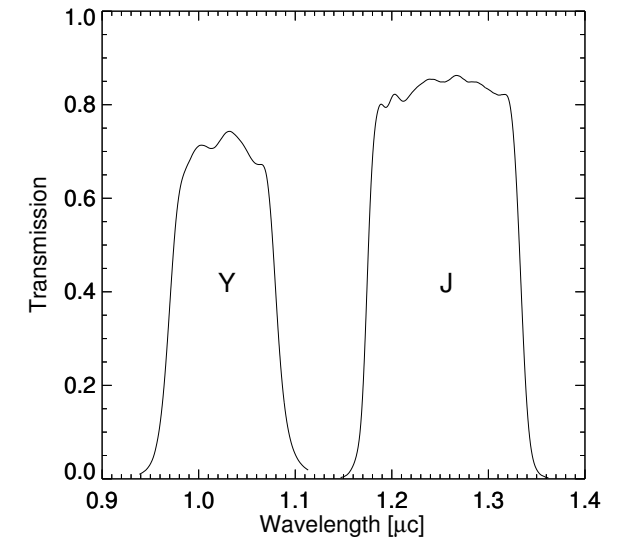
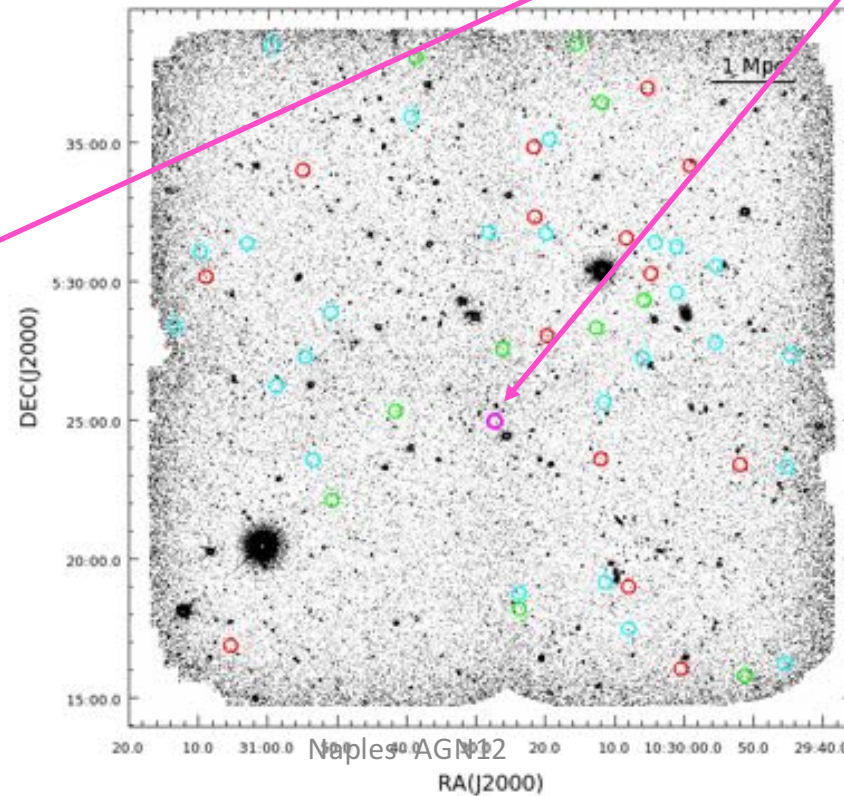
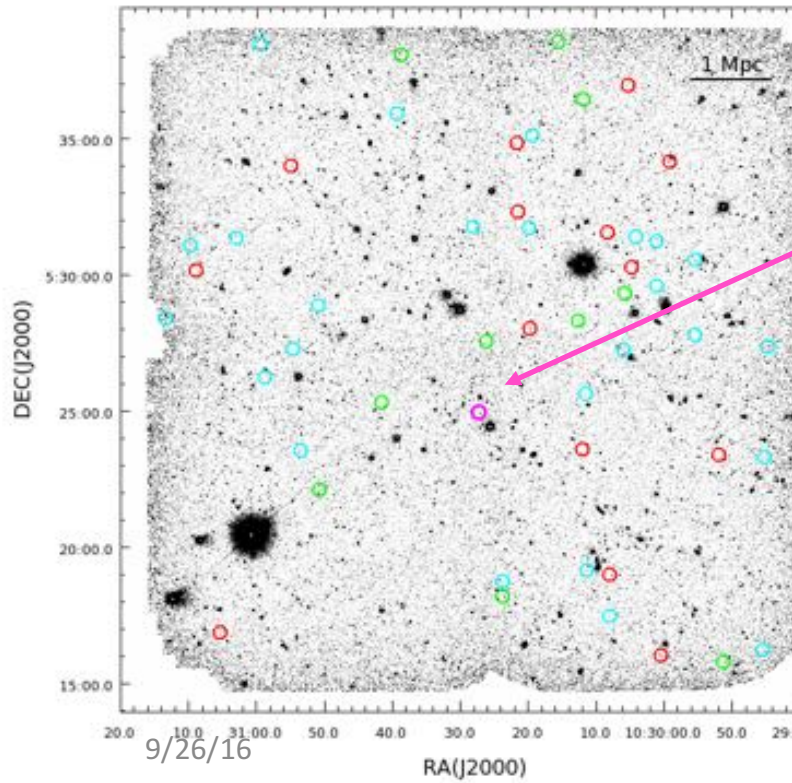
J1030 - Y BAND



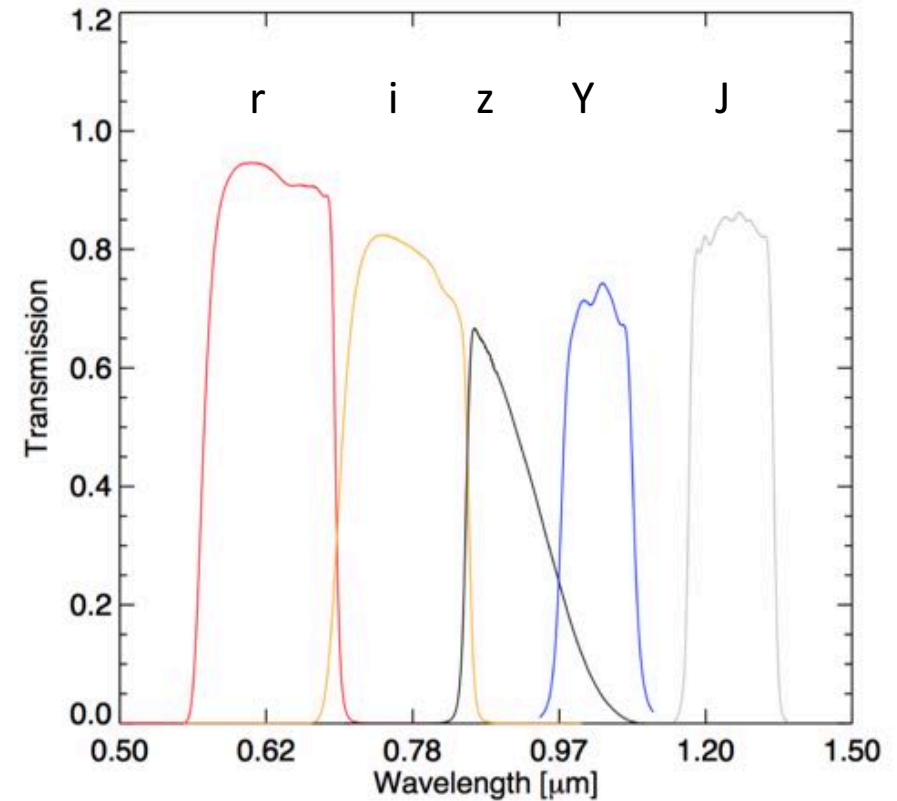
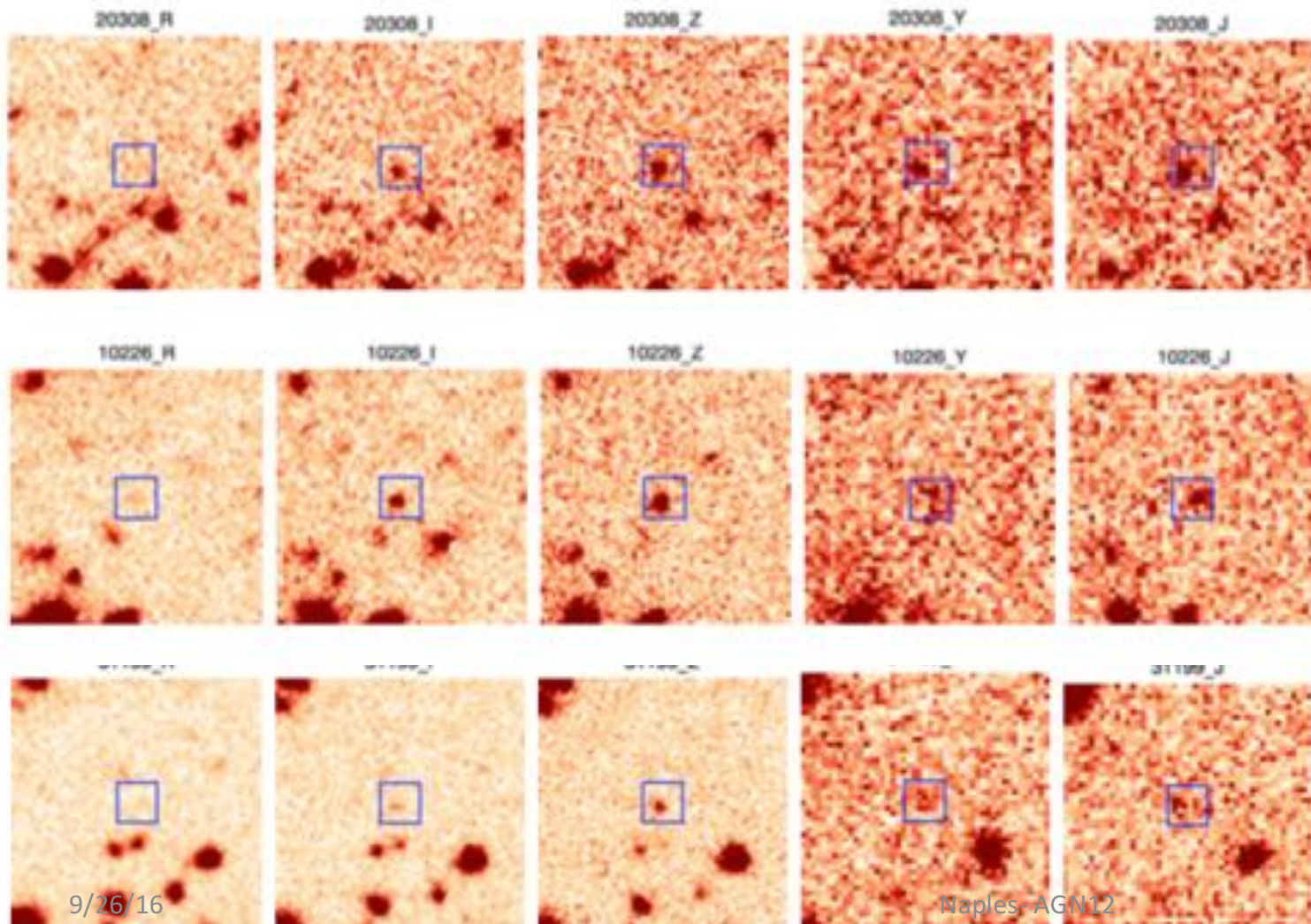
J1030 - J BAND



Pentericci02 - VLT/Fors2 spectrum

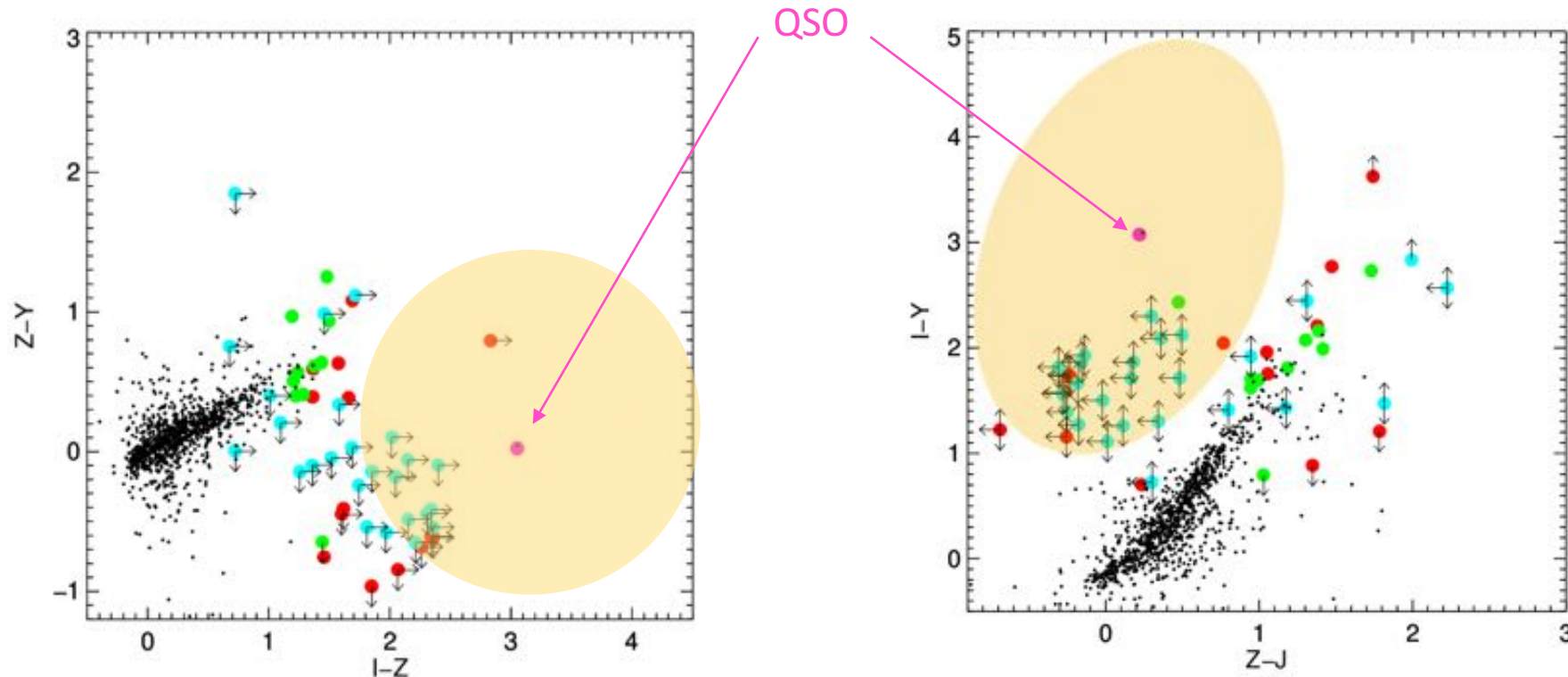


Toward a better LBGs candidates selection: Color plots & photometric redshift

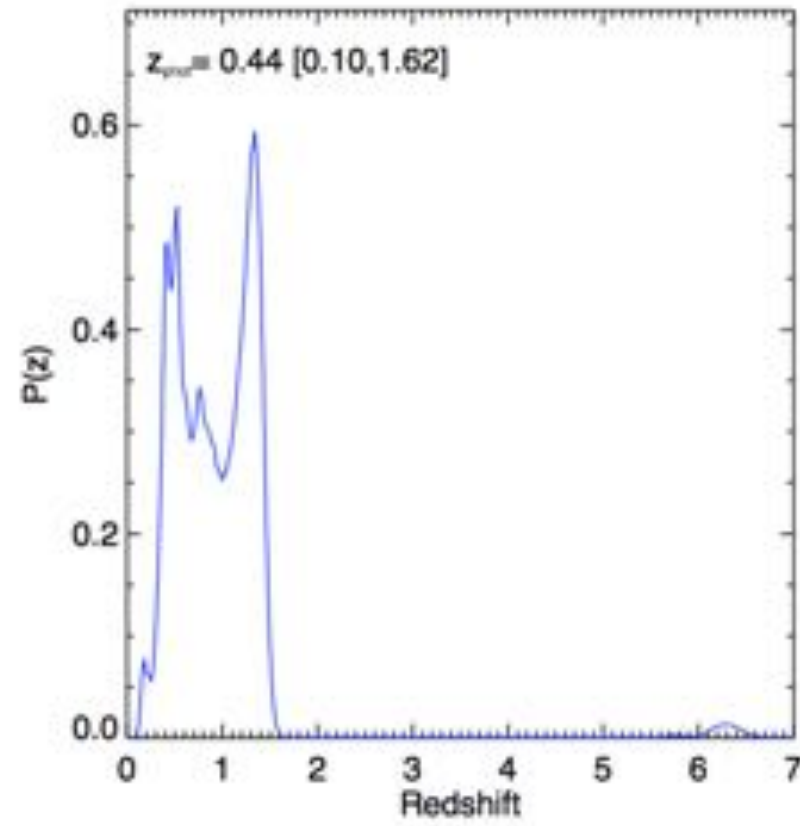
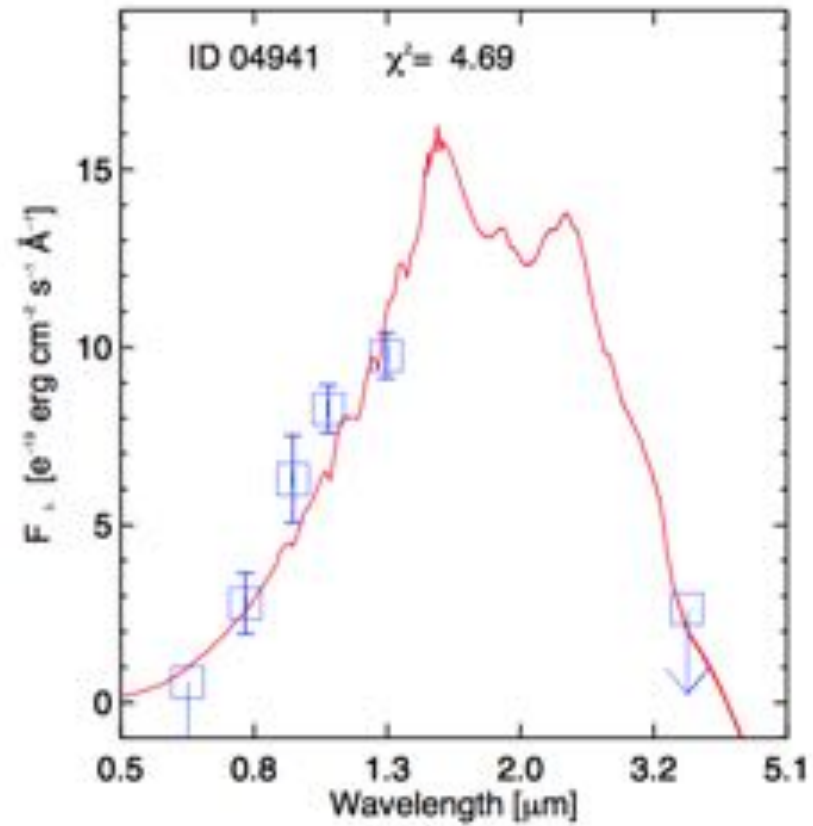


Toward a better LBGs candidates selection: Color plots & photometric redshift

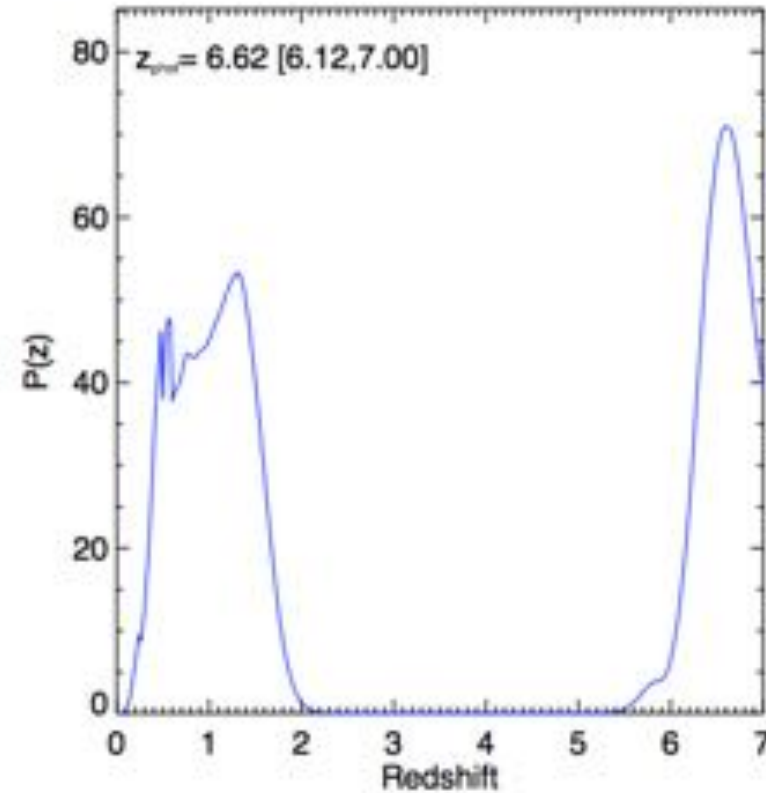
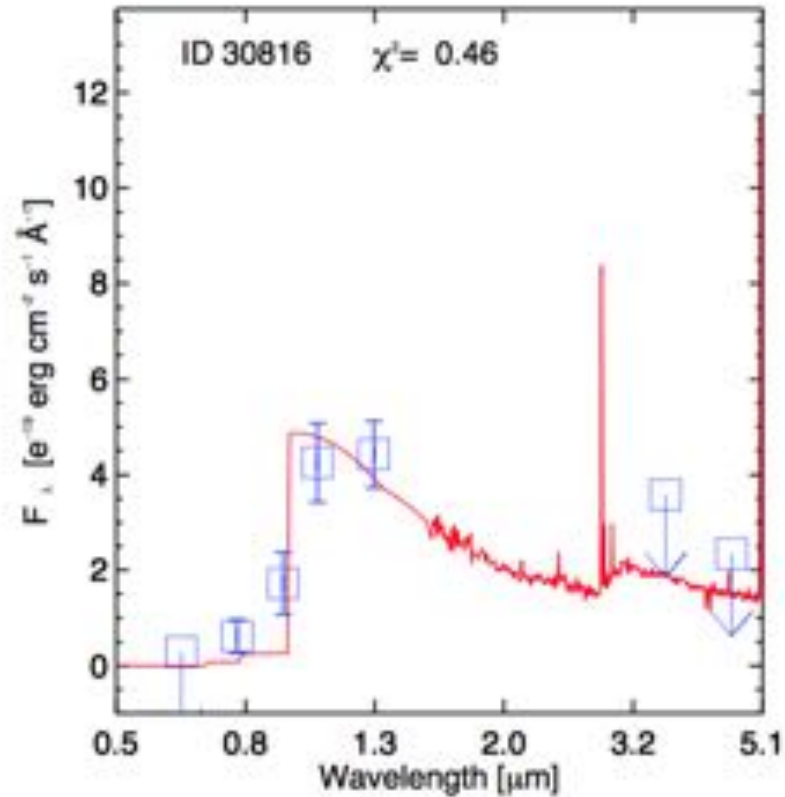
We select even more FAINT candidates: $(i-z) > 1.3$ & undetected in r & $z > 25.2$



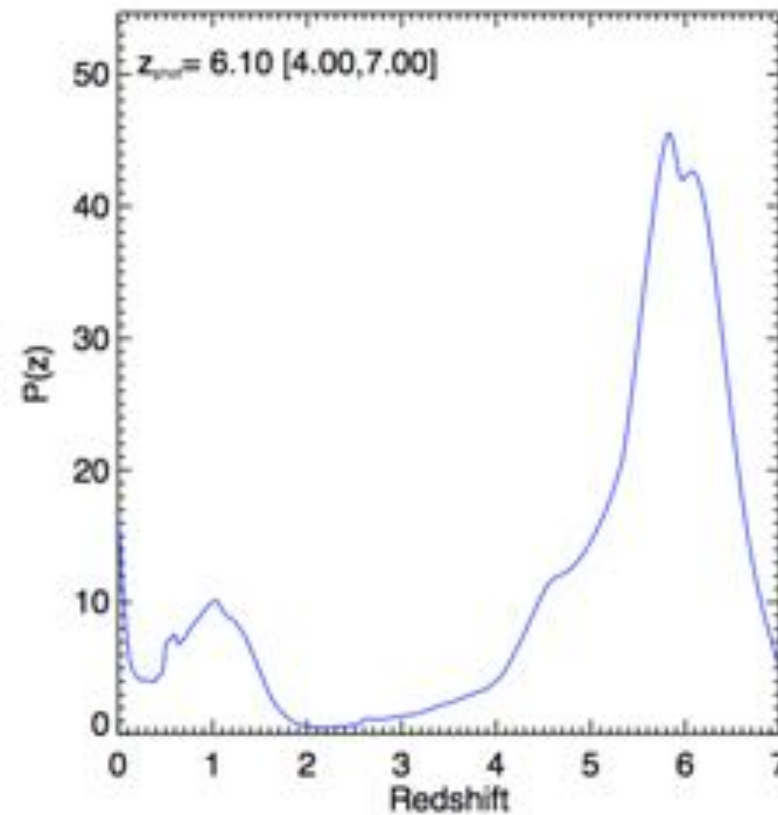
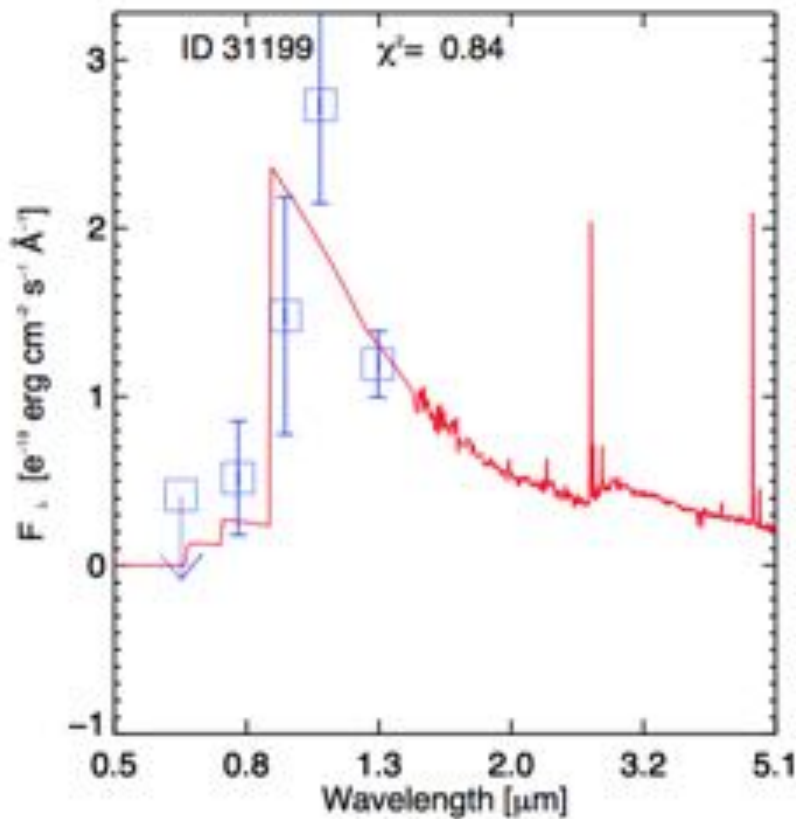
Toward a better LBGs candidates selection: Color plots & photometric redshift with Hyper



Toward a better LBGs candidates selection: Color plots & photometric redshift with Hyperz



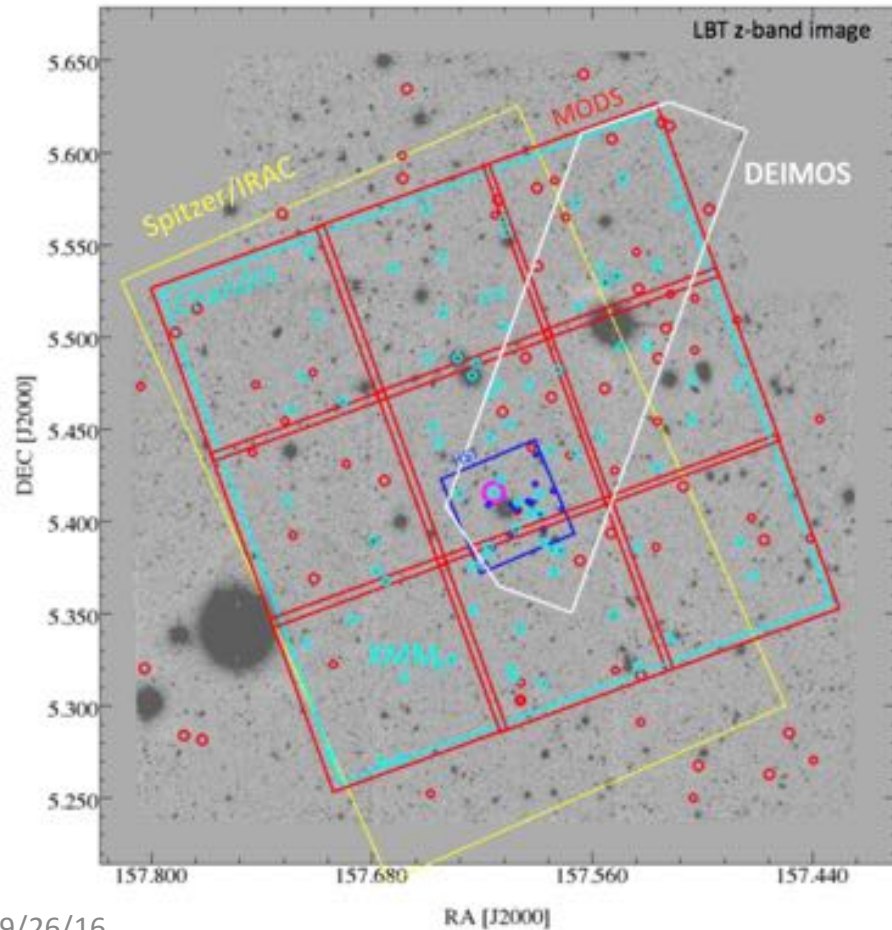
Toward a better LBGs candidates selection: Color plots & photometric redshift with Hyperz



FUTURE prospect:

Keck observations of most of the LBGs candidates in early Dec. with

DEIMOS (DEep Imaging Multi-Object Spectrograph)
to find the FIRST spectroscopically confirmed galaxies
in the J1030 QSO halo.



Stay tuned for new results in
the next few months....

Thank you!

