LYMAN ALPHA EMITTERS IN HETDEX

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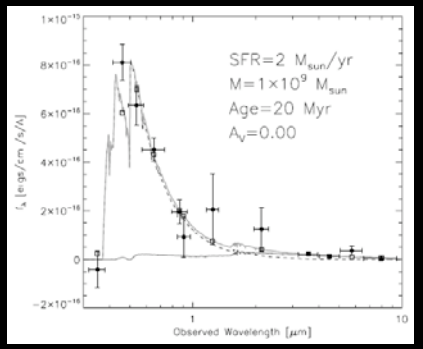
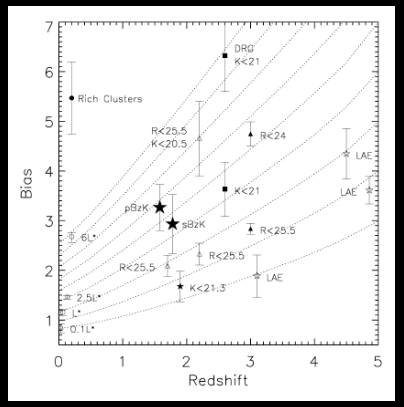
LYMAN ALPHA EMITTERS

- Physical Nature
  - Low masses of 10^8-10^{10} $M_\odot$ (sub LBG)
  - Young ages of 20-500 Myr
  - Highest specific SFR galaxies known
- Unknowns
  - Ly-α escape fraction?
  - Dusty or not?
  - Multiphase ISM vs. Homogeneous ISM?
  - Outflows?
  - Metallicity?
  - Age bimodality?
  - Bias?
  - Evolution with redshift?
- Importance
  - Progenitors of local L* galaxies
  - Access to the faint end of the LF at high z
  - Probes for ISM models
  - Probes for reionization
  - Probes for cosmology (BAO)



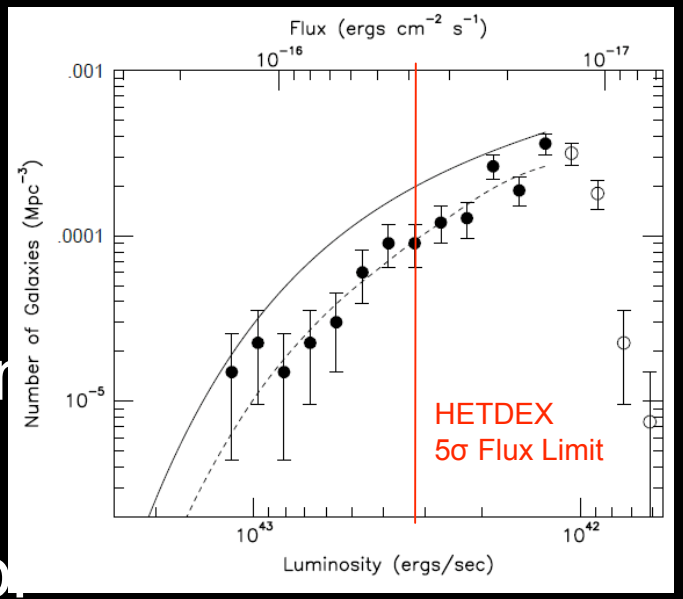
Gawiser et al. 2007



Blanc et al. 2008

LAEs IN HETDEX

- 1,000,000 LAEs at $1.9 < z < 3.5$
- Volume: 9 Gpc^3
- Flux Limit: $3 \cdot 10^{-17}$ ergs s^{-1} cm^{-2}
- σ_{inst}= 120 km s^{-1}
- 3 orders of magnitude larger than present samples.
- Largest volume ever surveyed for galaxies.
- Sample the bright end of the Ly-α LF of galaxies (all the way up to L*).

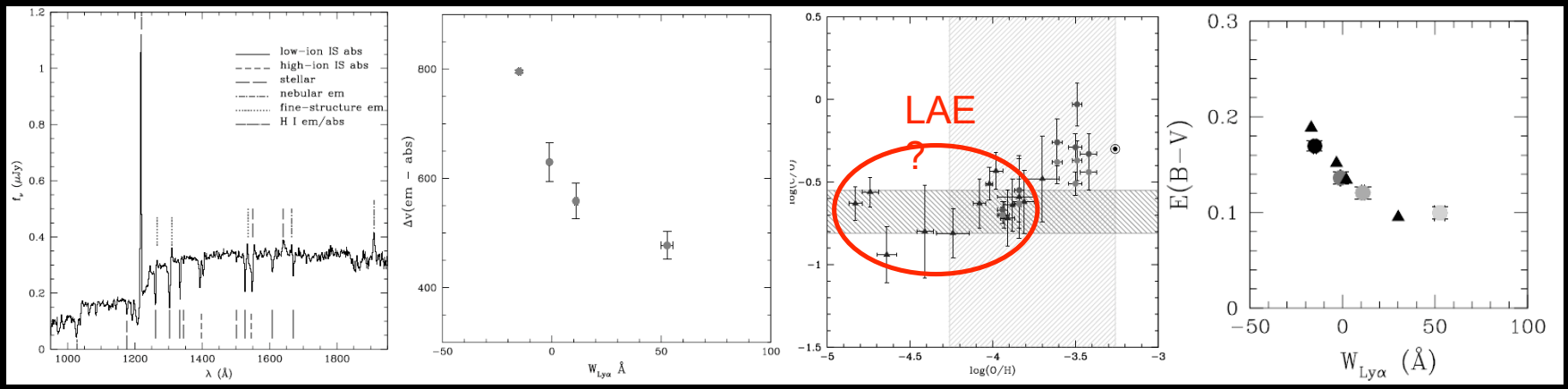


Gronwall et al. 2007

STACKED SPECTRA

- Average LAE (<R>=25.5) spectrum will have S/N=0.1 in continuum
- No Bootstraping!!!!
- Smart Weighting
- Will have to bin sample by measured quantities.
- 10 to 100 bins.

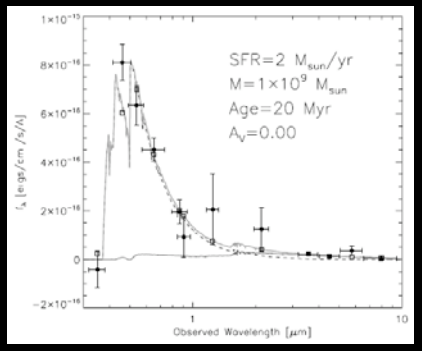
n_{lae}	S/N
1,000,000	100
100,000	32
10,000	10



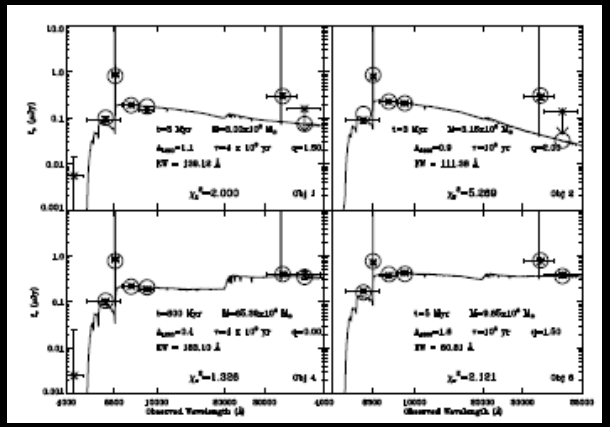
Shapley et al. 2003 ; 813 LBG spectra with <S/N>=4

STELLAR POPULATIONS

SED FITTING??
Imaging: g r i z to 25 mag?

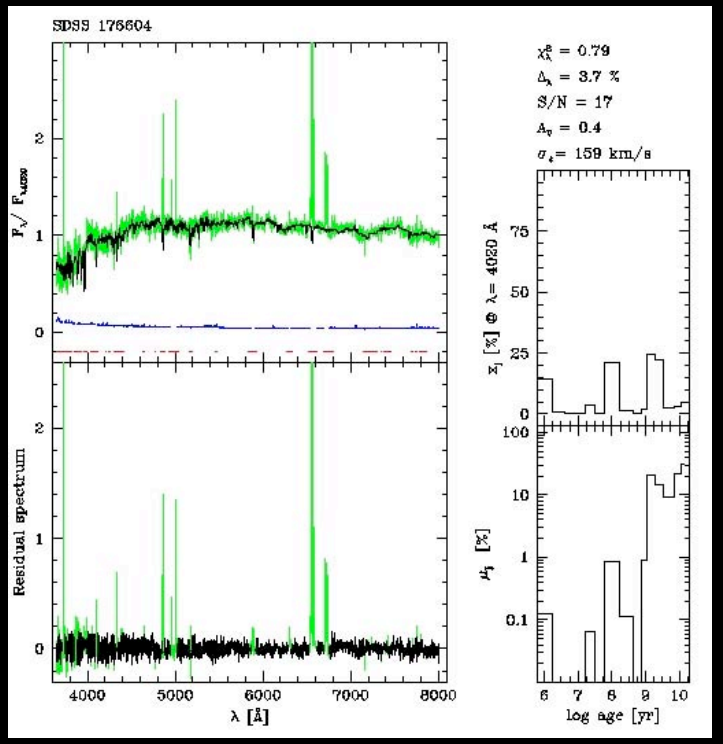


Gawiser et al. 2007



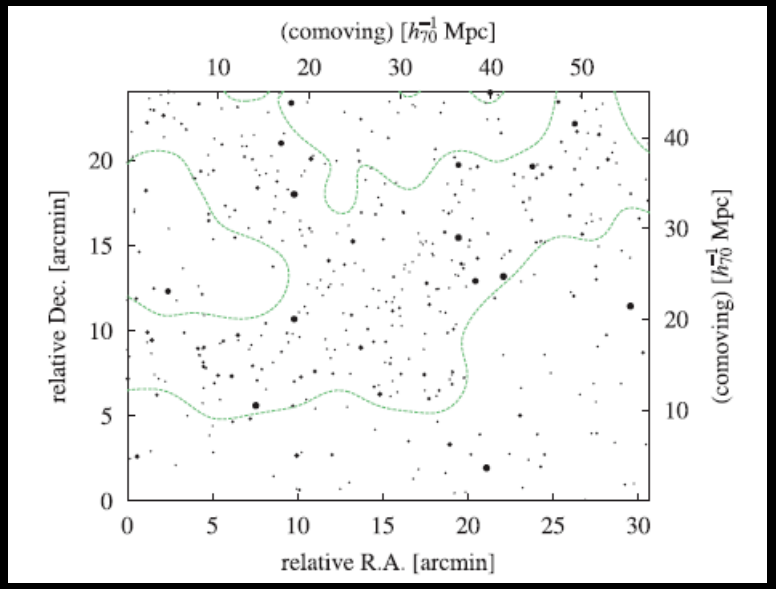
Finkelstein et al. 2008

SPECTRAL SYNTHESIS
Stacked Spectra

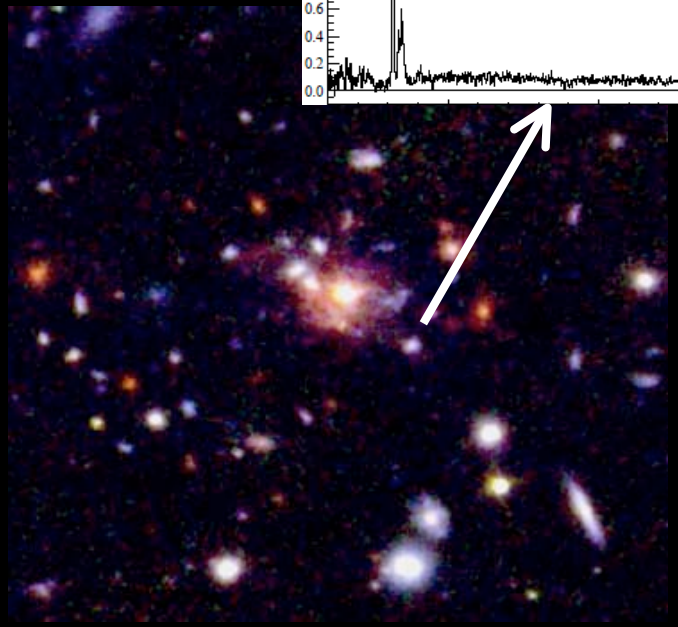


Cid-Fernandez et al. 2005

OVERDENSITIES AND CLUSTERS



Hayashino et al. 2004

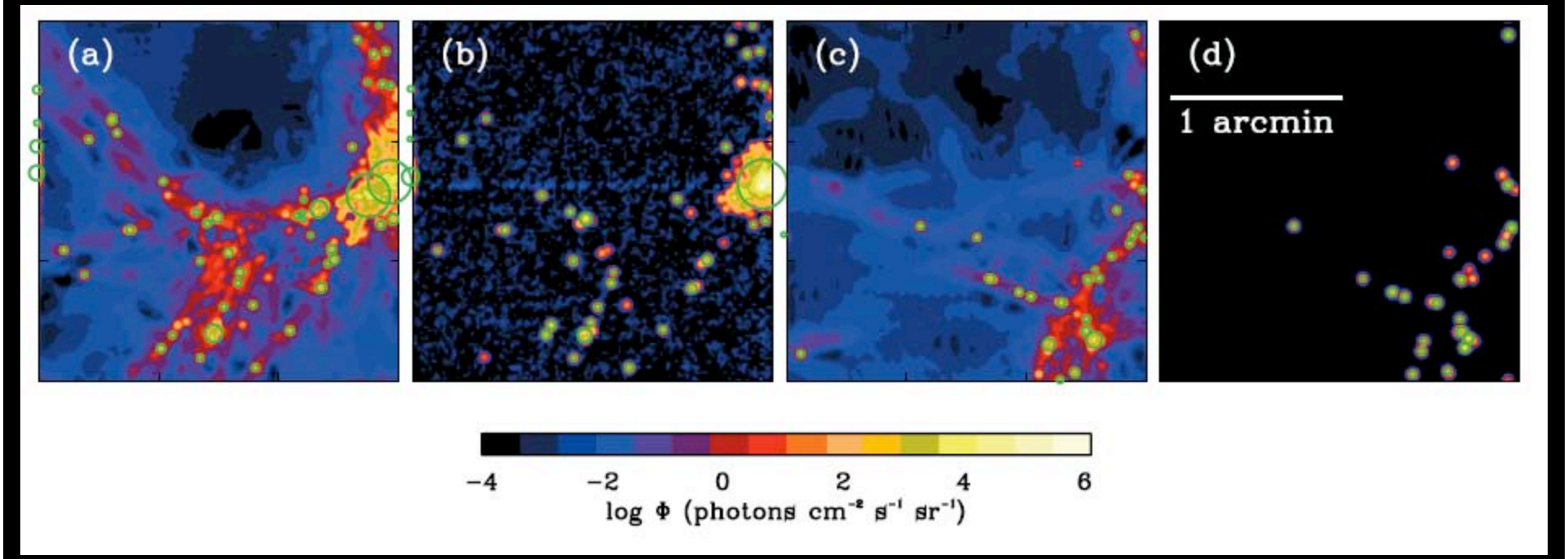


Hatch et al. 2008, 2009

SSA-22 @ z=3.1

Spider web Galaxy @ z=2.2

IGM DIFFUSE EMISSION

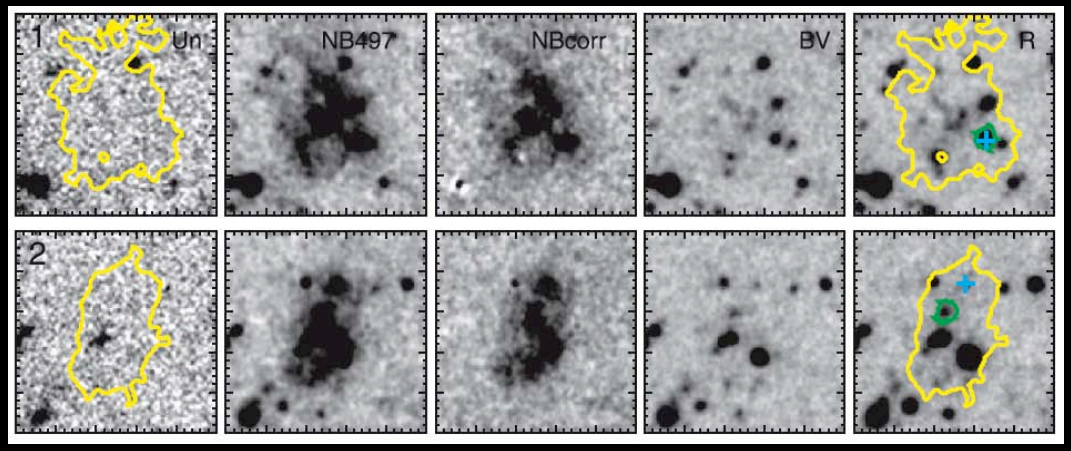


Furlanetto et al. 2005

- Diffuse Ly-α from the IGM is ~1000 times fainter than LAEs
- Filament stacking might reveal diffuse IGM Ly-α between LAEs
- If not, by far the best upper limit for the IGM emissivity

LYMAN ALPHA BLOBS

- We expect ~10,000 LAB in HETDEX



Matsuda et al. 2004

- Superwinds?
- Photoionization by AGN?
- Gravitational Cooling?
- HETDEX will create the largest catalog of LAB

CONCLUSIONS

- HETDEX will allow access to the continuum spectrum of LAEs for the first time:
  - Outflows
  - Metallicities
  - ISM properties
  - Stellar Populations
- HETDEX might allow the first detection of the IGM in emission.
- HETDEX will produce a large catalog of LAB, and proto clusters.