

A PANORAMIC SEARCH FOR LABS AT $Z=3$

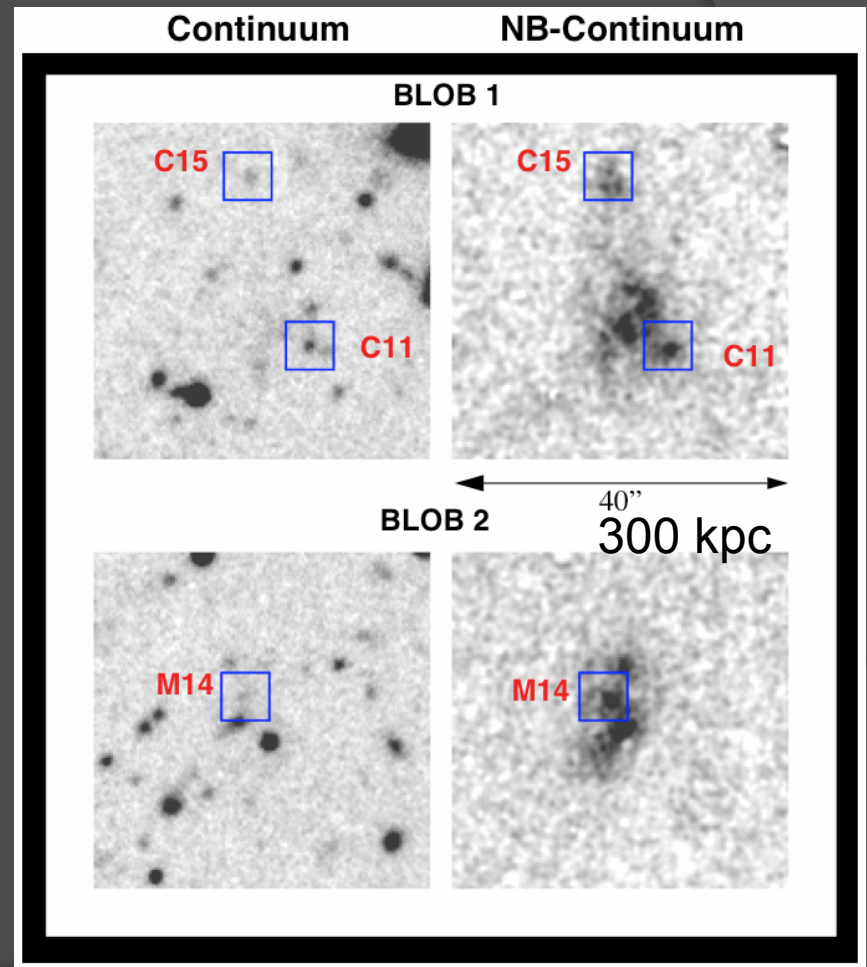
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Ly-alpha blobs (LABs)

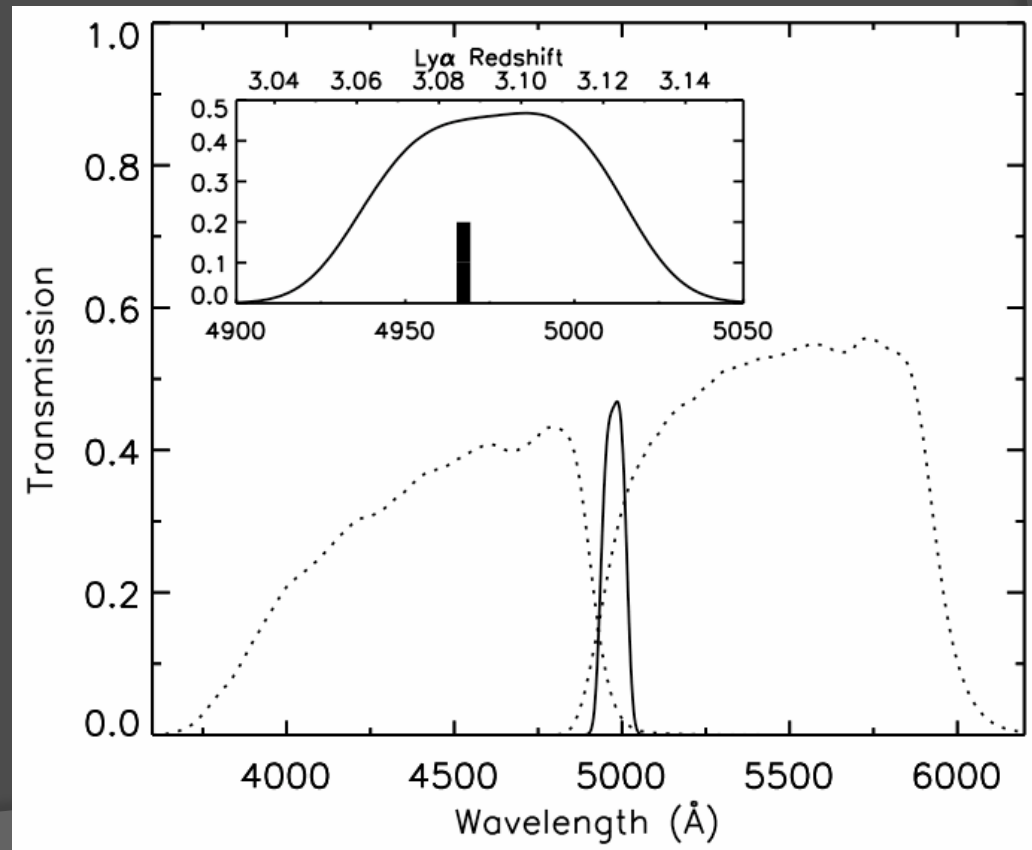
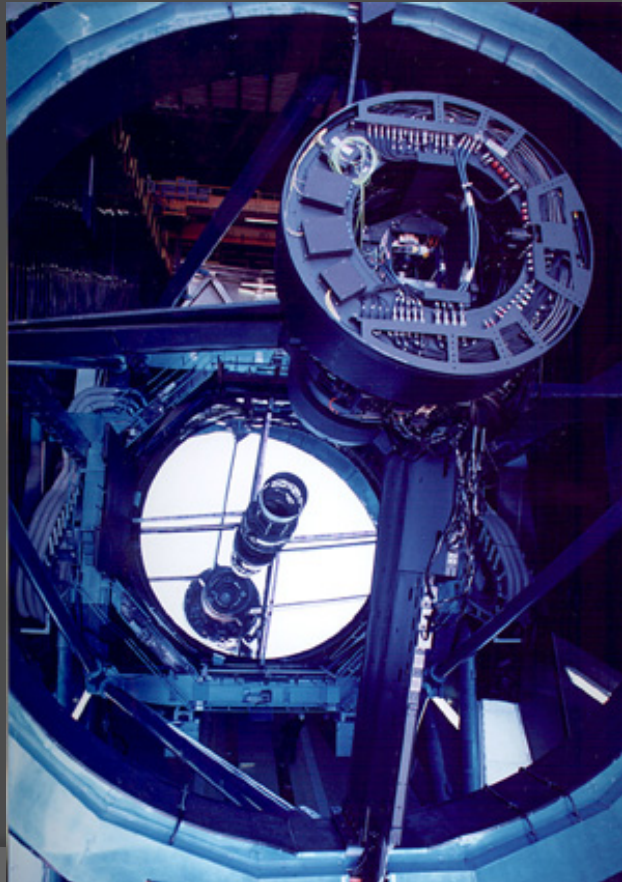
LABs at $z=3$ (Steidel et al. 2000)

- ~15 giant LAB (>50 kpc) & ~50 LABs (>30 kpc) are known to date
- The basic, statistical properties are still unclear.
- We need deep, panoramic LAB survey.



A Panoramic LAB survey at $z=3$

- Instrument: Subaru 8m / Suprime-Cam (34'x27')
- Filters: NB497(5-10h, 4977A/77A), B, V



A Panoramic LAB survey at $z=3$

◉ Fields:

- CDFN, SDF, SXDS (1.1 sq deg – blank field)
- SSA22 (1.1 sq deg – proto-cluster neighborhood)

◉ Survey Area: 2.1 sq deg (1.6×10^6 Mpc³)

◉ Depths (1σ): $L_{\text{Ly}\alpha} \sim 1 \times 10^{-18}$ erg s⁻¹ cm⁻² arcsec⁻²

Selection of LABs

- ⊙ Detection:

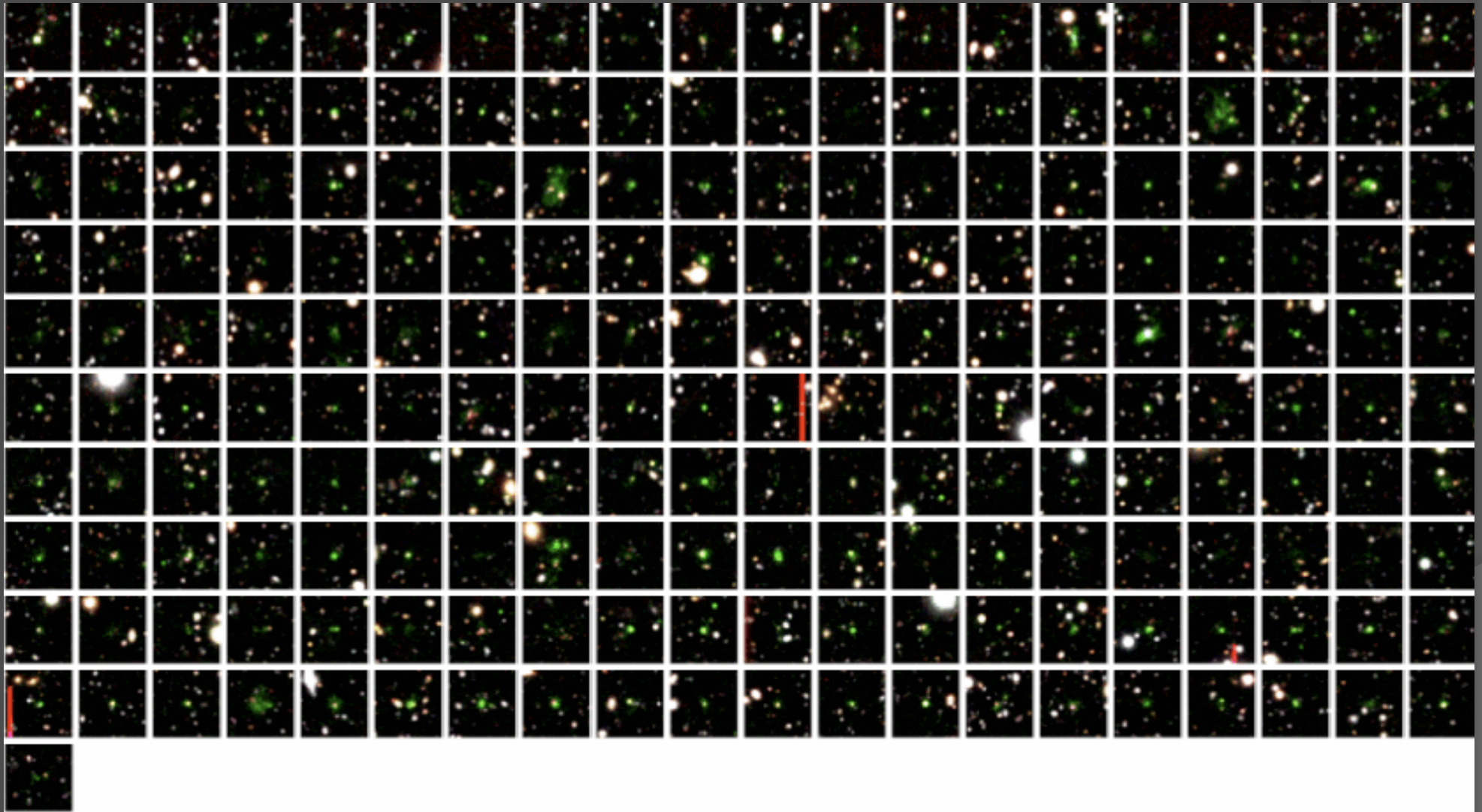
- Image - continuum subtracted NB497 image
- Threshold - $1.4 \times 10^{-18} \text{ erg s}^{-1} \text{ cm}^{-2} \text{ arcsec}^{-2}$

- ⊙ EW: $EW_{\text{obs}} > 80\text{\AA}$ (or $EW_{\text{rest}} > 20\text{\AA}$)

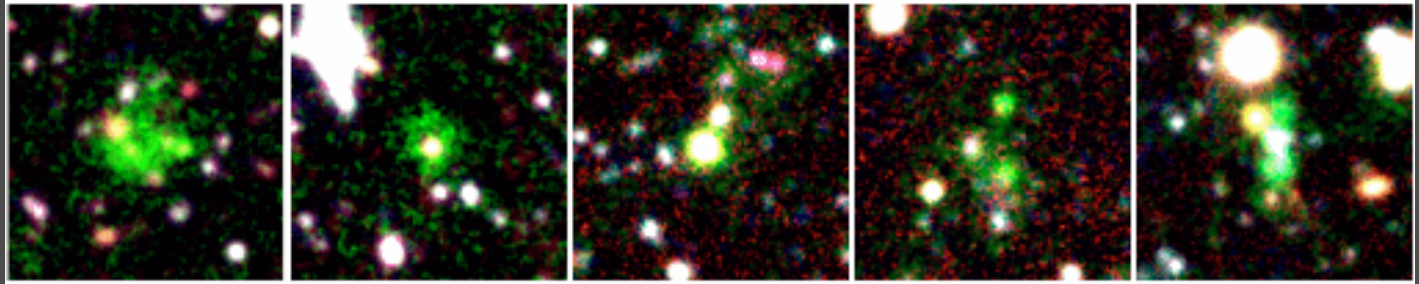
- ⊙ Size:

- Isophotal Area $> 15 \text{ arcsec}^2$ ($> 30 \text{ kpc}$)
- Isophotal area $> 1.5 \times \text{PSF}$

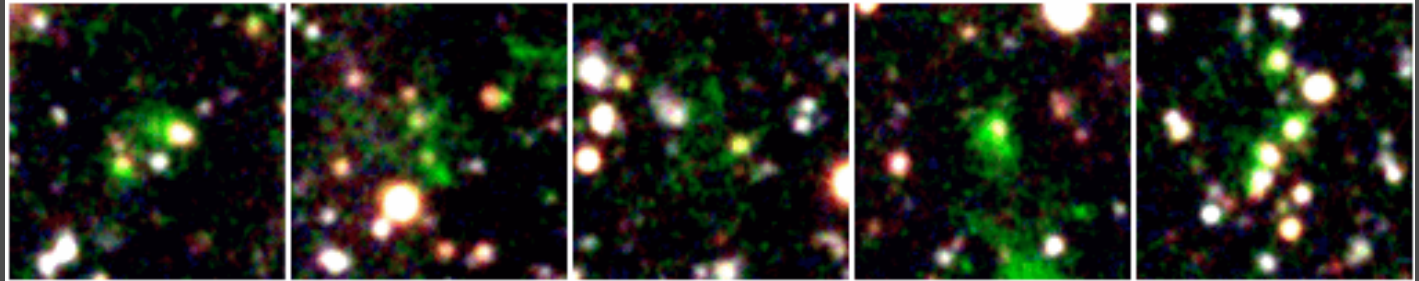
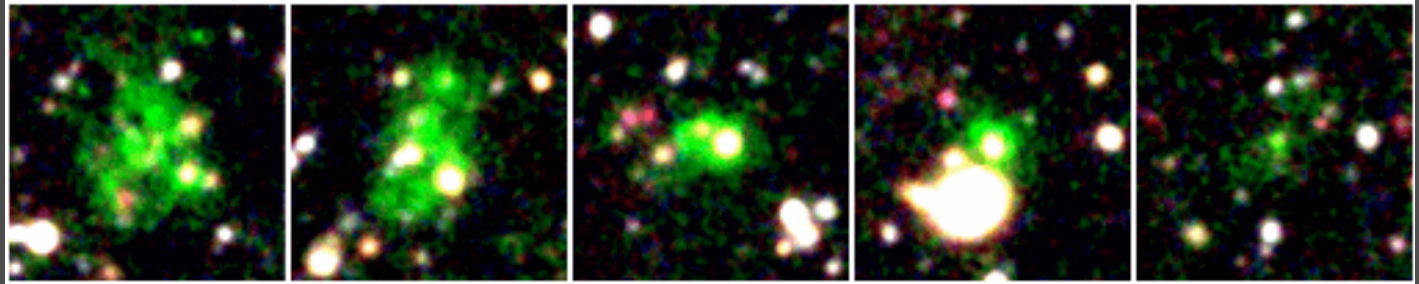
A Sample of 201 LABs (>30 kpc)



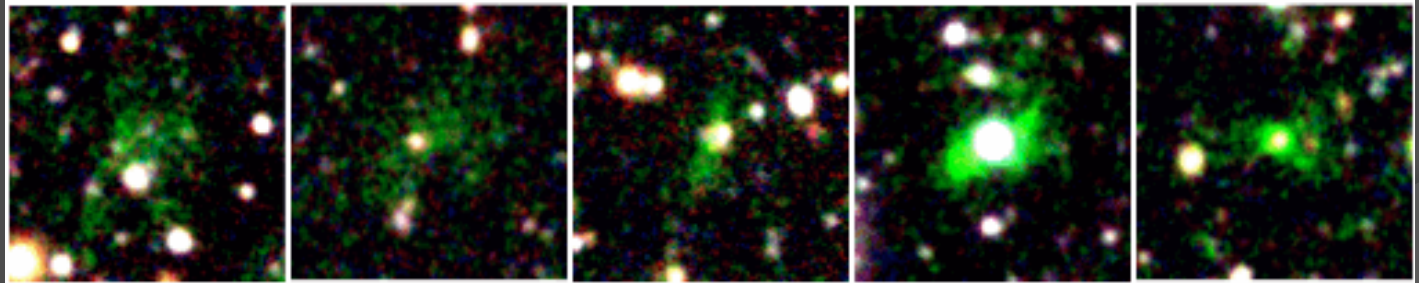
Blank Field



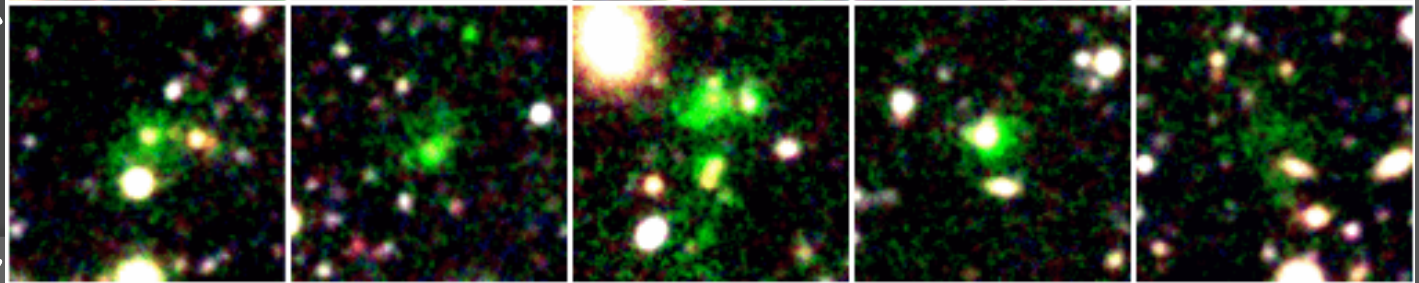
Proto-Cluster



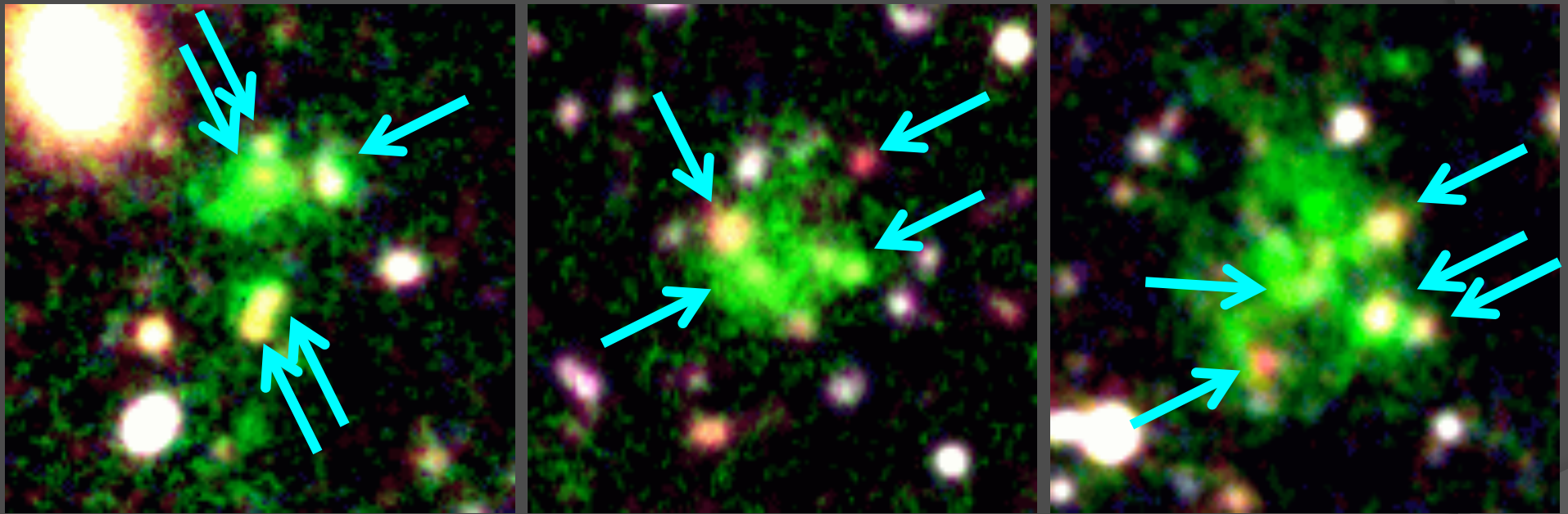
Cluster
Neighborhood



25"
190 kpc

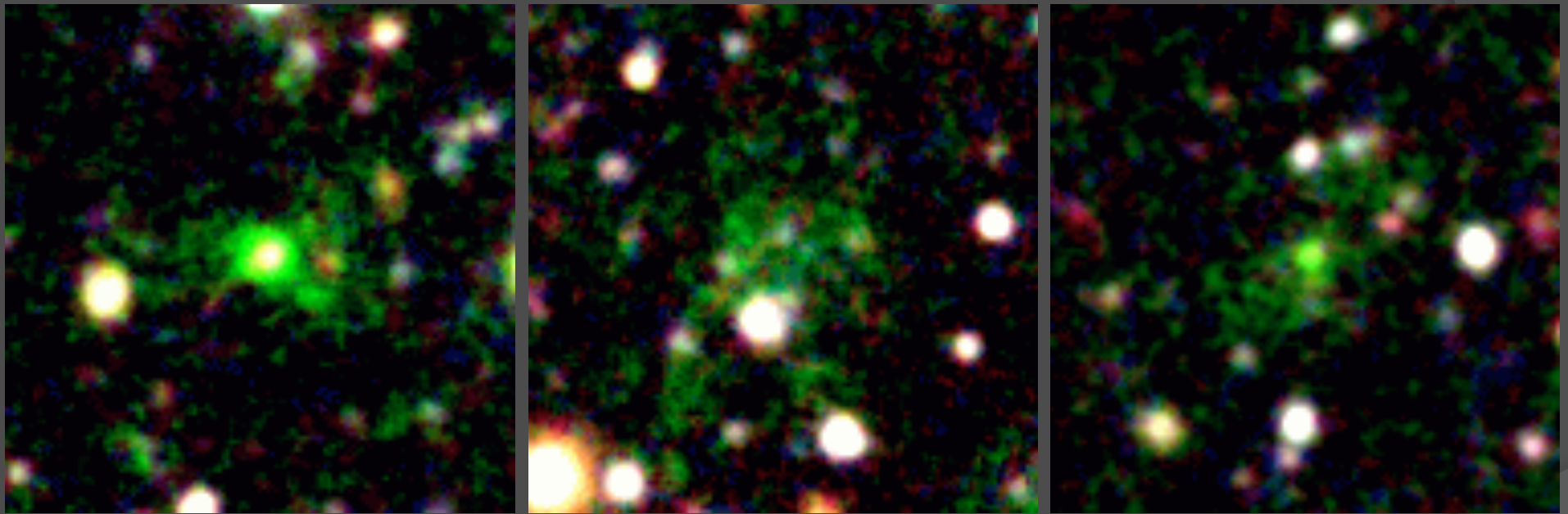


Multiple sources?



25"
190 kpc

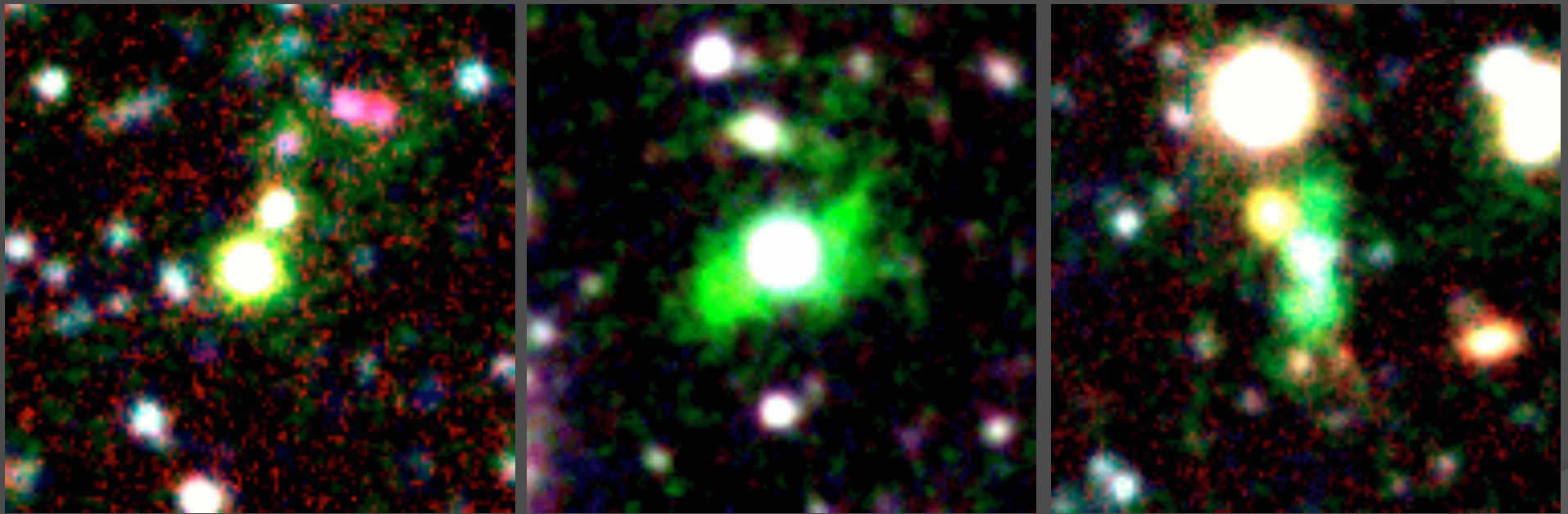
Filaments??



25"
190 kpc

Surface brightness of filaments
 $\sim 2 \times 10^{-18} \text{ erg s}^{-1} \text{ cm}^{-2} \text{ arcsec}^{-2}$

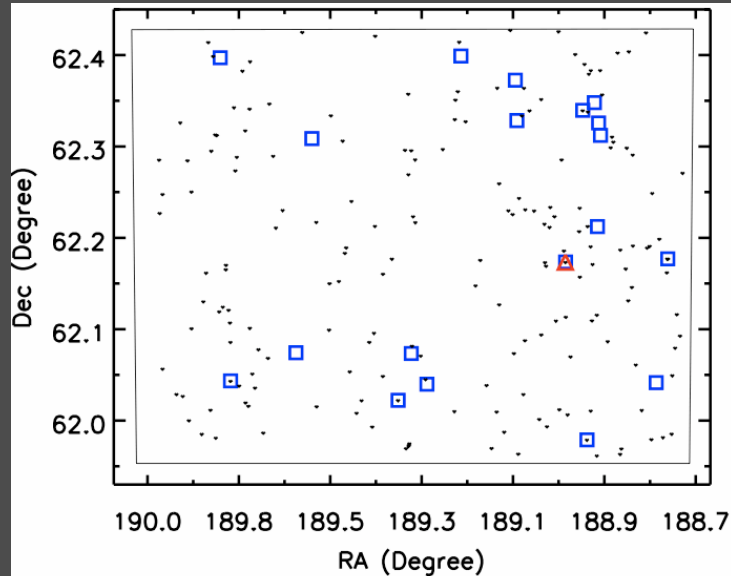
AGN!!



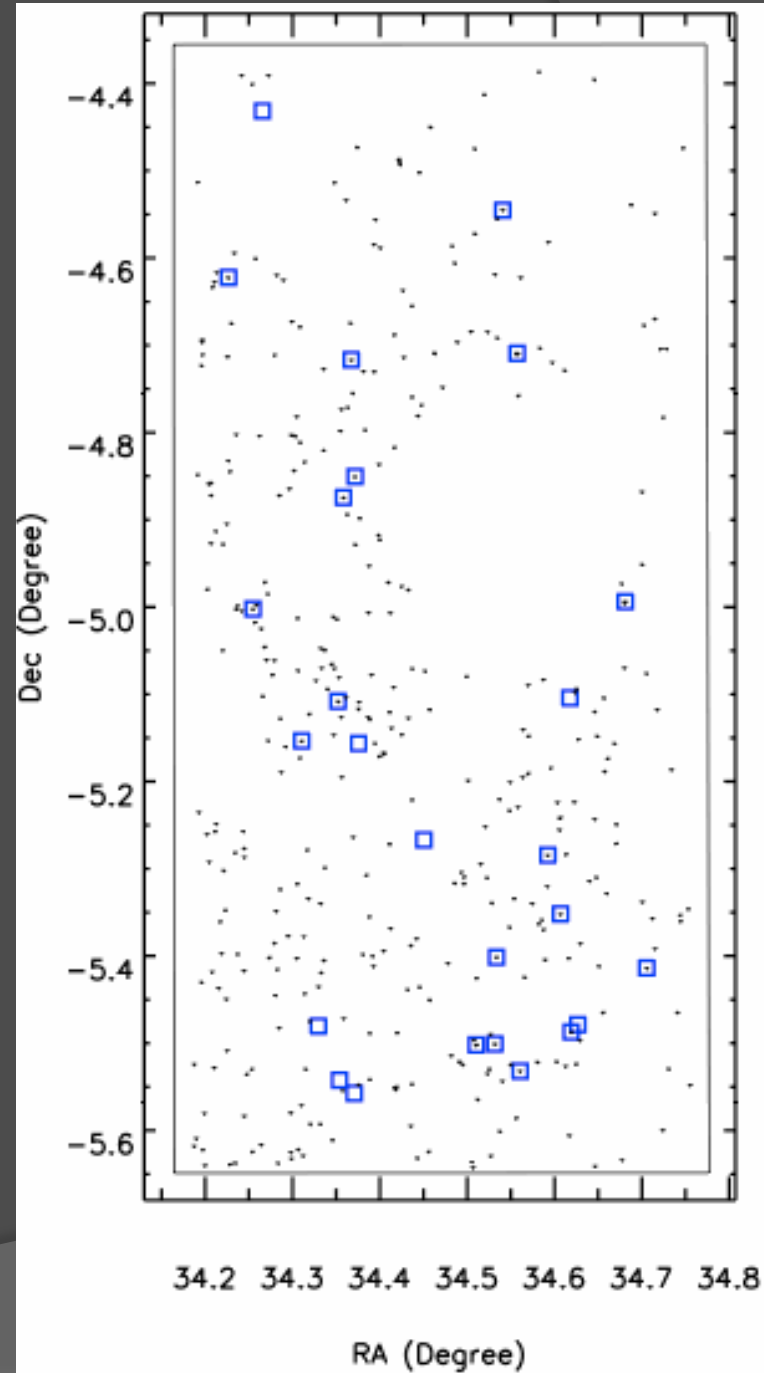
25"
190 kpc

AGN ~ 21-23 AB mag in continuum

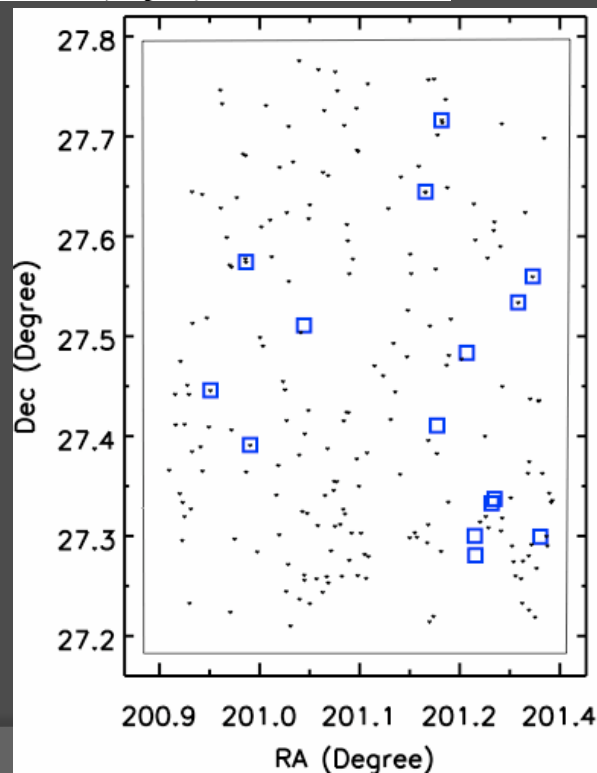
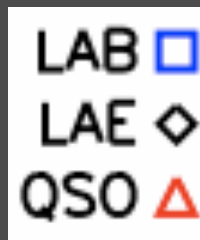
CDFN 19 LABs (0.24 deg²)



SXDS1-3 26 LABs (0.60 deg²)



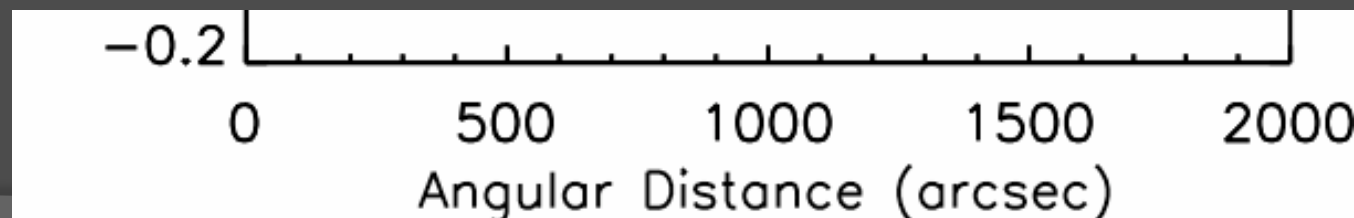
SDF 15 LABs
(0.22 deg²)



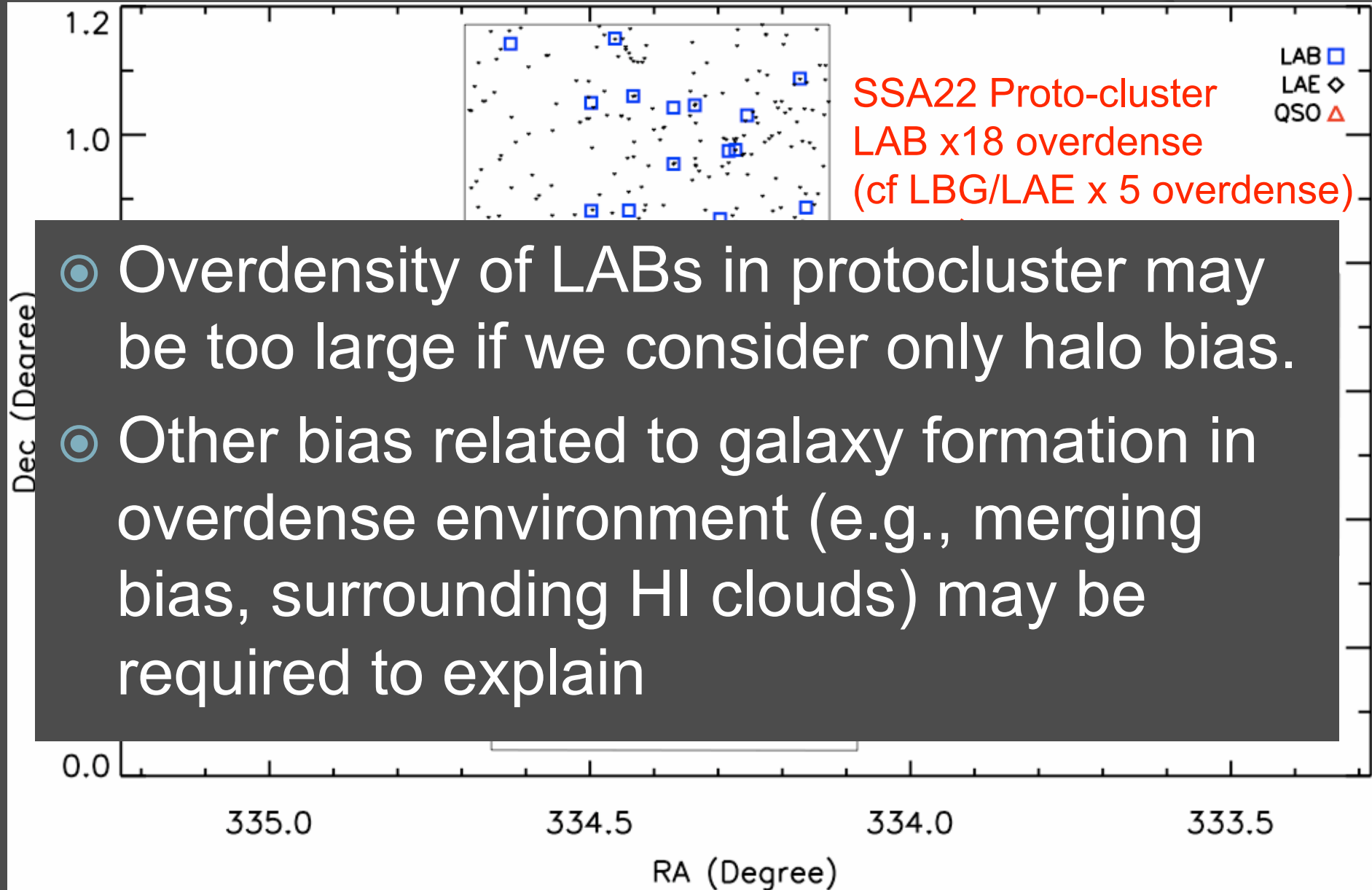
Angular correlation of 60 LABs (blank field only)



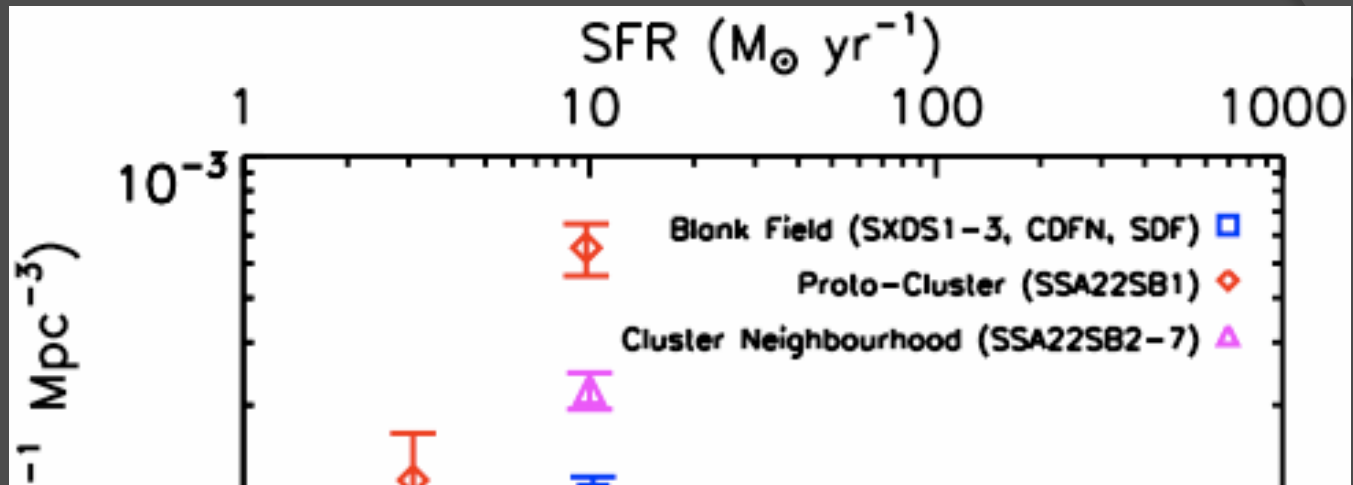
- If we consider only halo bias, we can estimate the halo mass of LABs (although the sample size is still small...).
- The halo mass of LABs is similar to LBGs (Adelberger et al. 2005, Shapley's talk), but somewhat more massive than LAEs (Gawiser et al. 2007, Franke's talk).
- $M_{\text{halo}} - \text{LAE} < \text{LAB} \sim \text{LBG}$



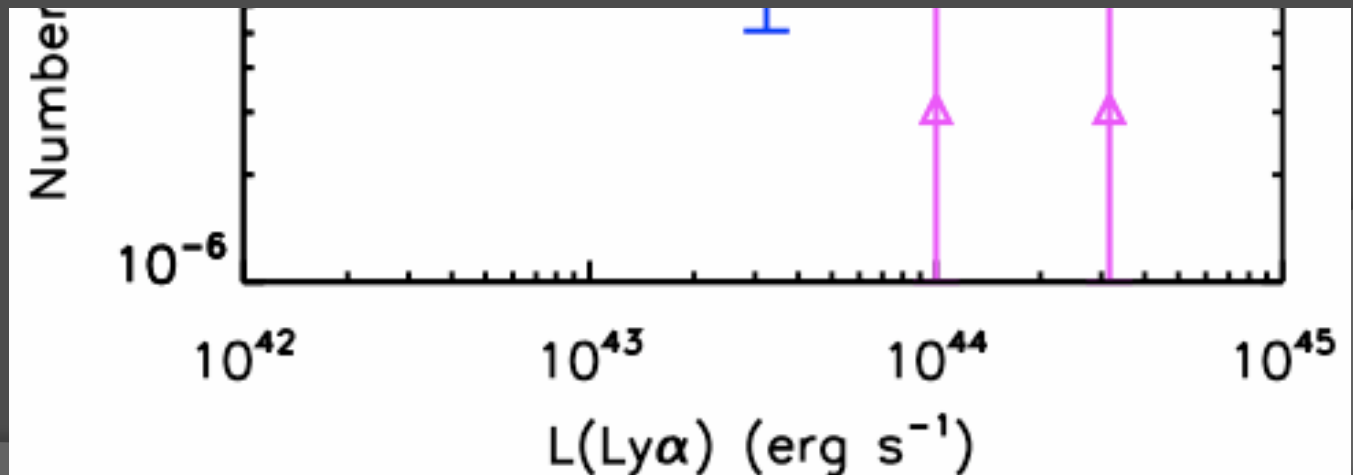
SSA22 141 LABs (1.06 deg²)



← 210 Mpc →



- Number density of LAB (>30 kpc) is $\sim 4 \times 10^{-5} \text{ Mpc}^{-3}$ (blank fields)
- Useful to compare with theoretical works (Furlanetto et al. 2005, Dijkstra's talk).



Summary

- Deep, panoramic LAB survey at $z=3$ with Suprime-Cam
- Sample of ~ 200 LABs (>30 kpc)
- Halo Mass (blank field): $M_{\text{halo}} > 10^{11} M_{\odot}$
- Strong clustering : x 18 overdense in protocluster (cf LAE/LBG, x5 overdense)
- Luminosity function & Number density :
 - LAB (>30 kpc) $\sim 4 \times 10^{-5} \text{ Mpc}^{-3}$
 - Giant LAB (>50 kpc) $\sim 3 \times 10^{-6} \text{ Mpc}^{-3}$

