Clustering properties of LAEs in MUSYC (ECDF-S)

Harold Francke - Pontificia Universidad Católica de Chile

Collaborators:
L. Infante, L. Guaita (PUC), E. Gawiser, N. Bond, J.P. Walker (Rutgers)
C. Gronwall , R. Ciardullo (PENN State), P. Lira (U. Chile)

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Outline

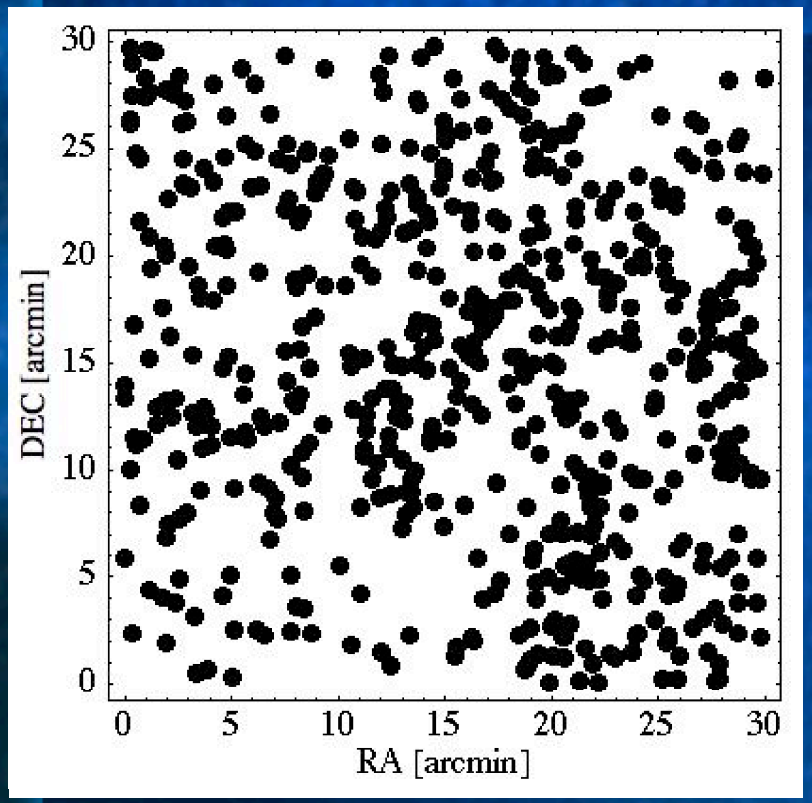
- Introduction
- Observational Dataset: MUSYC
- Clustering Analysis
  - Halo mases at z=3.1 and 2.1
  - Evolution
- Summary and Conclusions

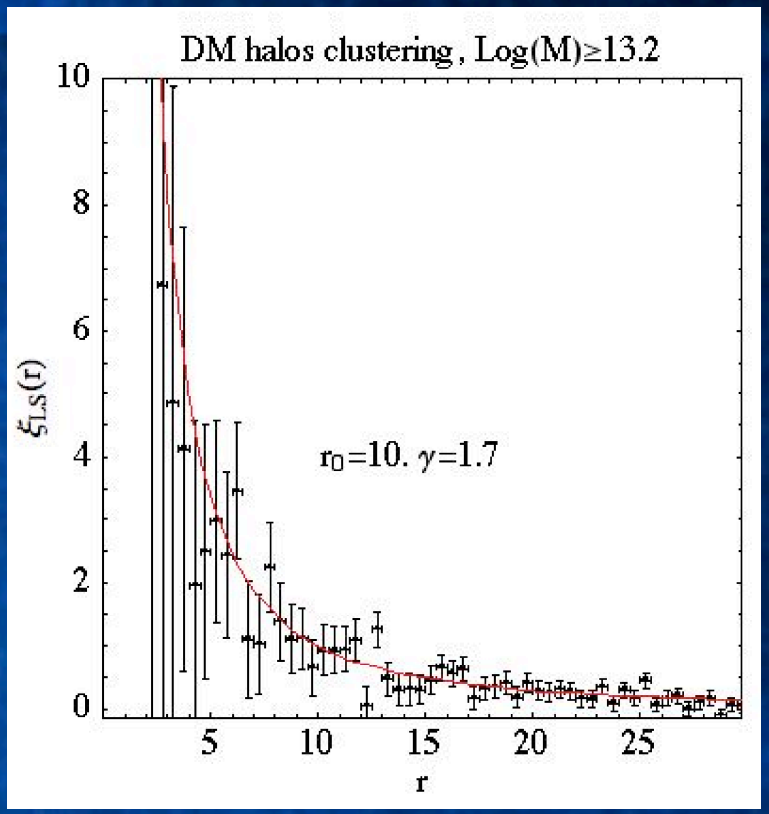
Introduction

- Lyman Alpha Emitters have shown significant clustering strength at high redshift…
  - But the bulk of them seem to have fairly blue, low stellar mass SEDs…
- MUSYC is optimized to detect star-forming galaxies at $2<z<3$

$\Rightarrow$ LAEs at $2<z<3$ in MUSYC are great targets for clustering analysis!!

Halo Mass and clustering





Clustering measure ⇒ Two-point correlation function

MUSYC Dataset

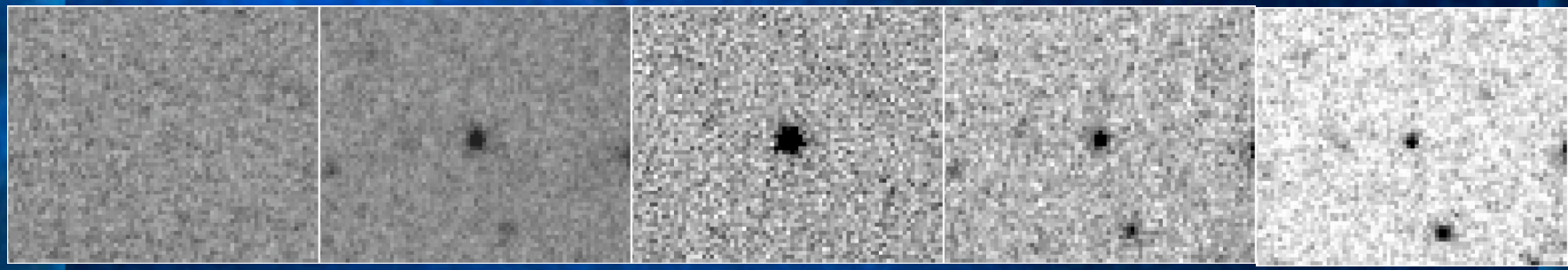
- Optical and NIR photometry, 4 fields, 30'x30' each.
- Spectroscopy:
  - Magellan+IMACS, >500 with spec ID so far
- ECDF-S has unique 250ks Chandra data
- SDSS 1030 has 105ks XMM data

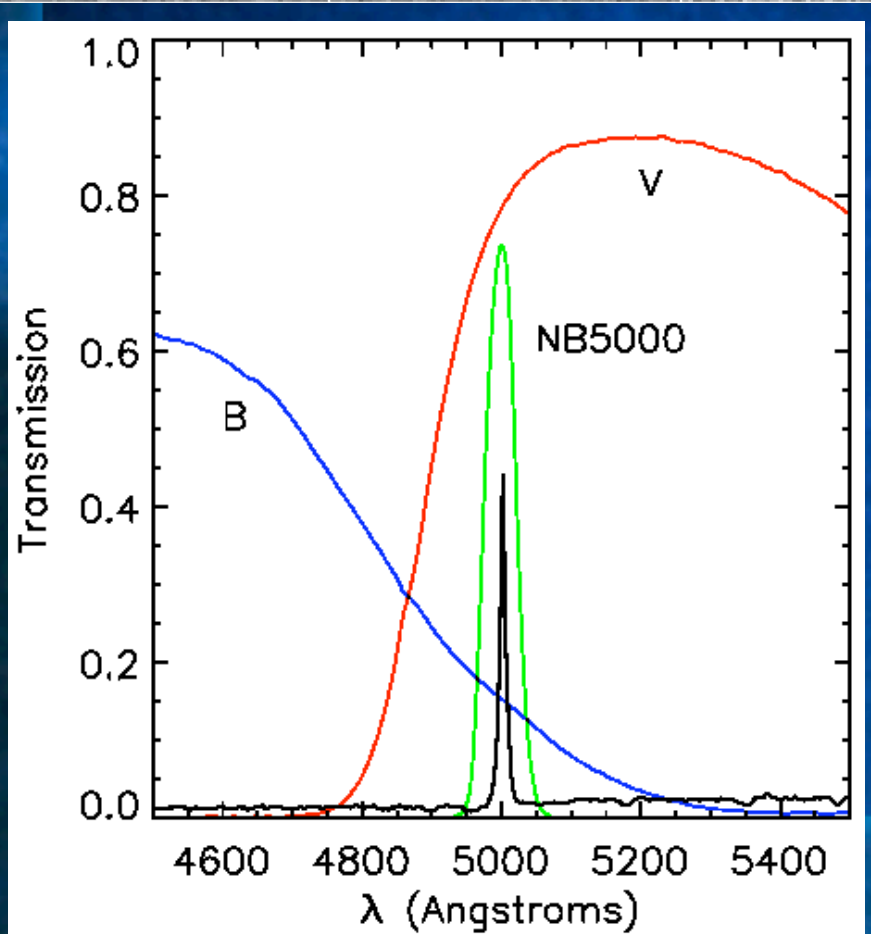
Field	# Obj.	U	B	V	R	I	z	J	H	K	NB5000	X-Ray [erg/(s cm^2)]
E-CDFS	84410	26.0	26.9	26.4	26.4	24.6	23.6	24.3	23.8	23.4	25.5	$2x10^{-16}$
SDSS 1030+05	69619	25.8	26.0	26.2	26.0	25.4	23.7	24.1	23.9	23.3	24.8	$8x10^{-16}$
Cast1255+01	60344	26.0	26.2	26.1	26.0	25.0	24.1	24.0	22.8	23.0	24.4	
E-HDFS	62968	26.0	26.1	26.0	25.8	24.7	23.6	24.3	23.4	23.4	24.1	

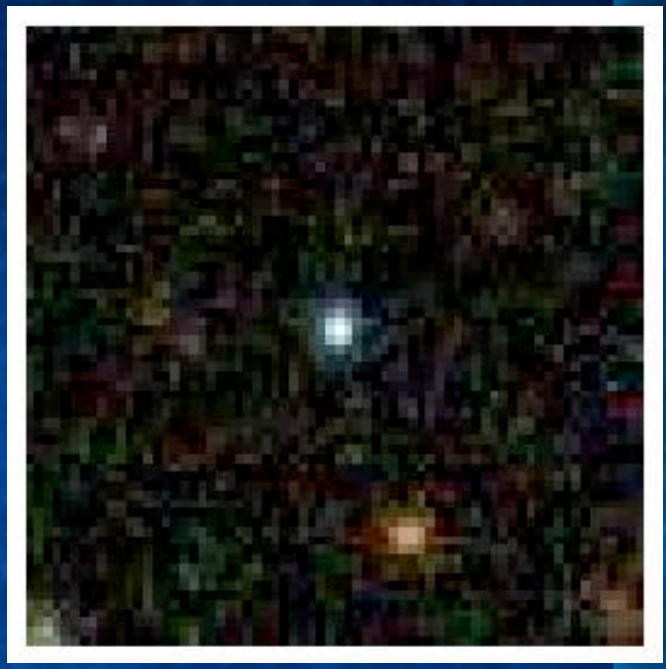
10x10 deep fields

LAE @ z=3.1 selection in MUSYC

U B NB5000 V R



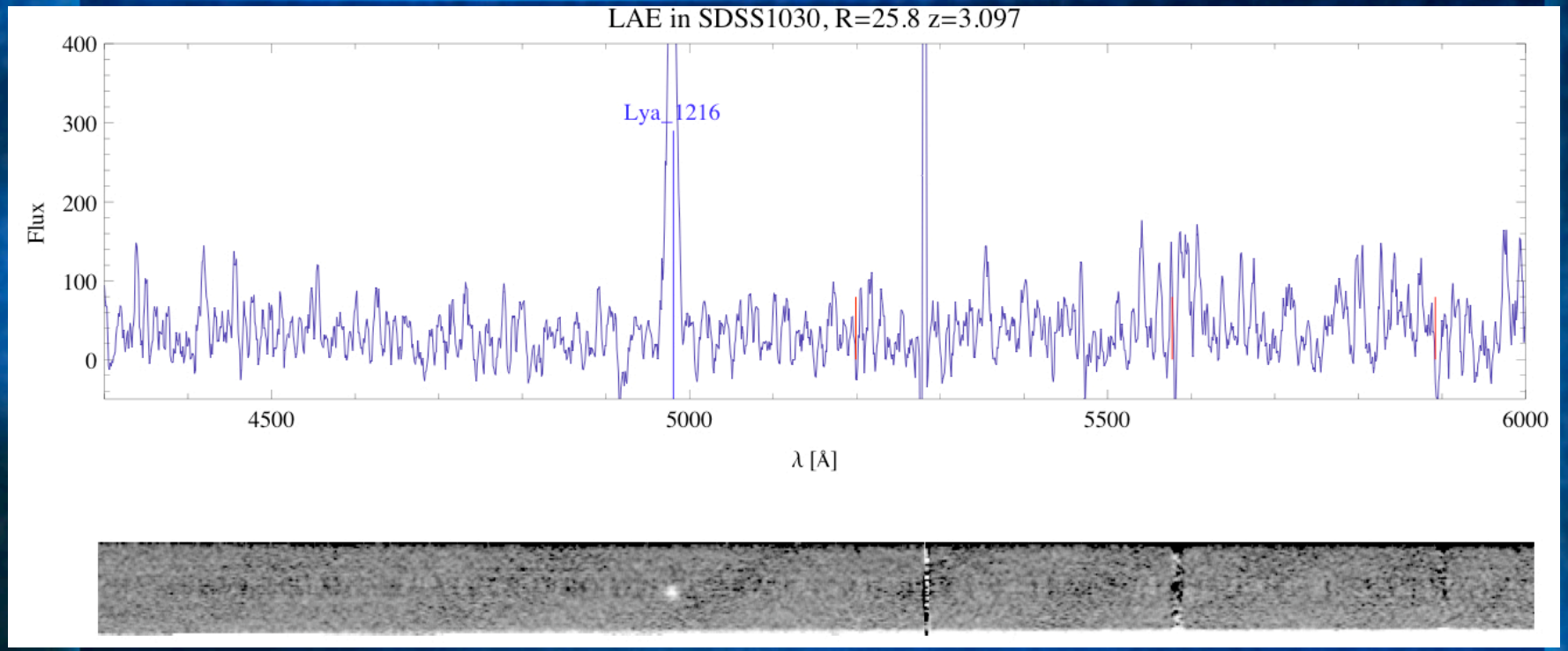




Sample of 160 LAEs, for more details, see:

Gronwall et al 2007, ApJ 667, 79

LAE spectrum (IMACS)



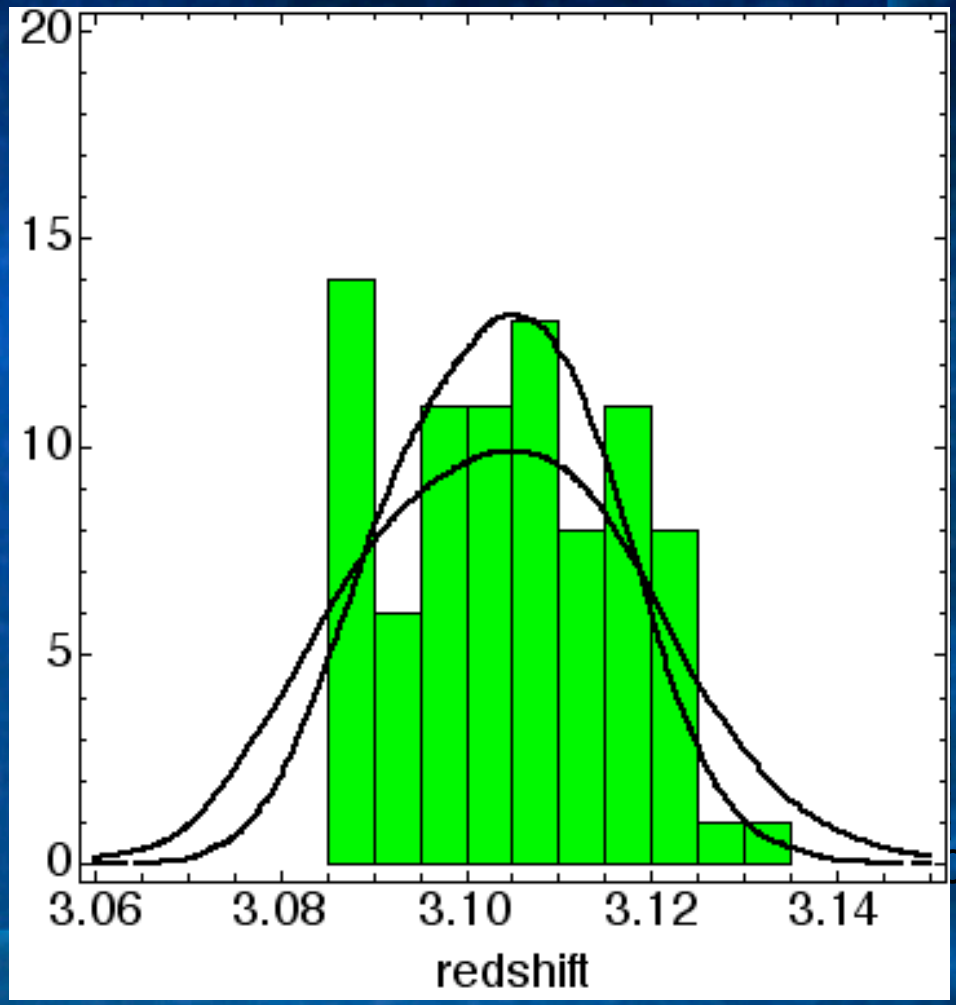
SED properties (z=3.1)

- From SED fitting (Gawiser et al. 2007), bulk of LAEs at z~3 seem to have:
  - Low stellar masses, ~10^9 M_{sun}
  - Low SFR, ~2 M_{sun}/yr
  - Nearly no dust

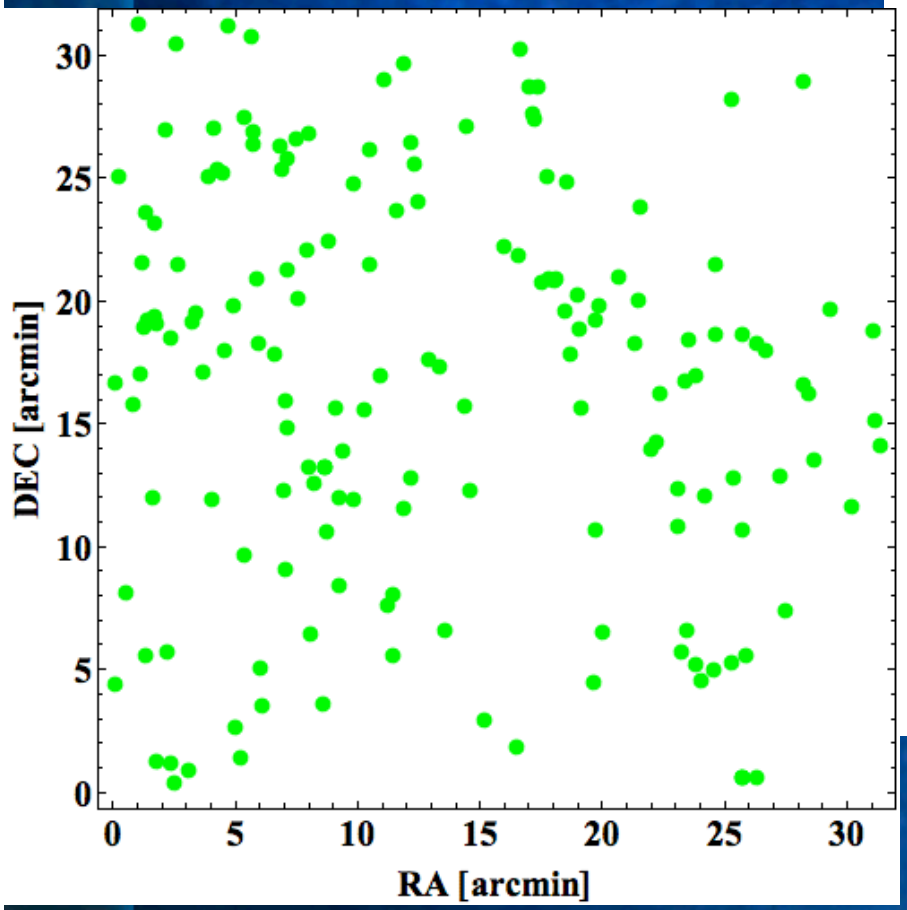
Spectroscopic confirmations at z=3.1

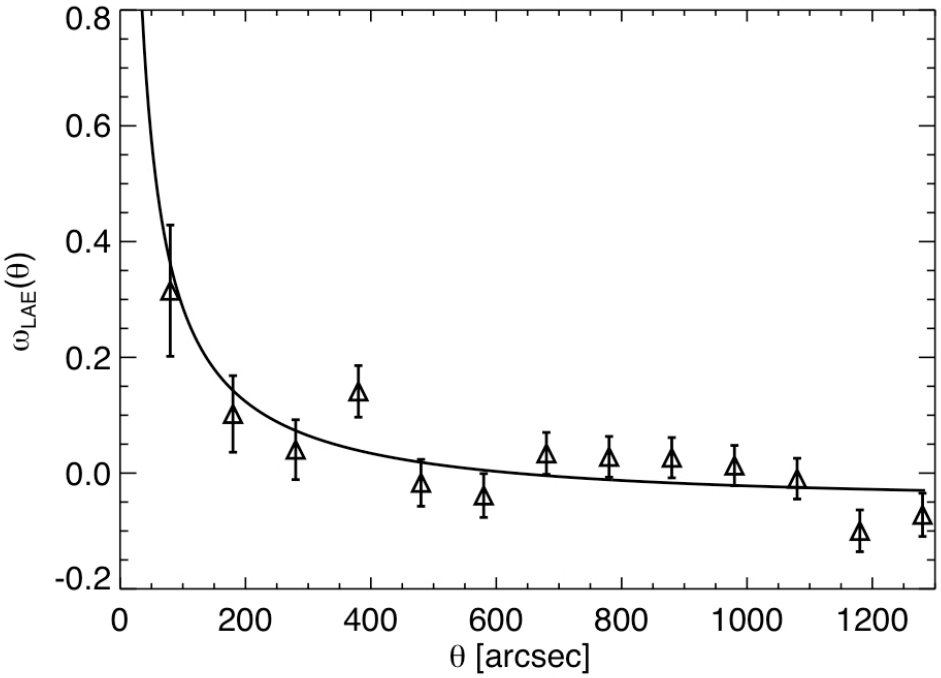
- From 3 MUSYC fields:

  ⇒ 74 LAEs



LAEs at z=3.1





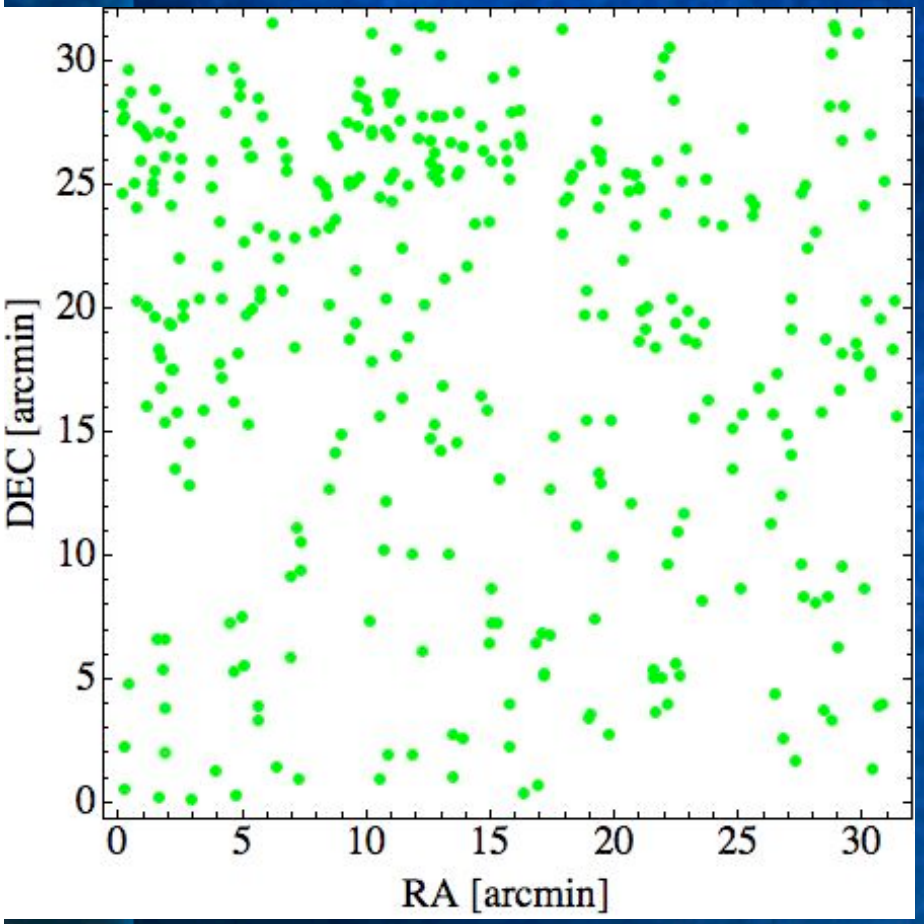
160 LAEs

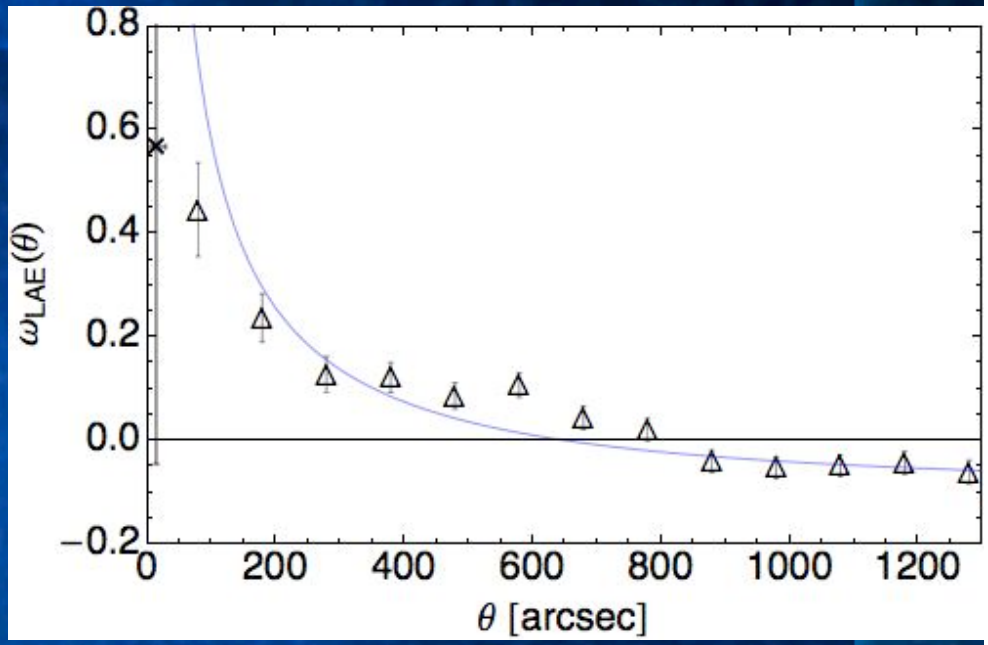
Best fit: r_0 = 3.6 ± 1 Mpc ⇒ bias = 1.9+/-0.4

⇒ log M = 10.8+0.5/-0.9 oc. frac. ~ 5%

Gawiser, Francke et al. 2007, ApJ 671, 278

LAEs at z=2.1





350 LAEs

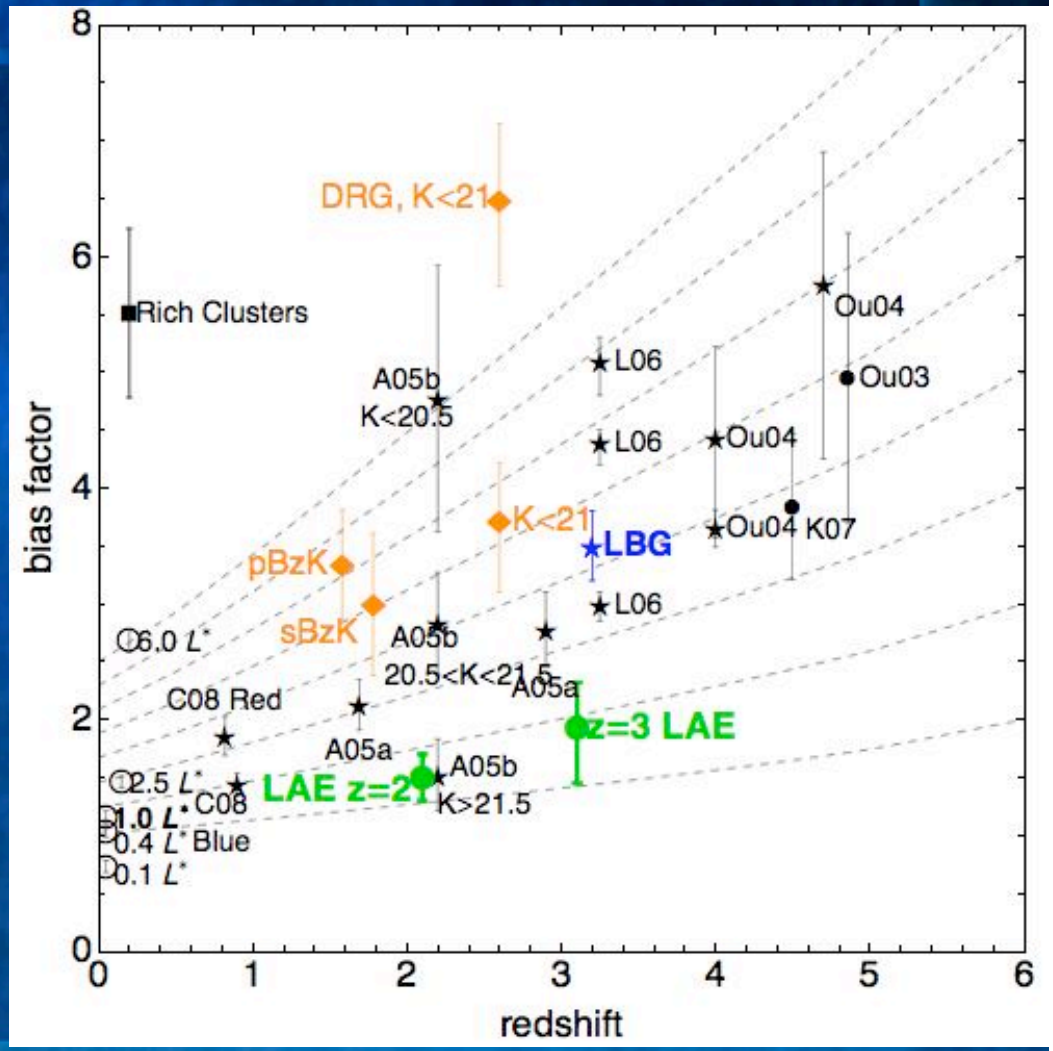
Best fit: r_0 = 3.7 ± 0.6 Mpc ⇒ bias = 1.5+/-0.2

⇒ log M = 11.0+0.4/-0.4 oc. frac. ~ 10%

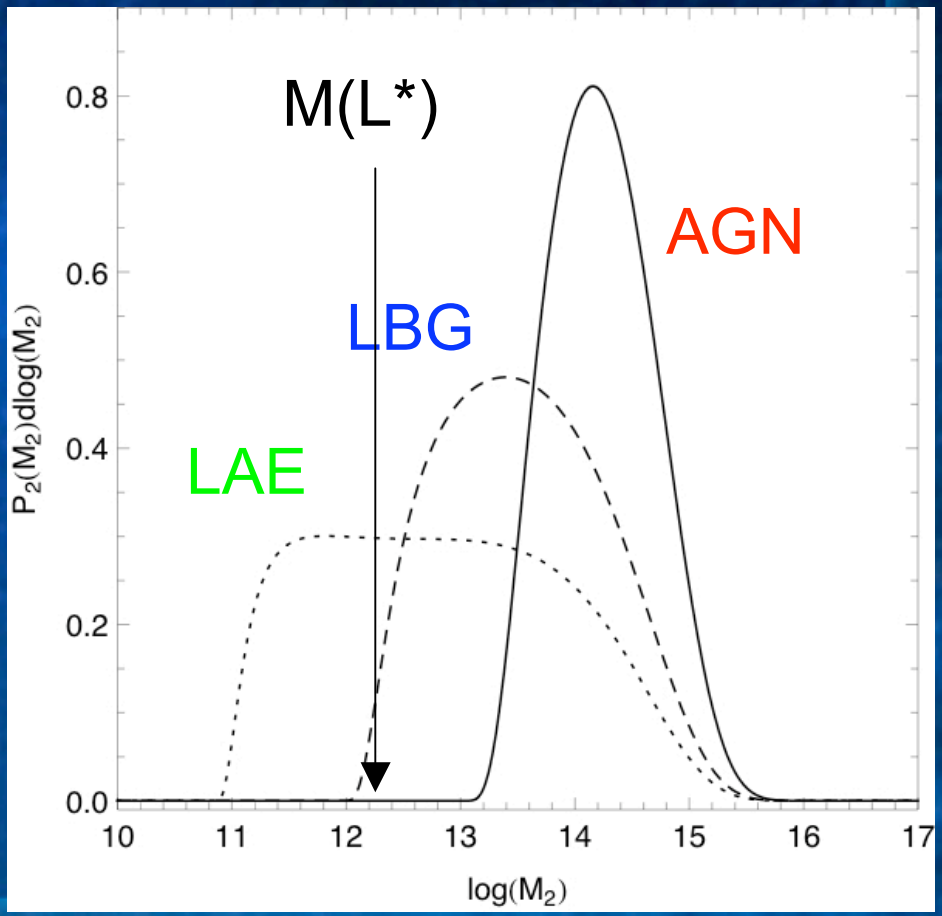
See Lucia Guaita's Poster

LAE clustering in context

- Both LAE samples are in the lowest mass range at 2<z<3
- Could be progenitors of many L* galaxies at z=0



Distribution at z=0 in terms of halo mass…



Summary/Conclusions

- LAEs show fairly weak clustering both at z=3.1 and 2.1 in ECDFS-MUSYC
- Appear to be progenitors of many of today's L* galaxies
- Stay tuned… data from more fields coming to confirm and expand this result.
  - Narrow band imaging of other MUSYC fields
    (Wider, more bright LAEs, better stats)
  - Follow-up spectroscopy
    (Control better contamination frac. at z=2.1)