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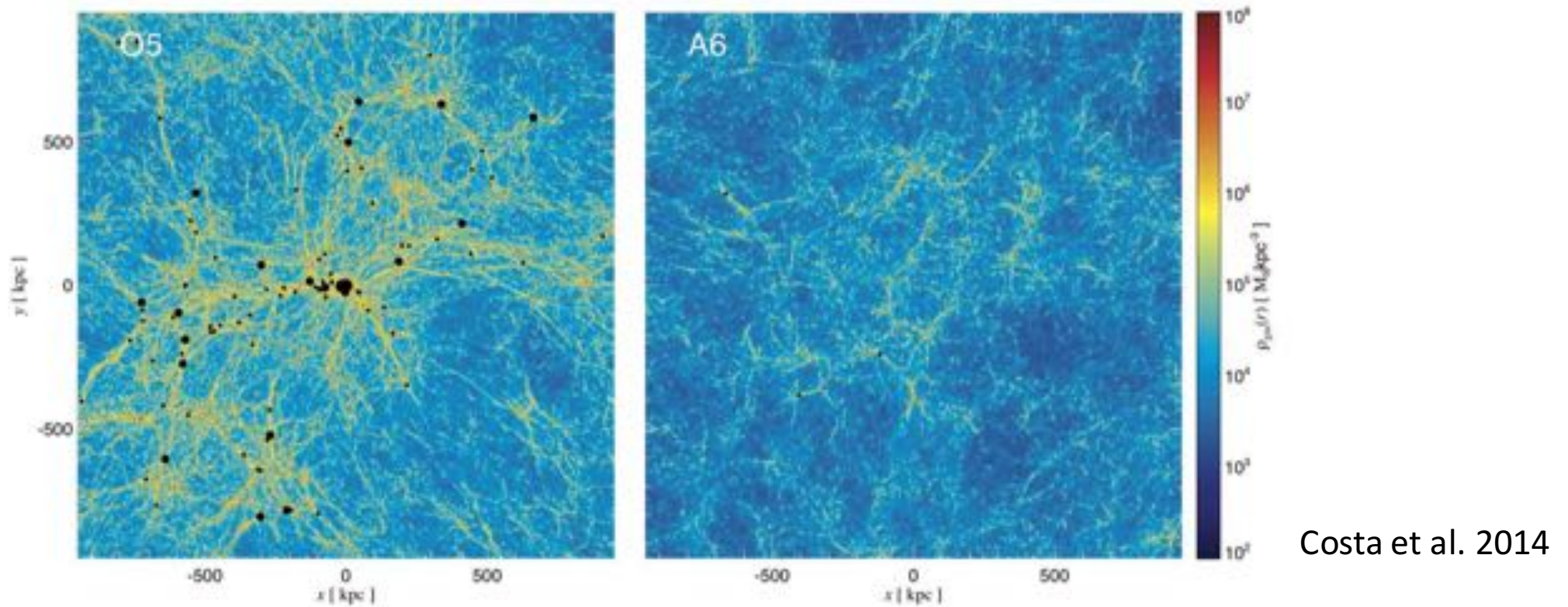
The primordial environment of SMBHs: the J1030 field around a quasar at $z=6.3$.

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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?

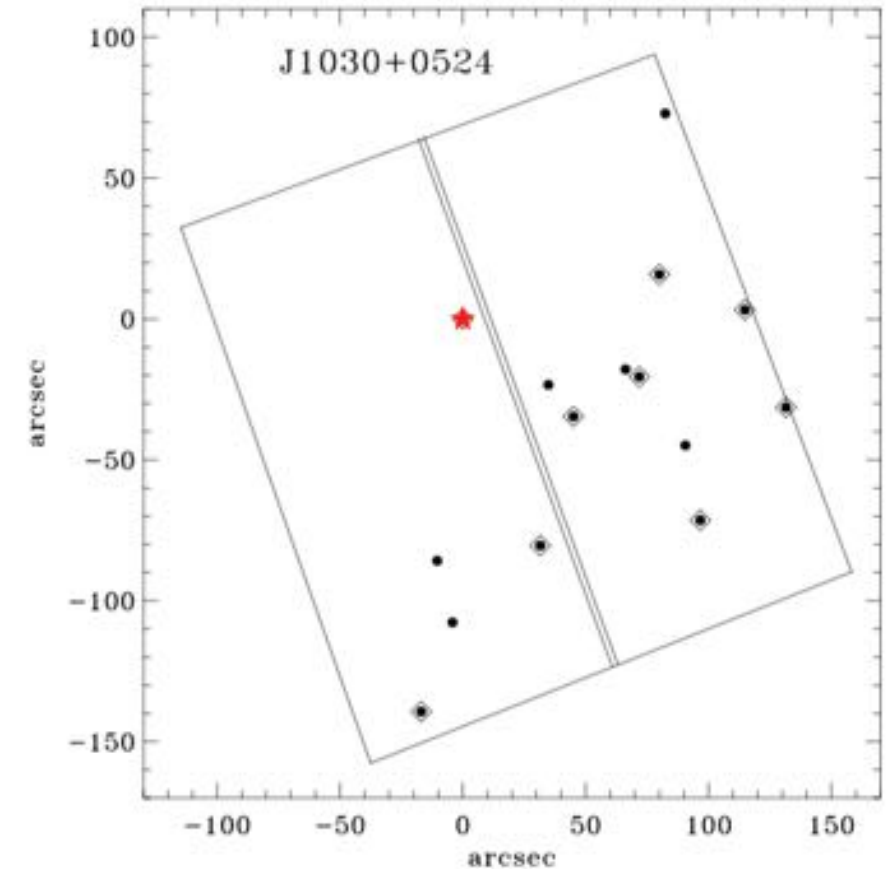
Currently we lack clear observations of the environment in which high redshift QSOs reside....

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 ($\sim 25' \times 25'$).

The technique:

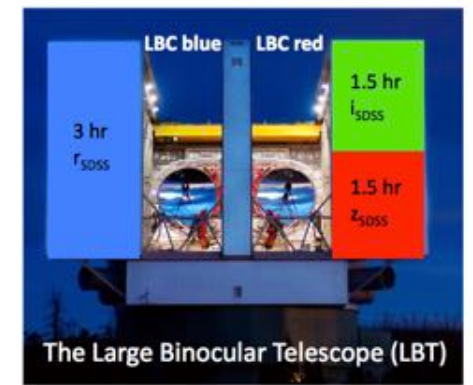
COLOR SELECTION

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.

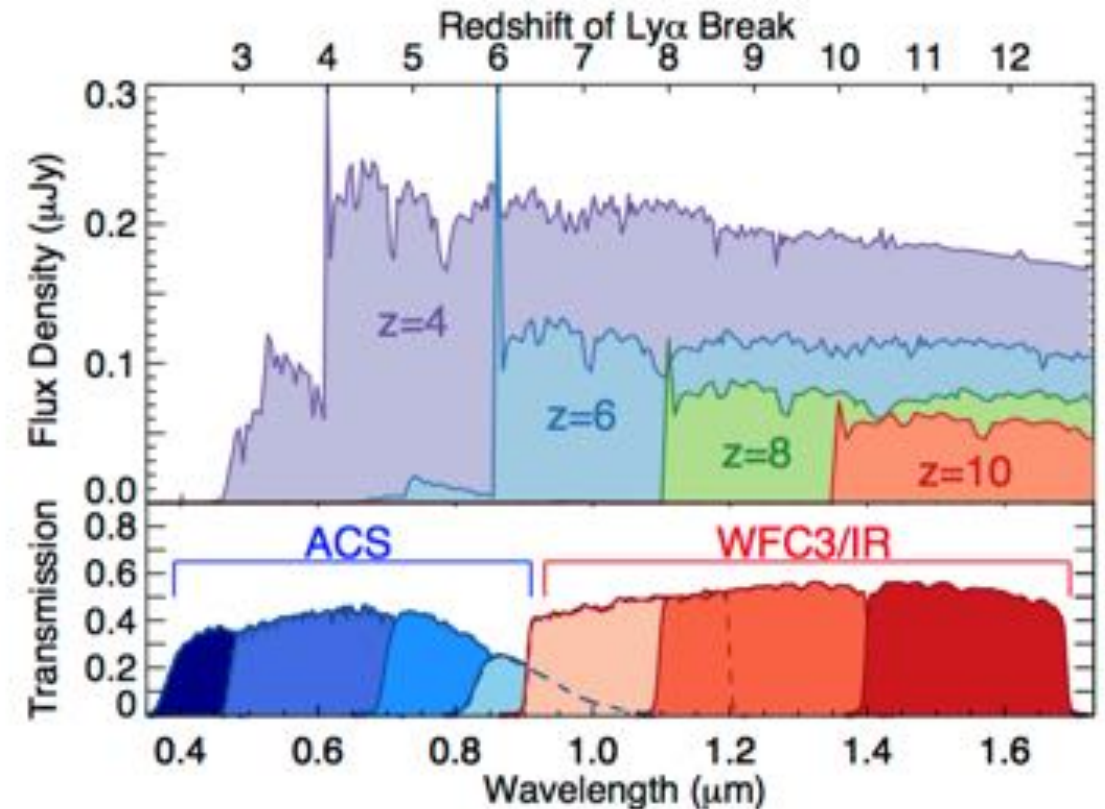
CRITERIUM:

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

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



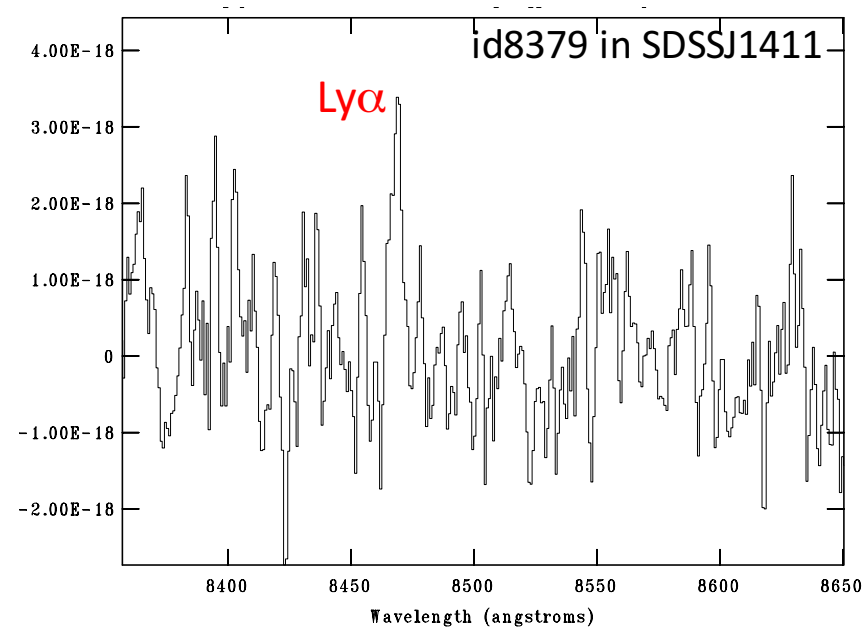
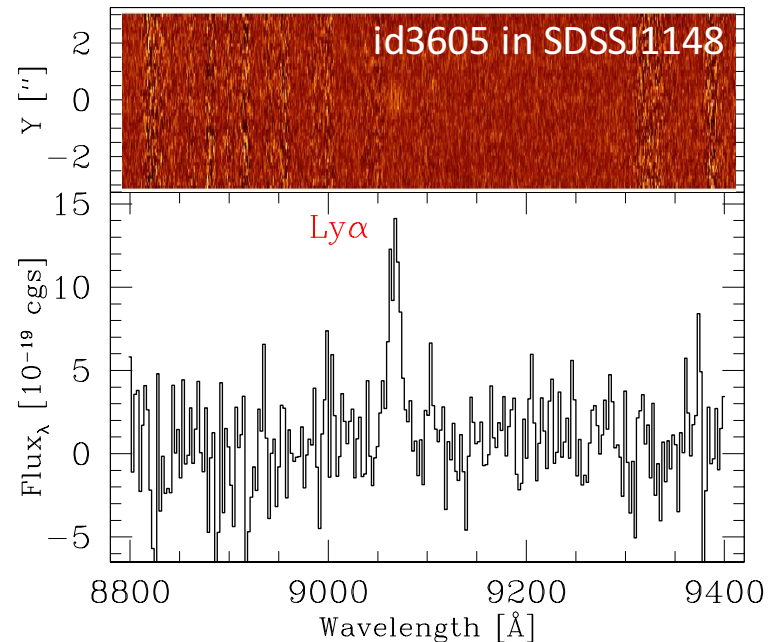
LBT = 2 x 8.4m telescopes – Mt. Graham (AZ)



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



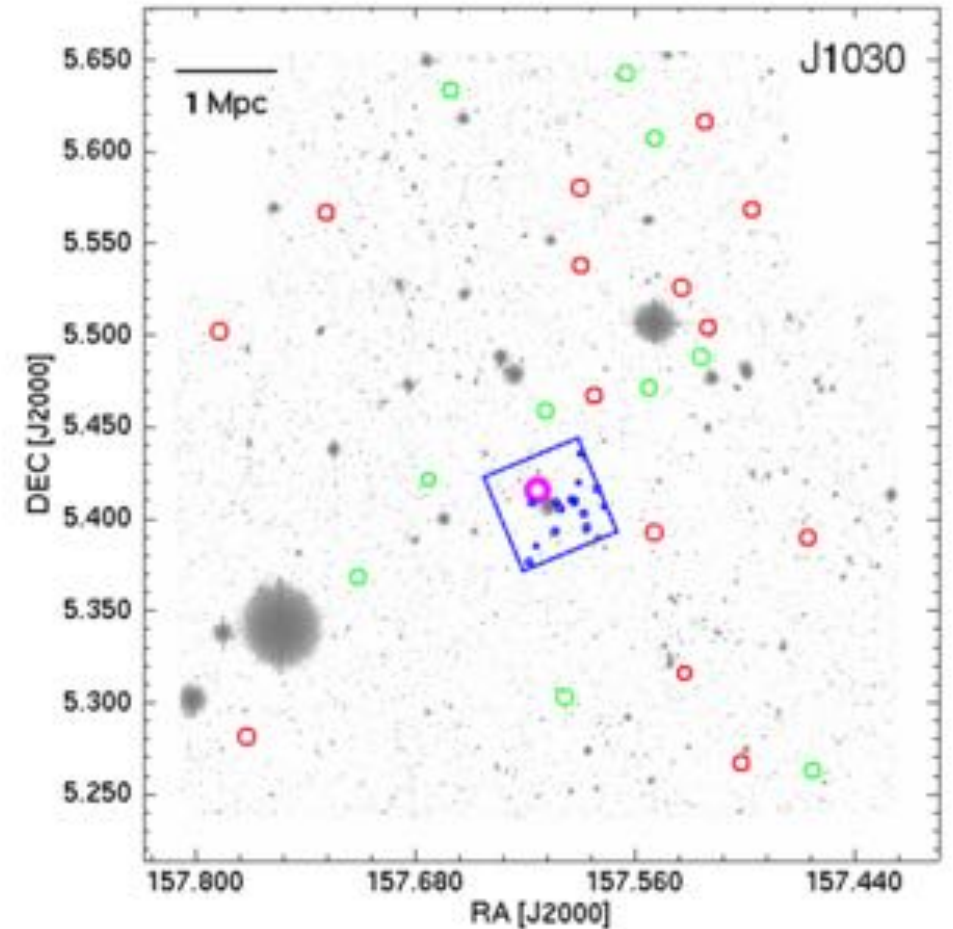
9/26/16 $z_{\text{LBG}} = 6.456, z_{\text{QSO}} = 6.42 \rightarrow d \sim 4 \text{ pMpc}$

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

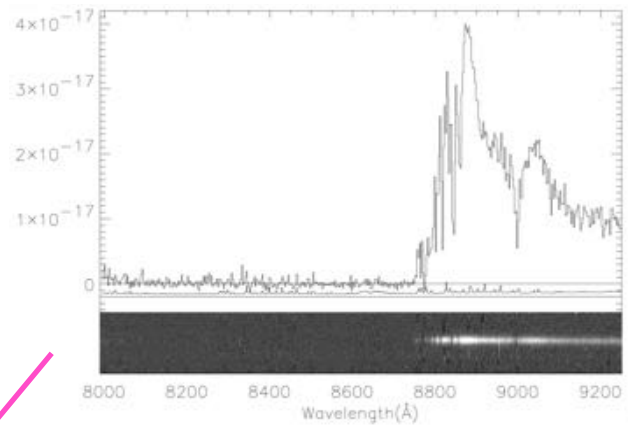
Towards an accurate selection of LBGs candidates...

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.

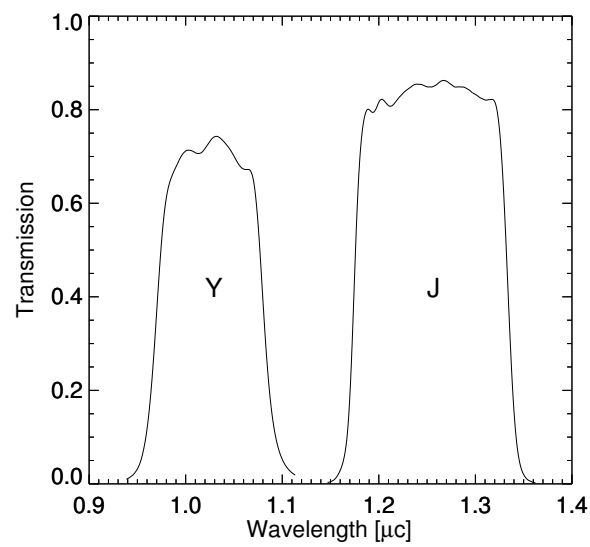
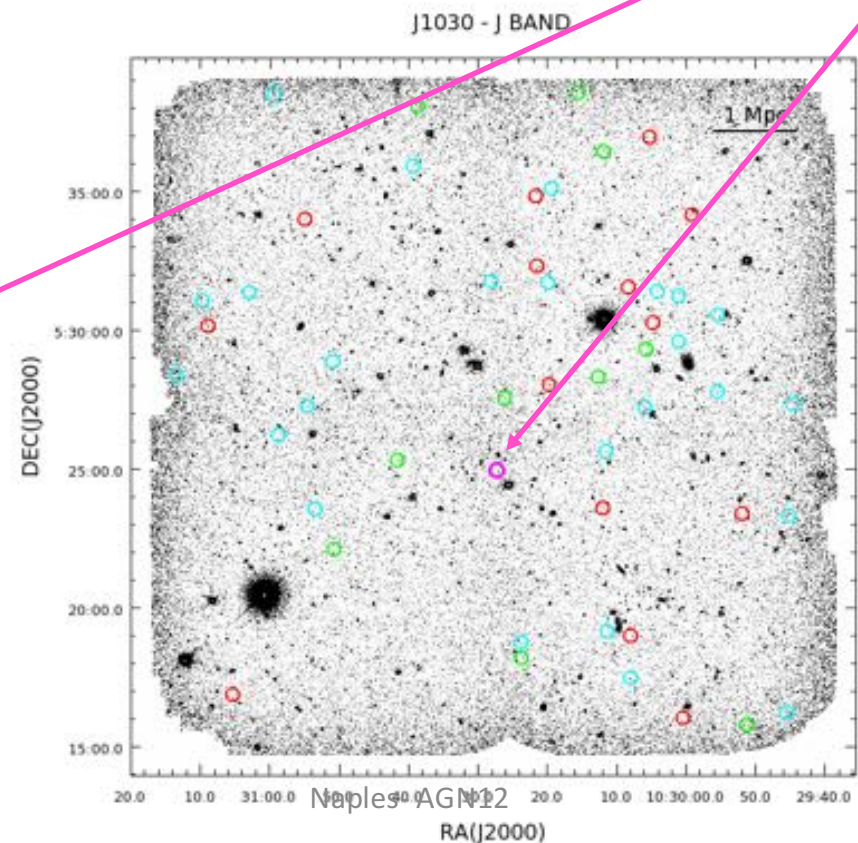
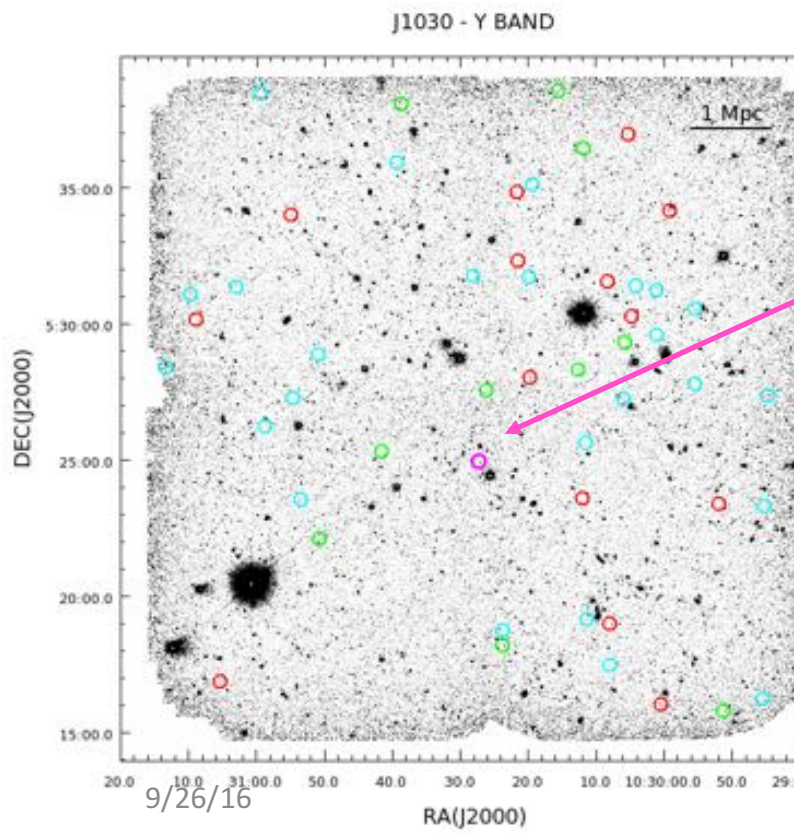
Because spectroscopic observations are very time expensive we need to select carefully our candidates.



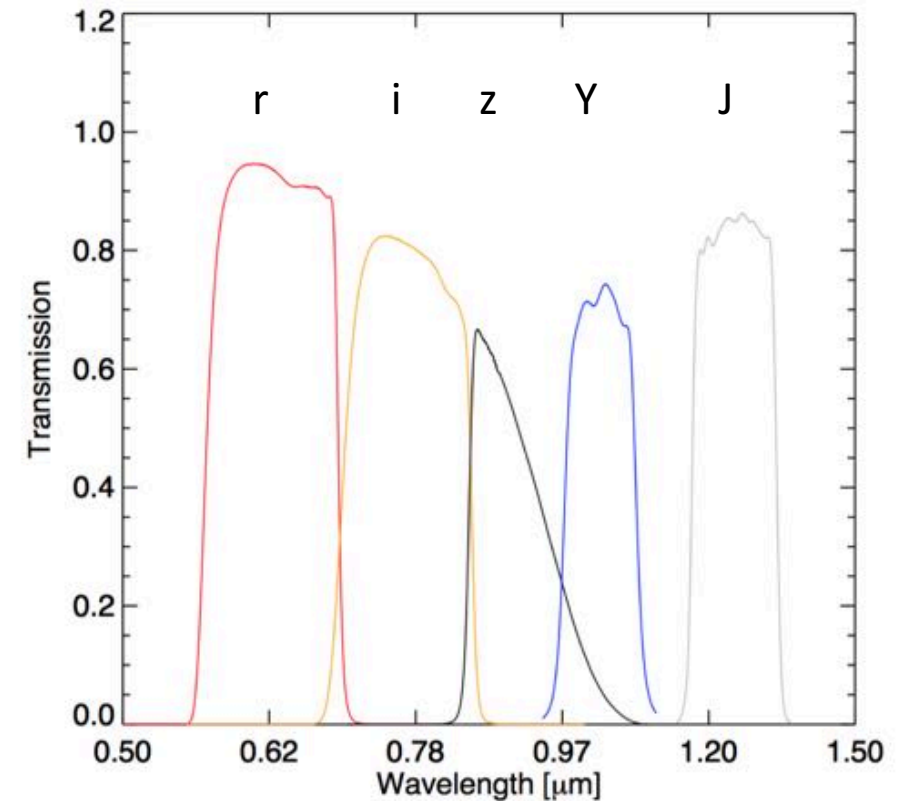
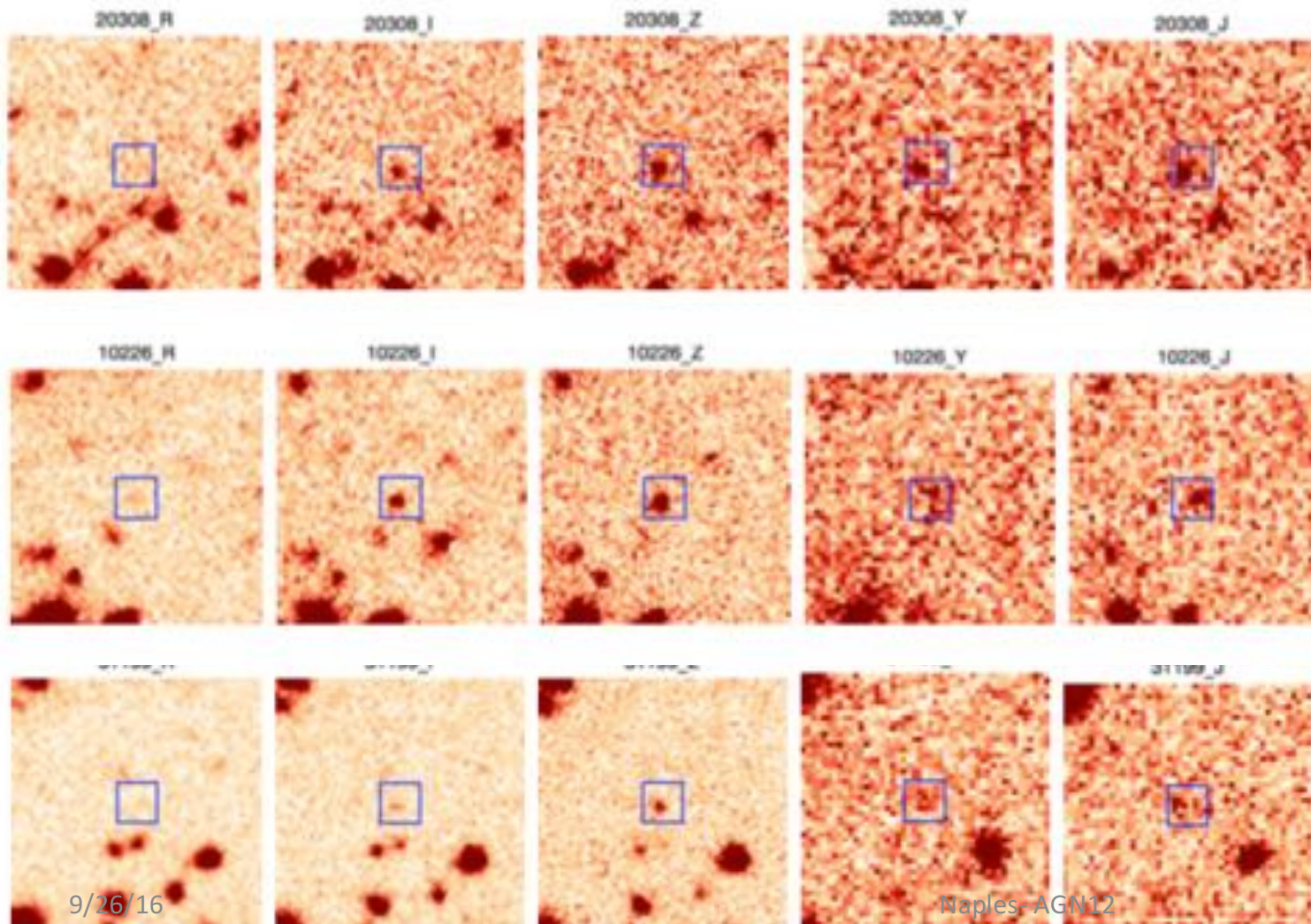
Deep near IR Y and J images around J1030



Pentericci02 - VLT/Fors2 spectrum

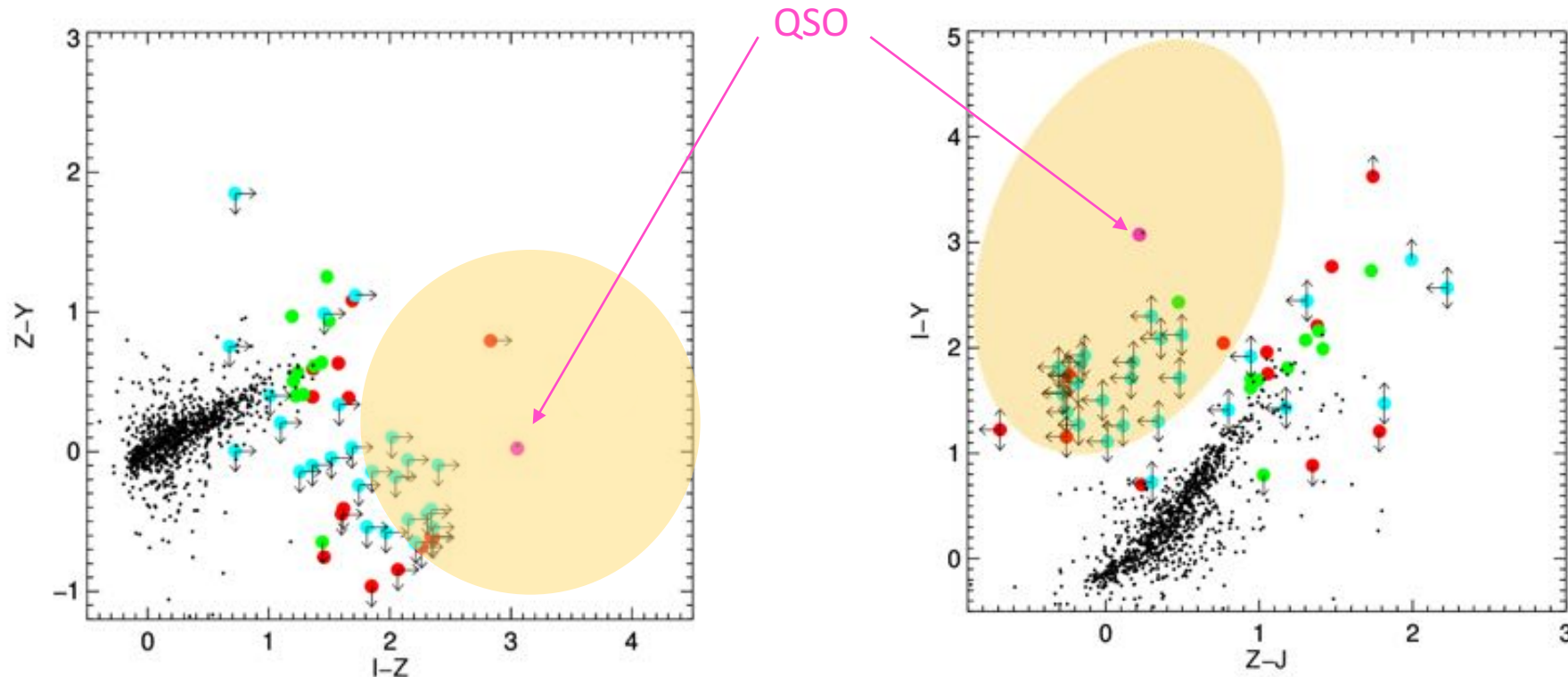


Toward a better LBGs candidates selection: Color plots & photometric redshift

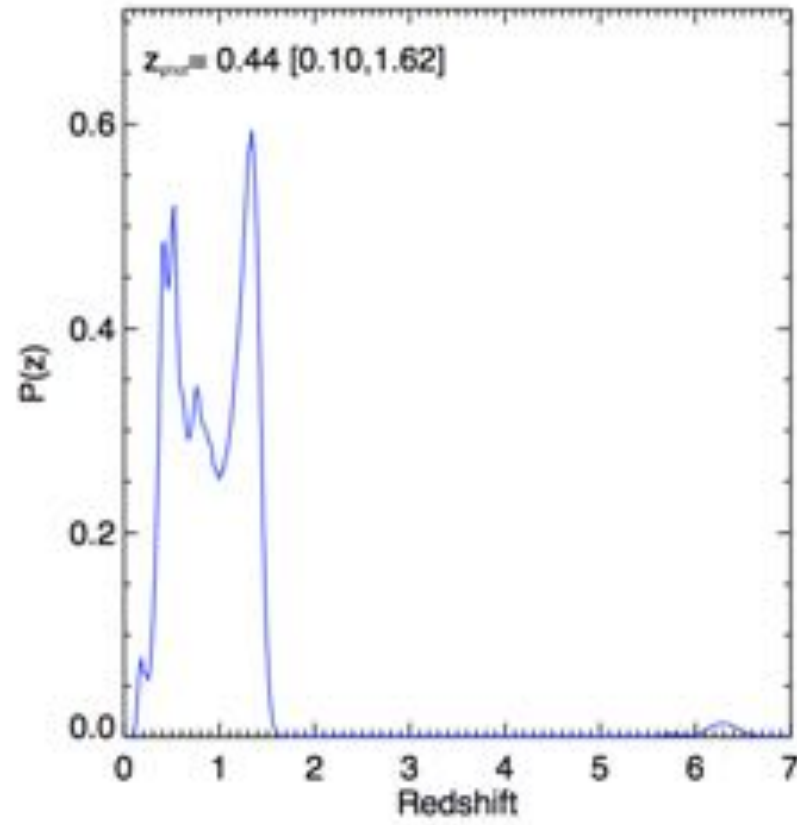
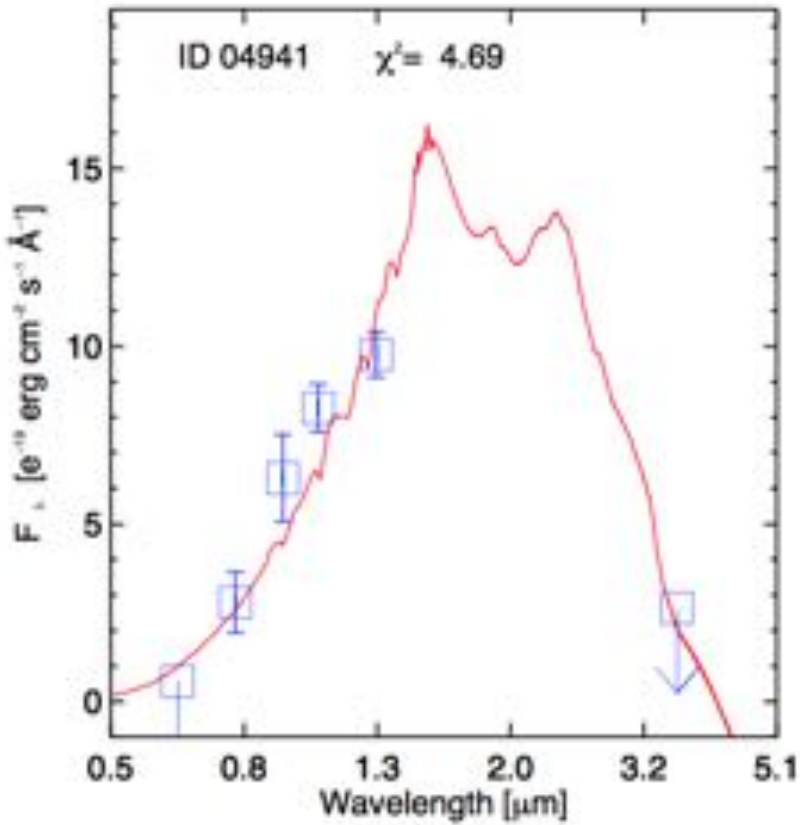


Toward a better LBGs candidates selection: Color plots & photometric redshift

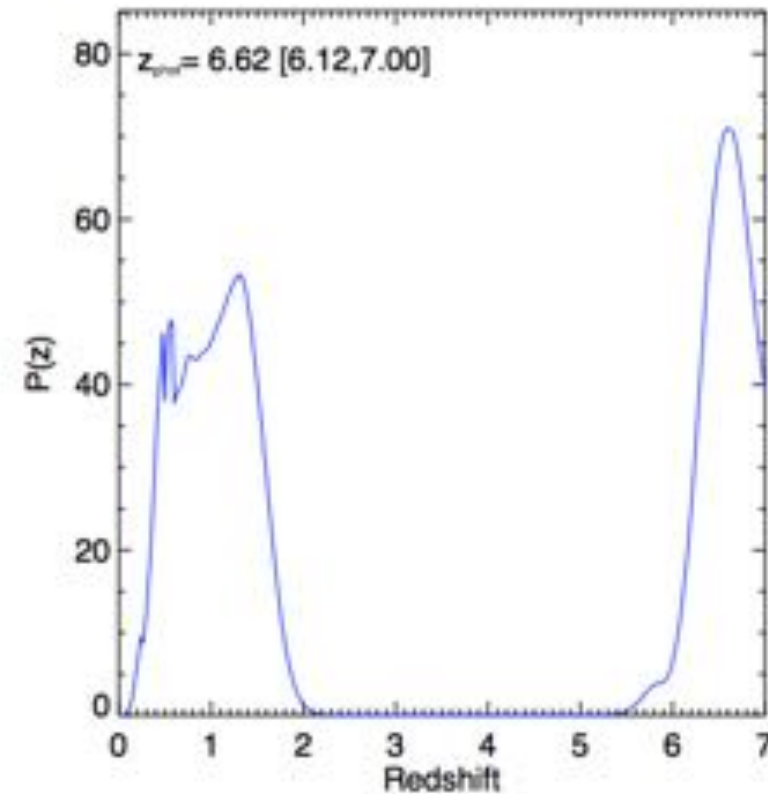
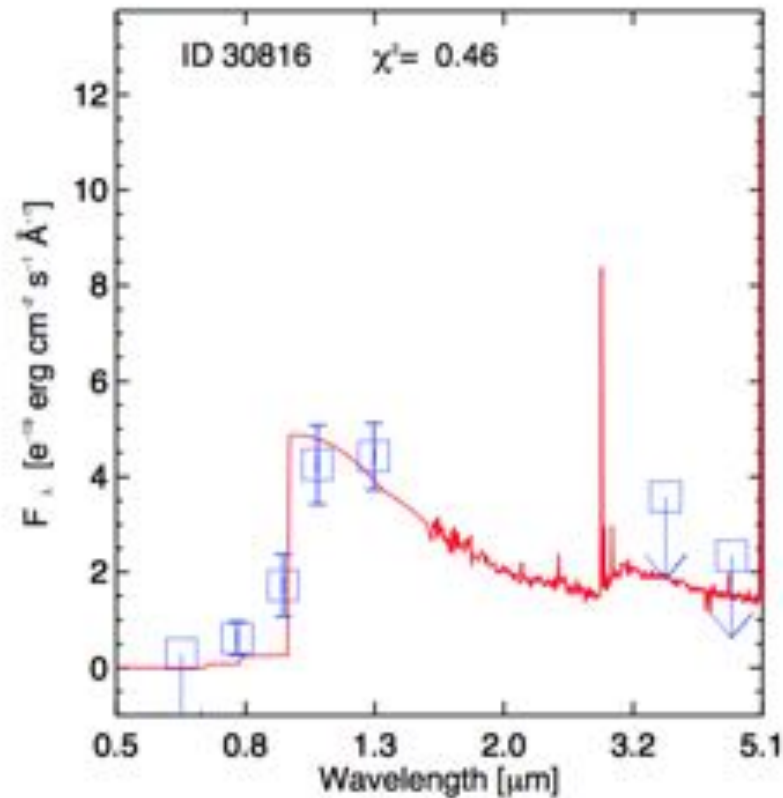
We select even more FAINT candidates: $(i-z)>1.3$ & undetected in r & $z>25.2$



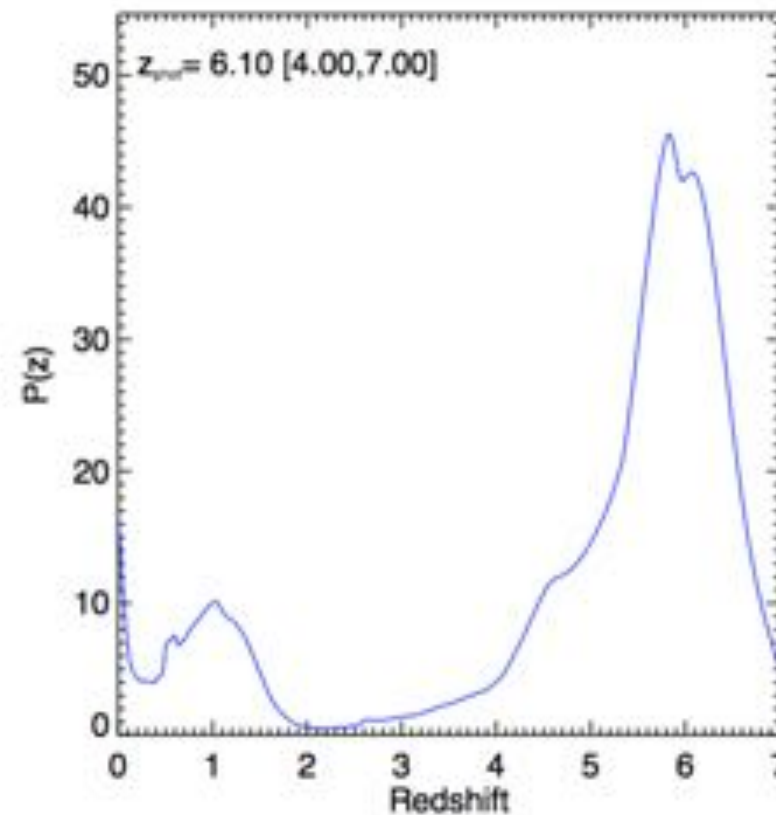
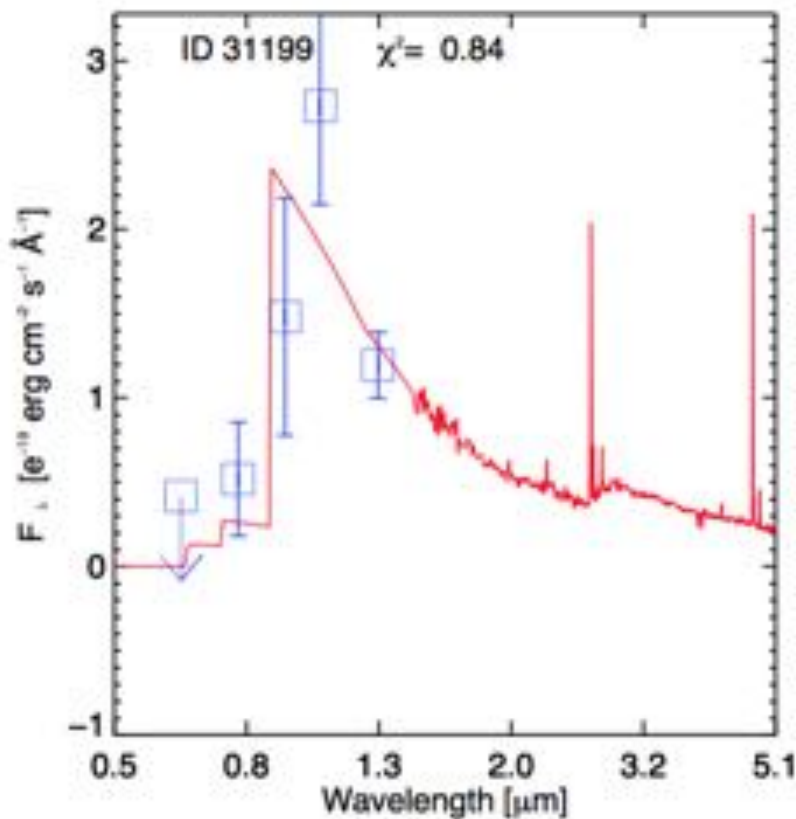
Toward a better LBGs candidates selection: Color plots & photometric redshift with Hyper



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



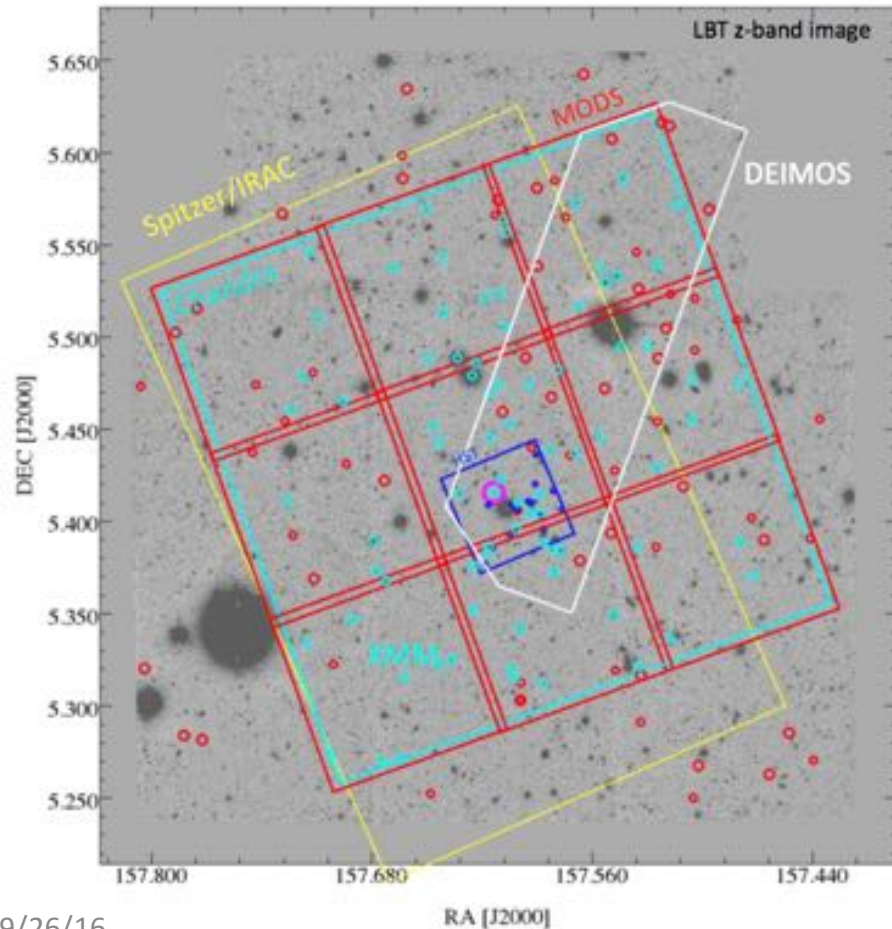
Toward a better LBGs candidates selection: Color plots & photometric redshift with Hyperz



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.



Naples- AGN12

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

Thank you!

