z~6 @ LBT

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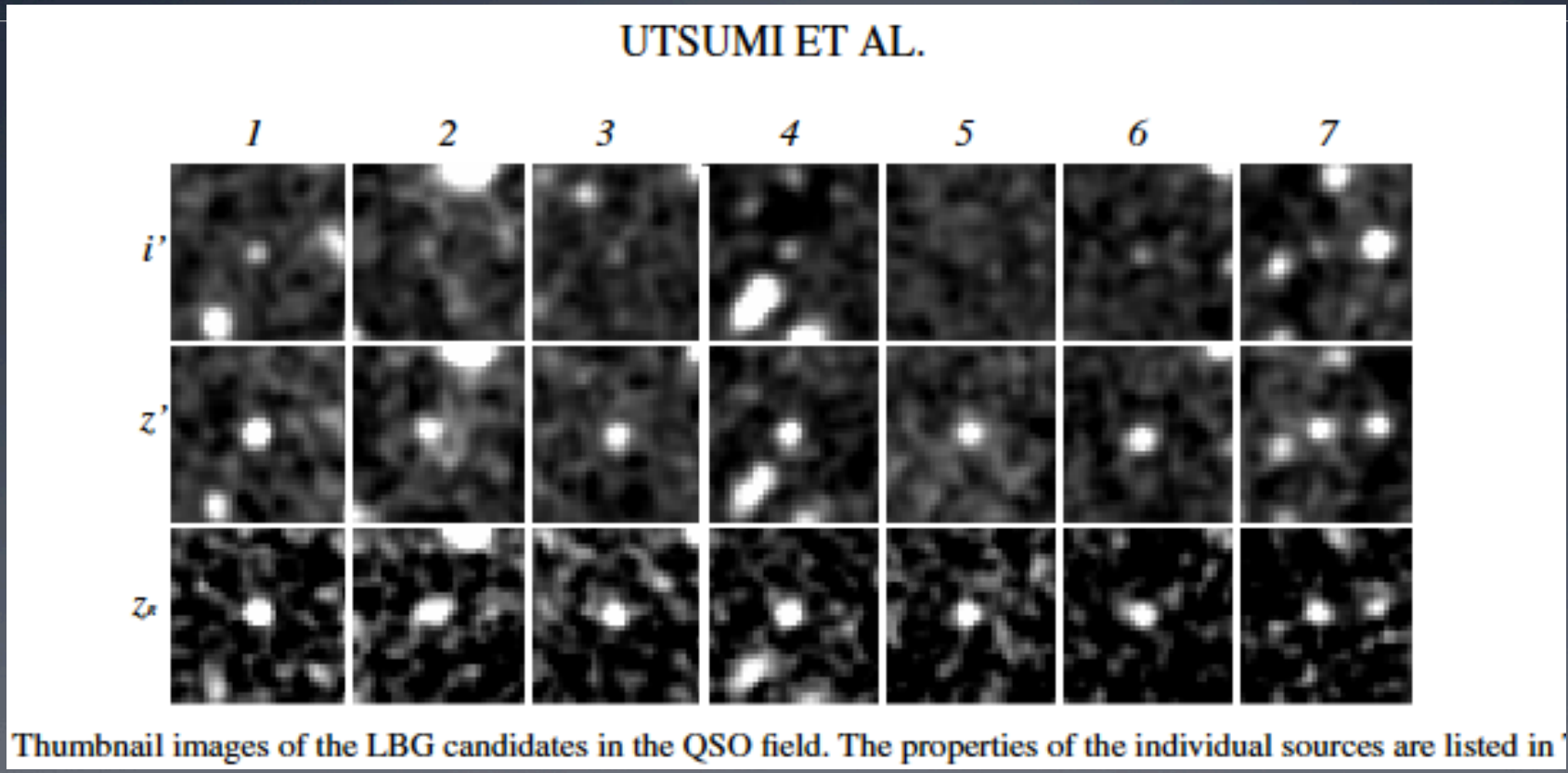
Starting Point



Utsumi et al. (2010) found seven candidate LBGs at z ~ 6.4 around the bright quasar CFHQS J2329−0301 at *z = 6.43*. The LBG surface density is *7 times larger than that in a comparison field (the* SDF), suggesting that the QSO field hosts an overdense region, when defined on a sufficiently large scale (i.e. larger than an *HST/ACS pointing).*

LBC Proposal

Application for LBT observing time **Category: B**

Period Feb 2012-Jun 2012 **Deadline: Nov 8th, 2011, 2pm CEST** **Submit using: www.tng.iac.es/lbt/submit**

1. Title

Mapping the primordial environment of QSOs at $z \sim 6$

2. Abstract

Luminous QSOs at very high redshifts, $z \sim 6$, are believed to reside in the most massive dark matter halos collapsed at that time. They should then trace early large-scale structures, and the fields around $z \sim 6$ QSOs may be expected to show galaxy overdensities on scales up to tens of Mpc. Current observations, mainly performed with the $3' \times 3'$ HST/ACS camera, still are unable to support or disprove this scenario, since the small area covered by an ACS pointing ($\sim 1 \times 1$ Mpc at $z \sim 6$) is a serious limitation to these measurements. We propose here to exploit the unique *etendue* (product between collecting area and field of view) of LBC (111 $m^2 \times$ 0.16 deg^2) to obtain deep r,i and z-band imaging of the fields around 6 of the most massive black holes at $z \sim 6$, and find co-eval galaxies as i-band dropouts. Our observations will finally probe what is the typical environment of these objects posing a fundamental observational constraint to models of BH/galaxy evolution. Remarkably, recent observations, similar to those proposed here and performed with the wide-field Suprime-Cam at Subaru, have revealed a significant galaxy overdensity around a $z = 6.4$ QSO.

APPROVED! Ranked 2nd

LBC Proposal

- Deep LBC imaging in r,i and z around ~~six~~ four of the most massive BH at z~6.
- Selection of i-band dropouts: 1) $i - z > 1.3$ 2) $S/N(z) > 5$
- 1.5 hrs in both z_{SDSS} and i_{SDSS} on the LBC-red channel, and simultaneous 3 hrs in r_{SDSS} on the LBC-blue channel
- Estimated AB limits of z=25.6 (S/N=5), i=27.2 (S/N=3) and r=28.3 (S/N=2). [Utsumi dropouts with z~25.0–25.4]
- Assuming structures similar to Utsumi (2010), we estimate that ~36 i-band dropouts will be found by our program
- Possible spectroscopic follow-up program with MODS1

The target QSO fields

Target sample					
Name	z	M_{1450}	M_{BH} ($10^9\ M_\odot$)	z_{SDSS} (AB mag)	Ref.
SDSSJ1148+5251	6.41	-27.8	4.9	20.1	De Rosa et al. 2011
SDSSJ1030+0524	6.28	-27.2	3.2	20.0	De Rosa et al. 2011
SDSSJ1048+4637	6.20	-27.6	3.9	19.9	De Rosa et al. 2011
~~FIRST J1427+3312~~	~~6.12~~	~~-26.9~~	~~1.3~~	~~20~~	~~McGreer et al. 2006~~
SDSSJ1411+1217	5.95	-26.8	1.2	19.6	De Rosa et al. 2011
~~Q0906+6930~~	~~5.47~~	~~-27.0~~	~~10.2~~	~~-~~	~~Romani et al. 2004~~

Data at all wavelengths - from X-rays to radio - are available for all the fields

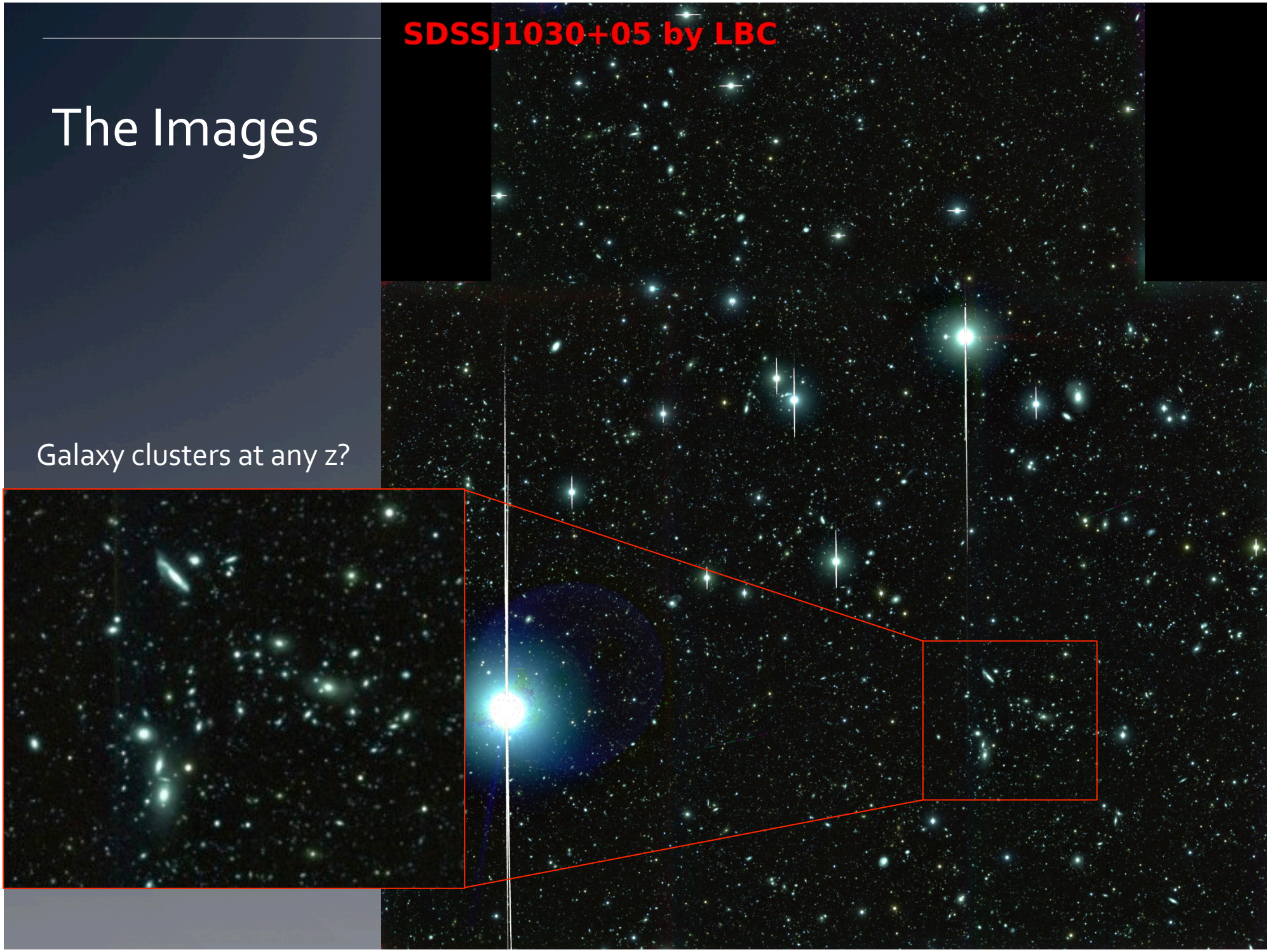
TAC eliminated two radio quasars. Why? The radio emission is a good proxy for massive halos

The Observations

- All the four fields have been observed by LBC (March-May 2012).
- Data reduced by the LBC team available soon (three out of four already released to us). Trouble with the March data due to a very bright star in the upper CCD.
- Images look exceptional… I would stress the word "look"
- Seeing in the range 0.6-0.9 arcsec
- The final photometric catalog is projected to contain approximately 2-3x10^5 objects.

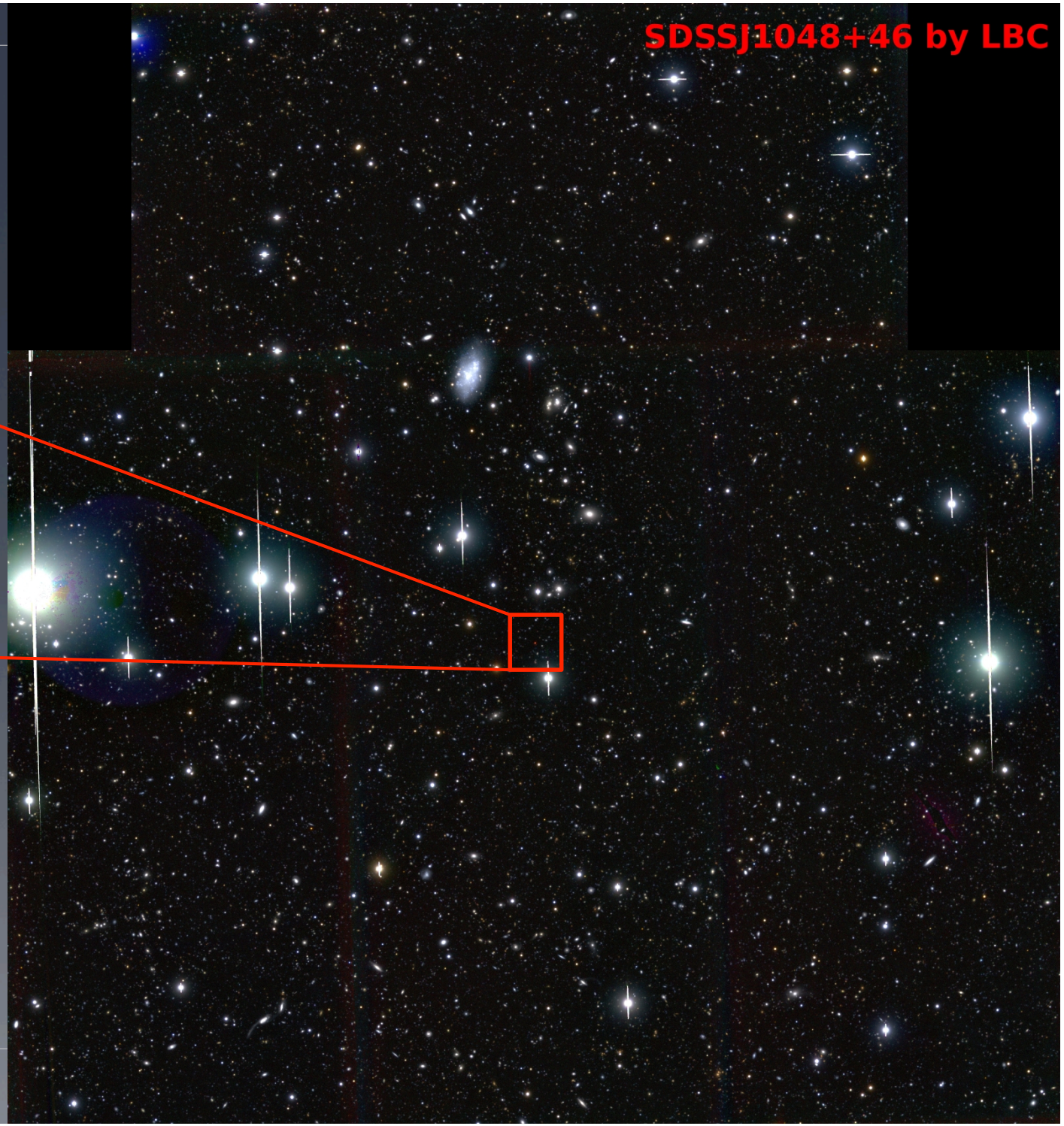
The Images

Galaxy clusters at any z?



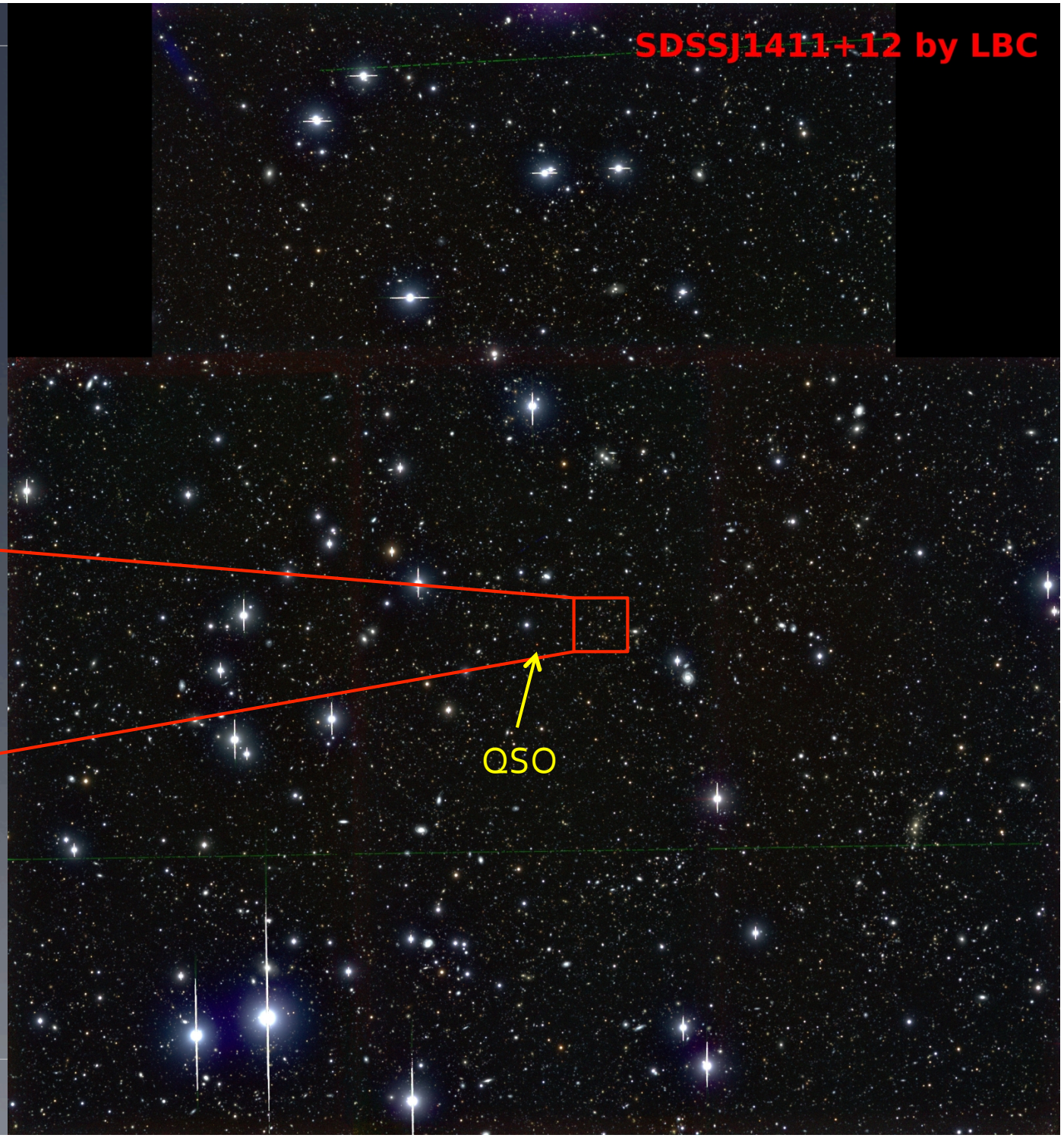
The Images

The high-z QSO
SDSSJ1048+46



The Images

Reddish objects nearby the QSO



Now the *real* work is starting…

- Searching for an excess of i-dropouts in the four QSO fields
- Exploiting the multi-wavelength data
  - X-rays: for SDSS1030 deep 100ks XMM observations
- Searching for over-densities of red objects (z>1 clusters)
- ???
- Suggestions are welcome! Help too…