Lyman-Break Galaxies in the Epoch of Reionization

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MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA

SFRH / BPD / 89554 / 2012 ; PEst-OE/FIS/UI2751/2011 ; PTDC/FIS-AST/2194/2012

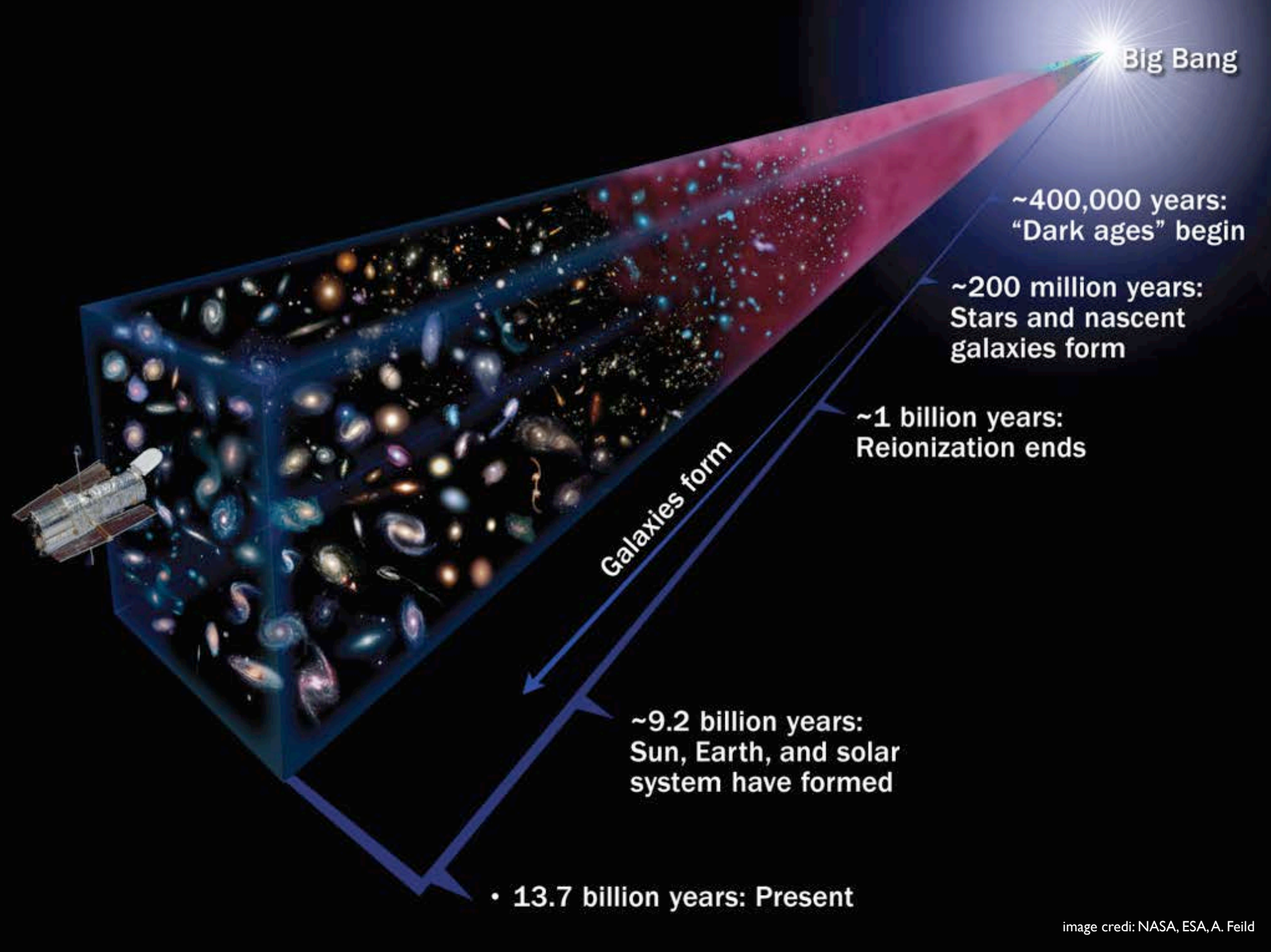
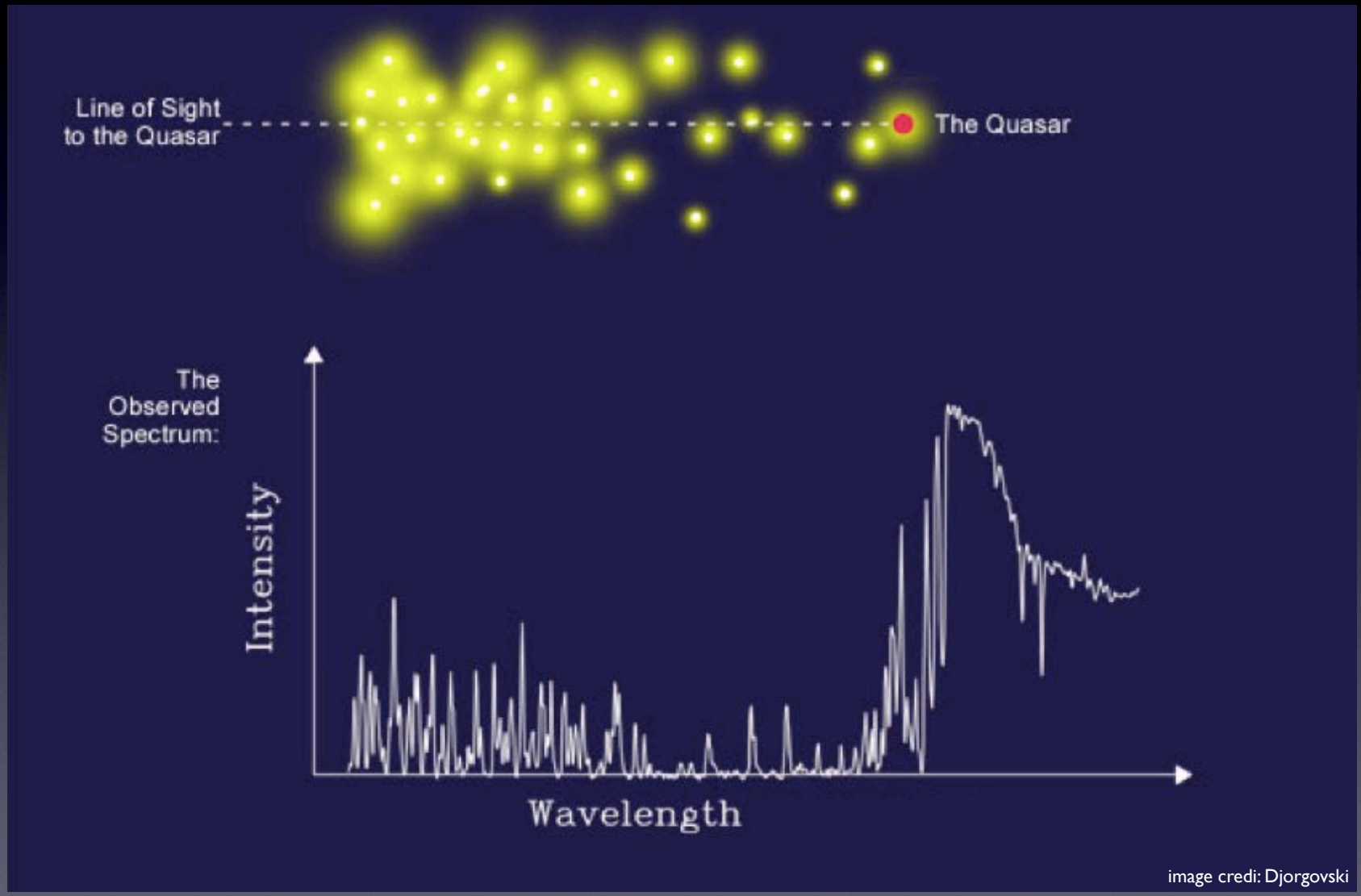


image credi: NASA, ESA, A. Feild

Gunn-Peterson effect



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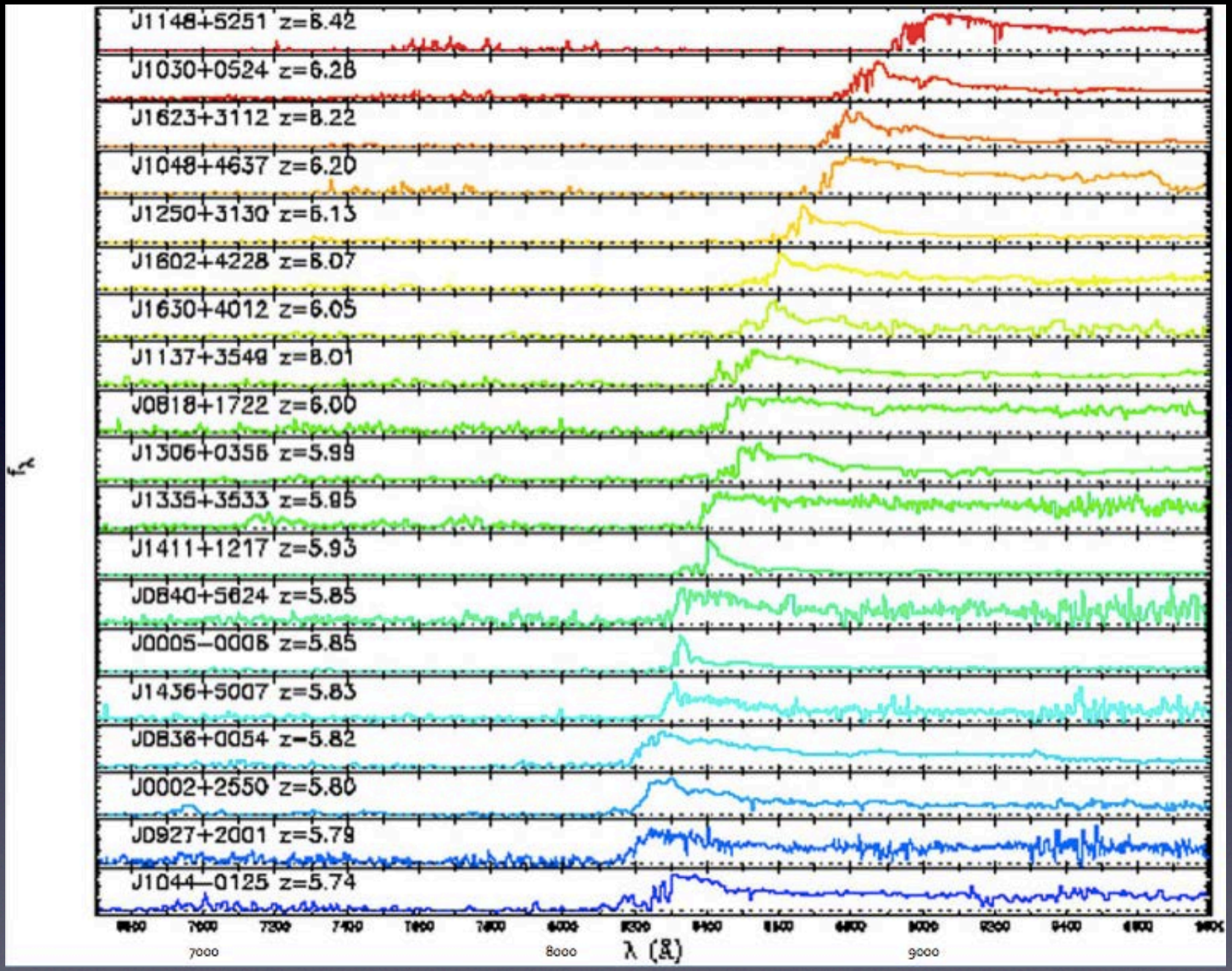
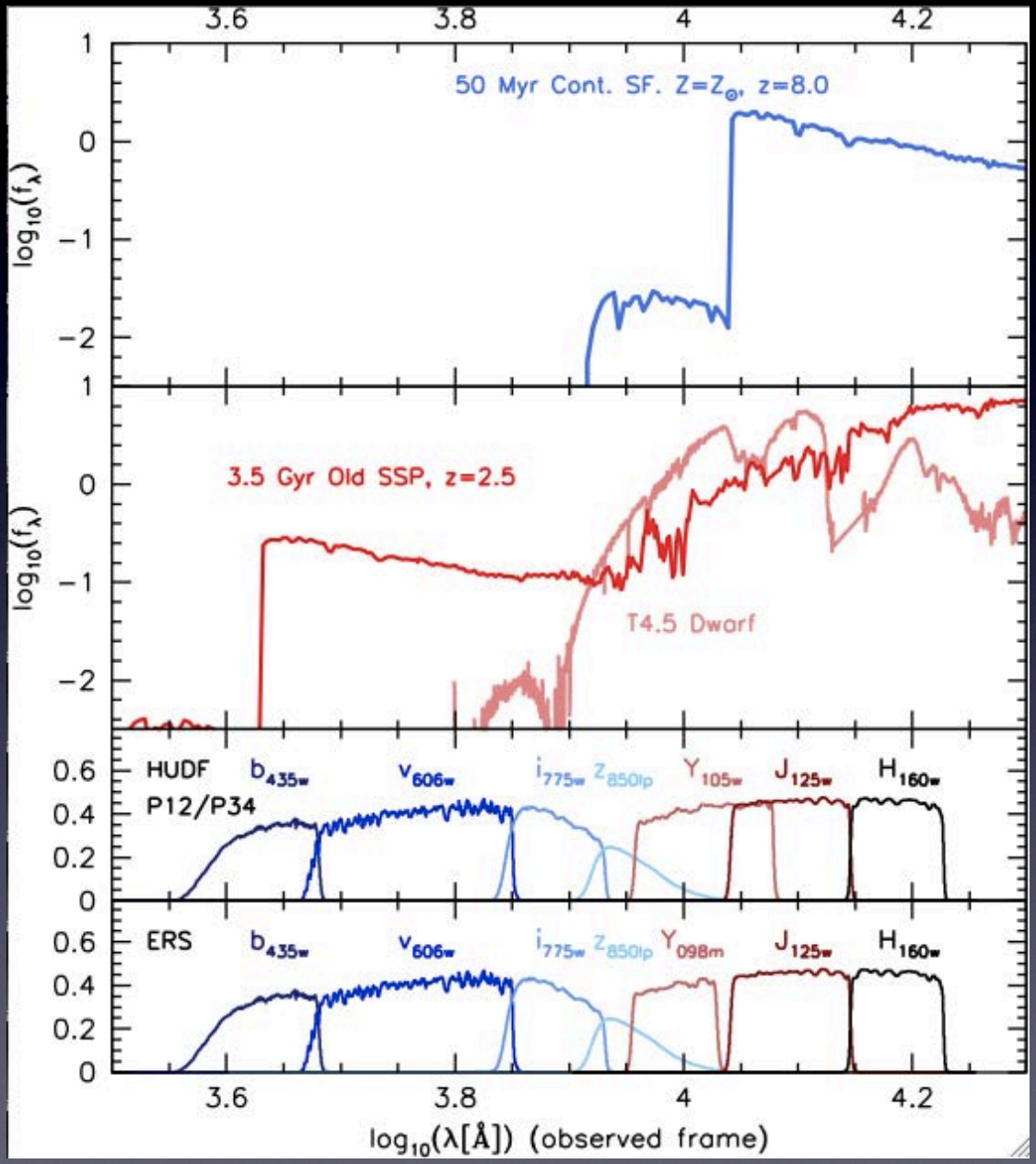
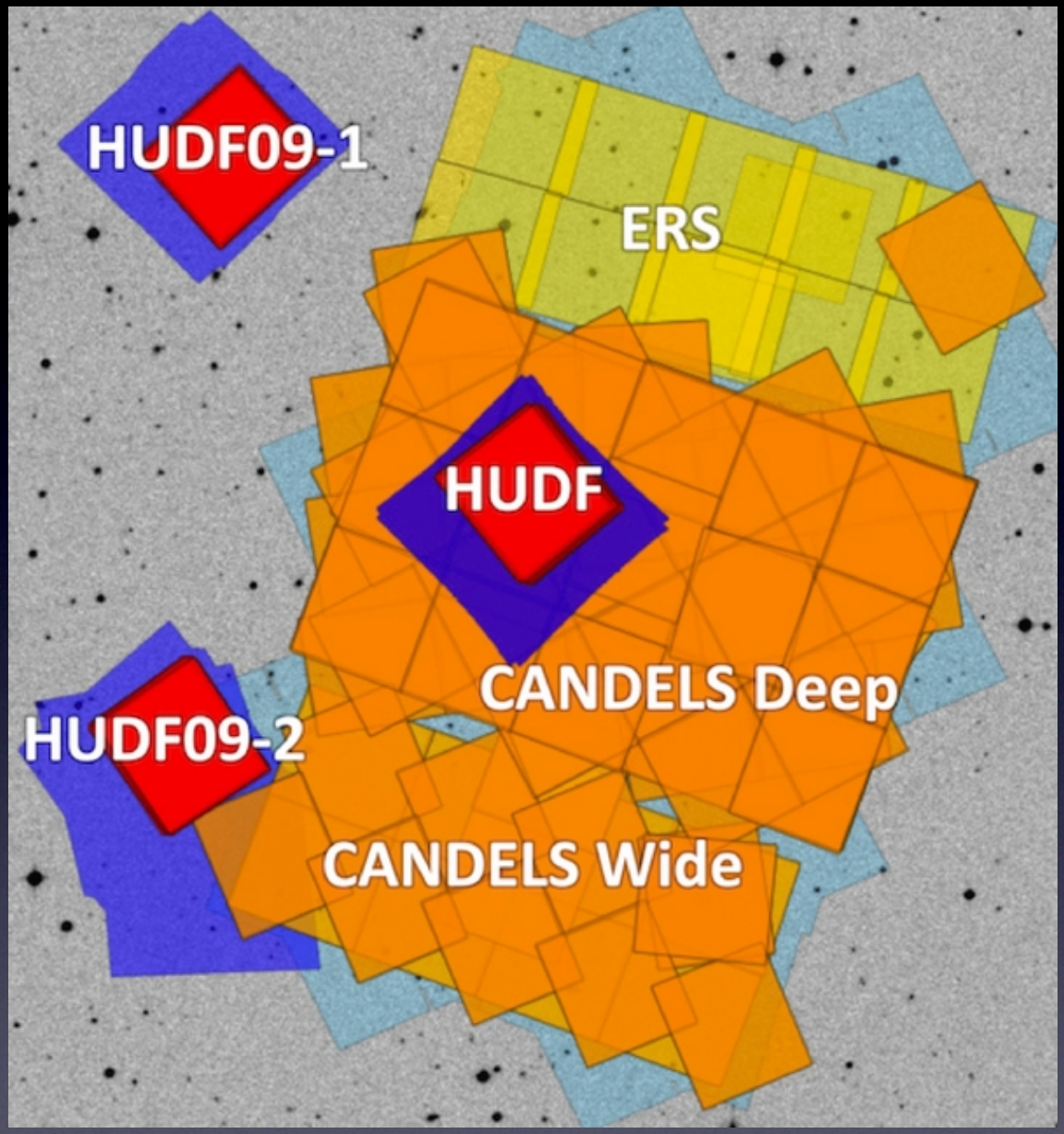


Fan et al. (2006), AJ 132 117

Lyman-break technique





	5-σ depths (AB magnitudes)		
	Y-band	*J*-band	*H*-band
HUDF	28.7	28.7	28.7
HUDF09-2	28.5	28.6	28.4
HUDF09-1	28.2	28.5	27.2
ERS	27.0	27.4	27.1
CANDELS DEEP	27.8	27.3	27.2
CANDELS WIDE	26.8	26.9	26.6

Oesch et al. (2012) ApJ 745 110

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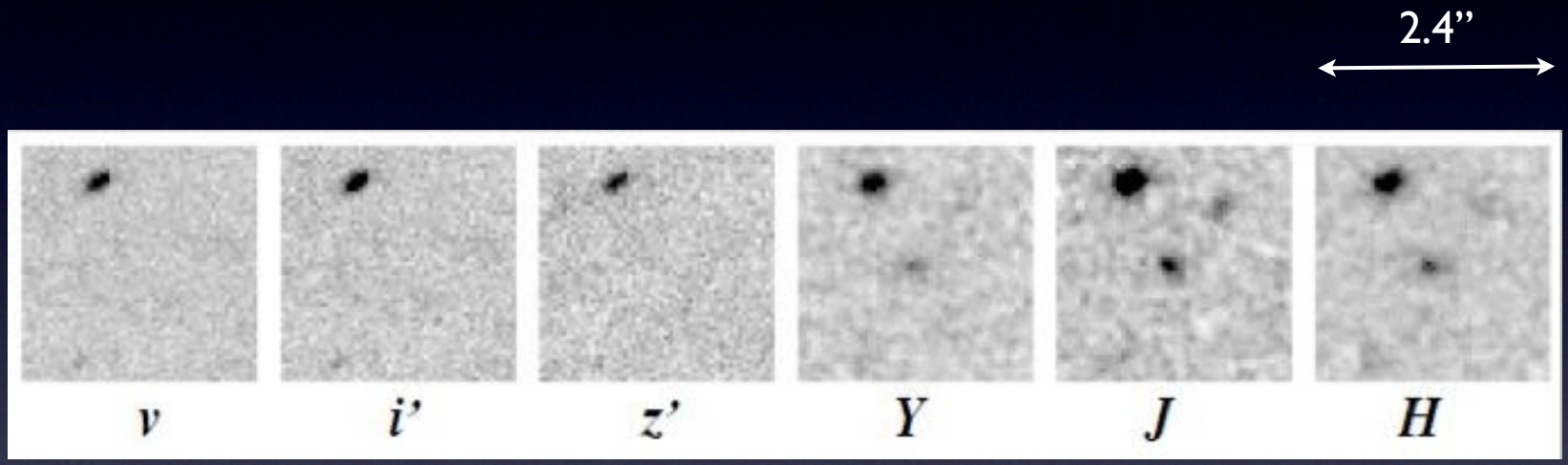
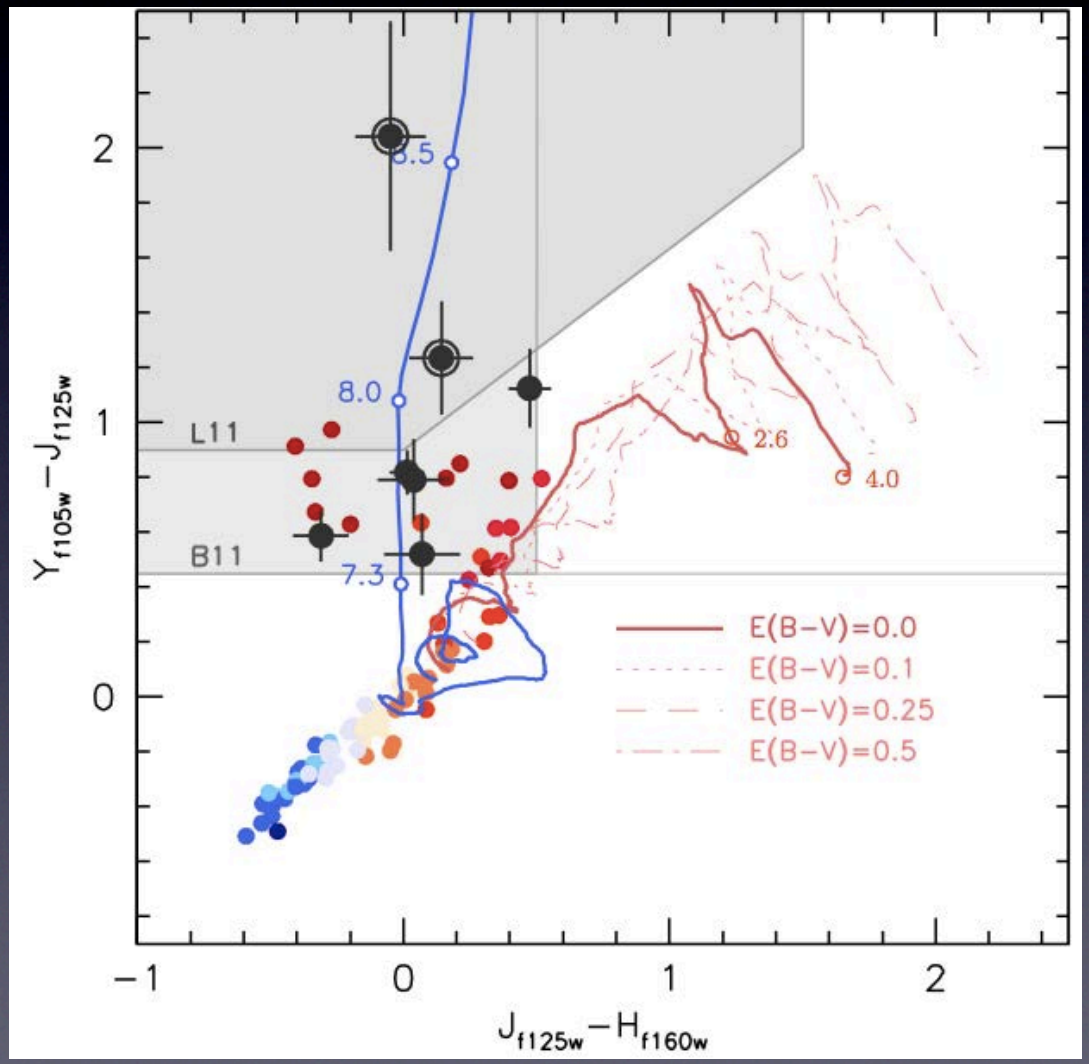
Candidates



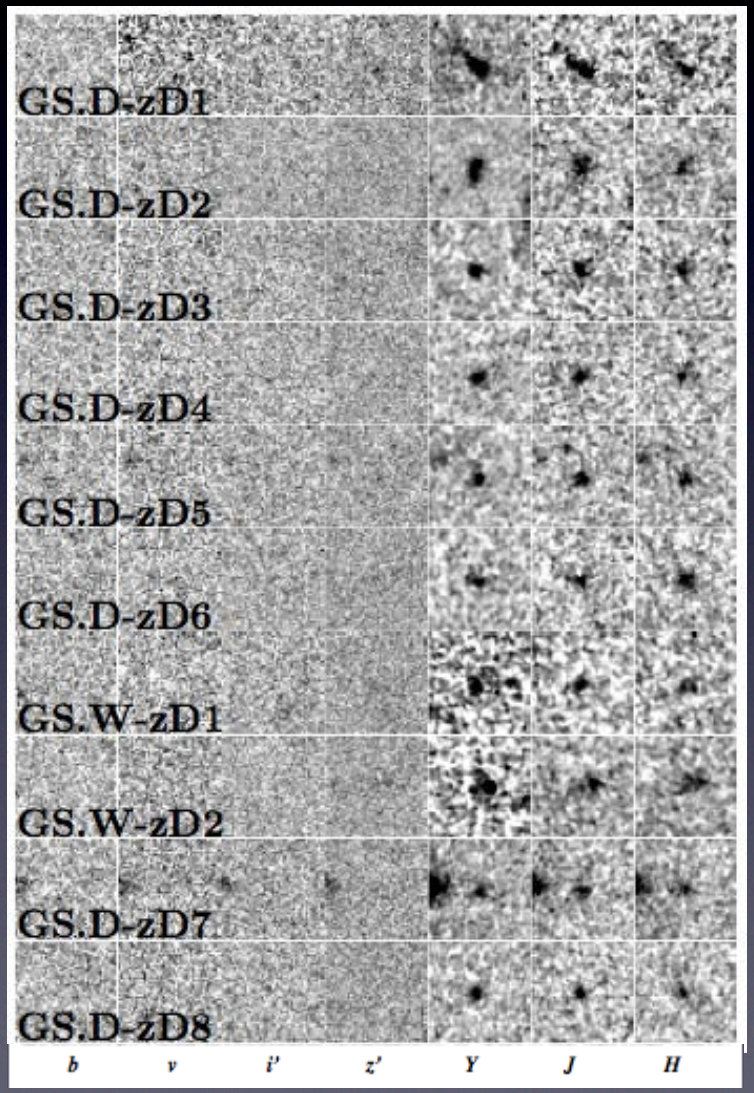
Selection criteria



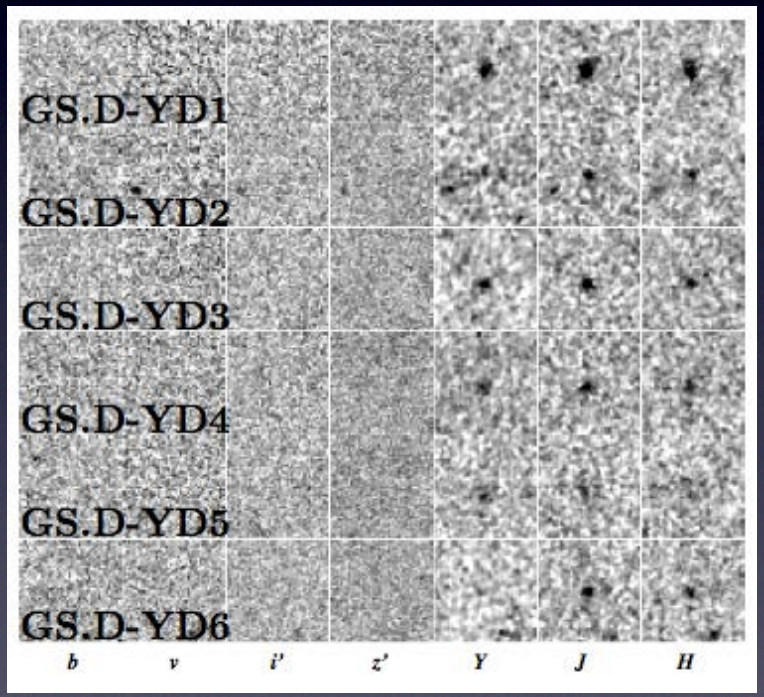
- >5σ detection in two bands longwards of the break
- <2σ non-detection in optic bands
- colour criteria

CANDELS candidates

z-drops

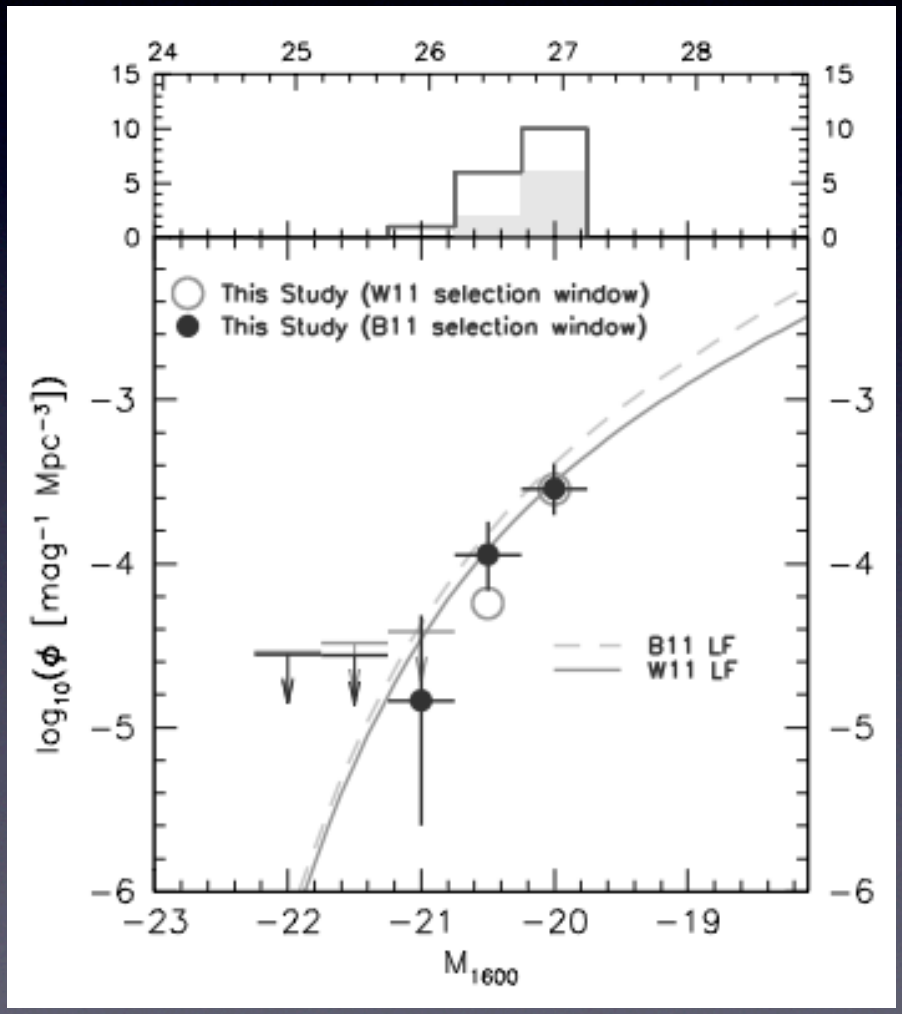


Y-drops

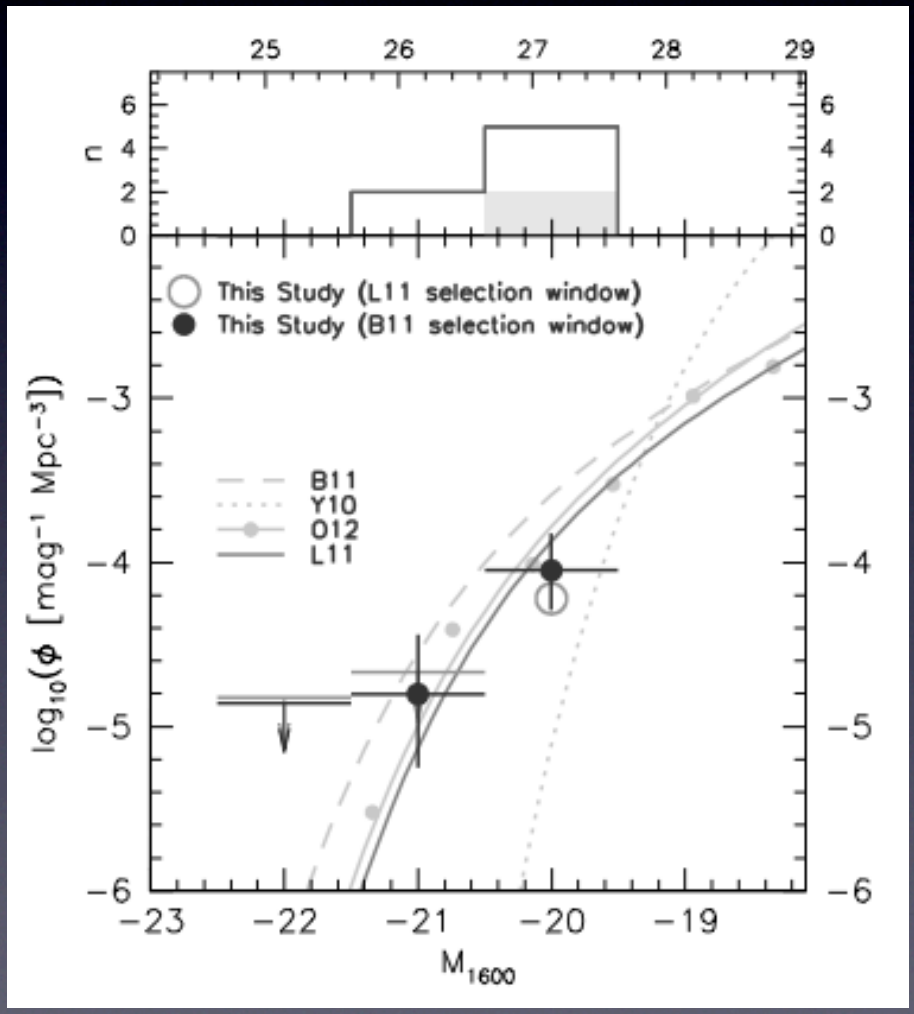


Luminosity functions

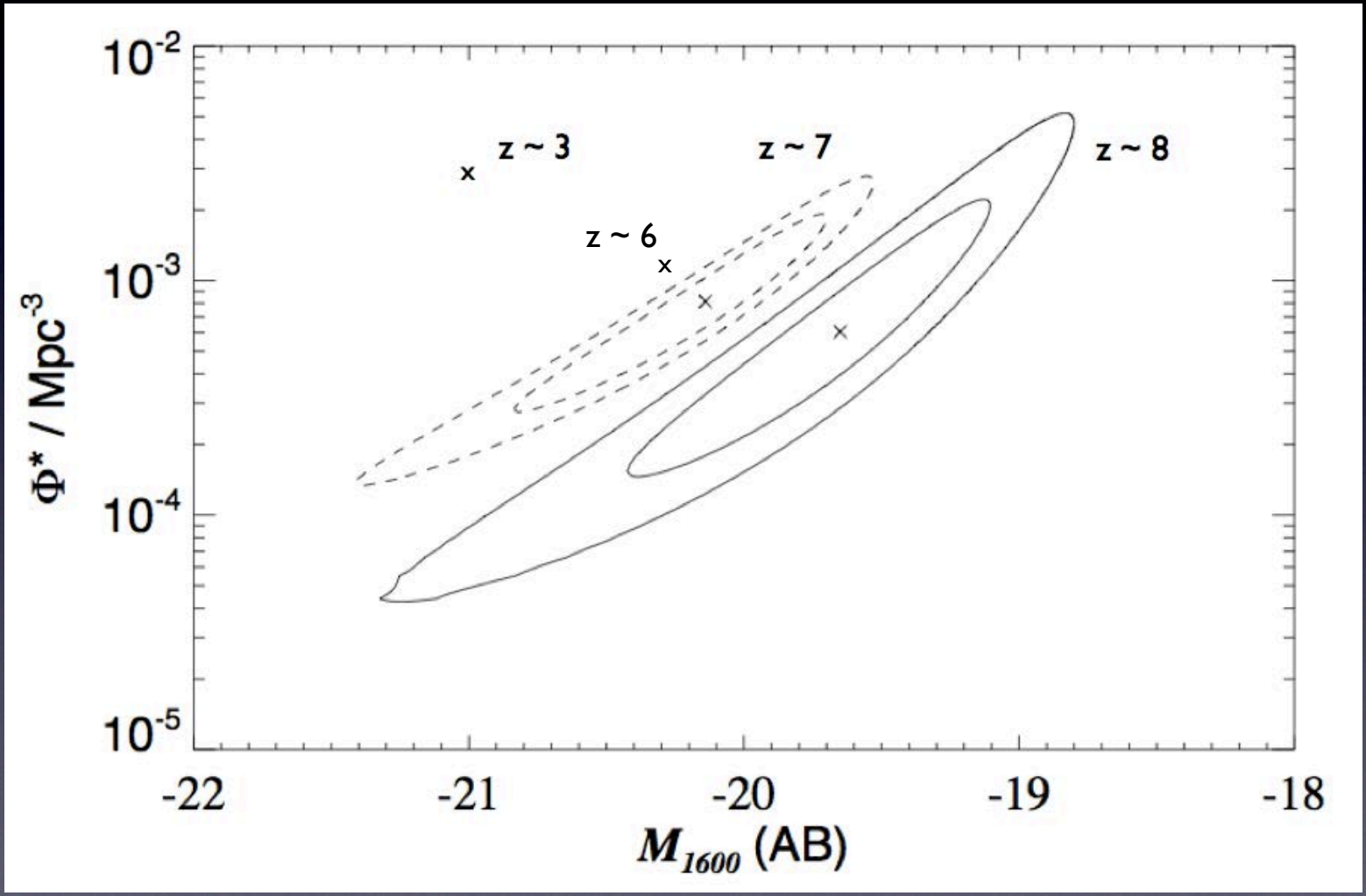
z ~ 7



z ~ 8



LF evolution



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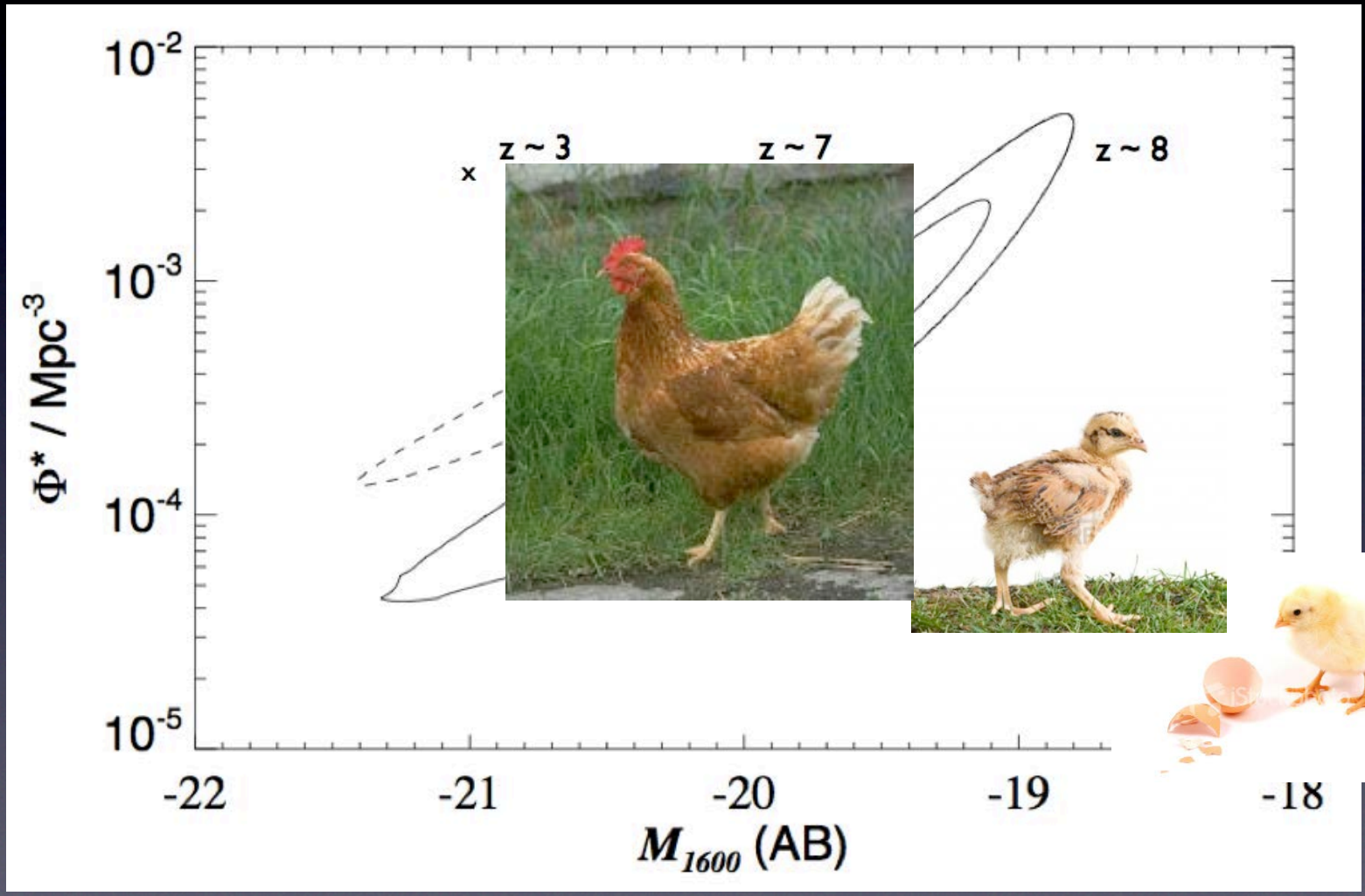
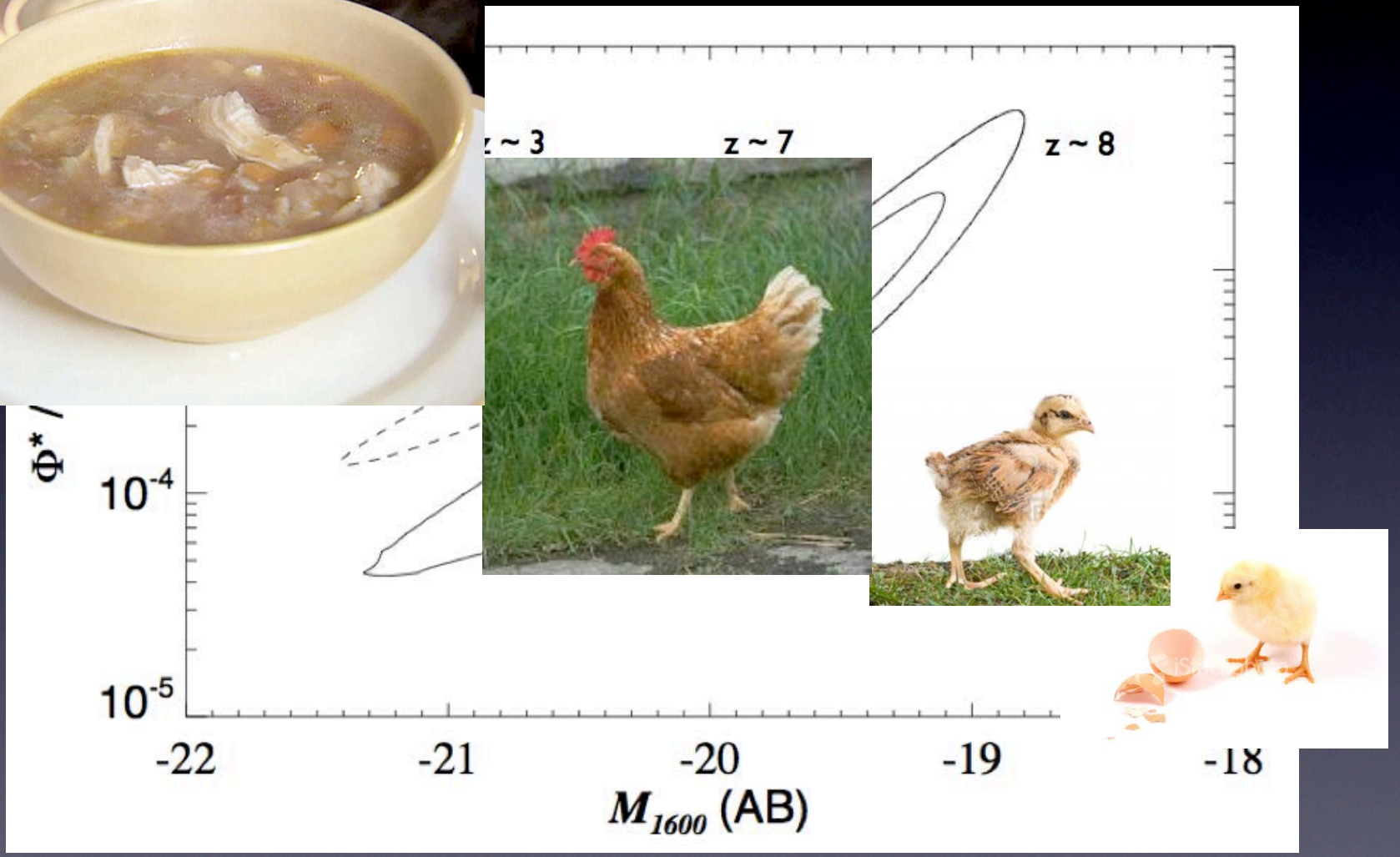
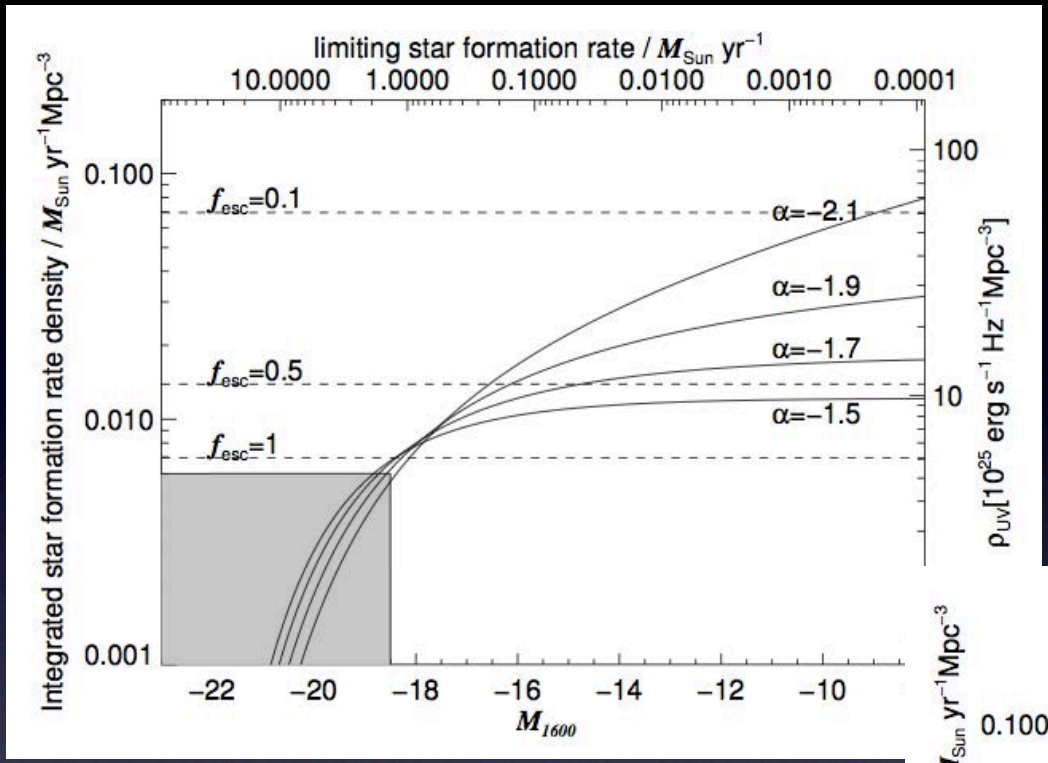
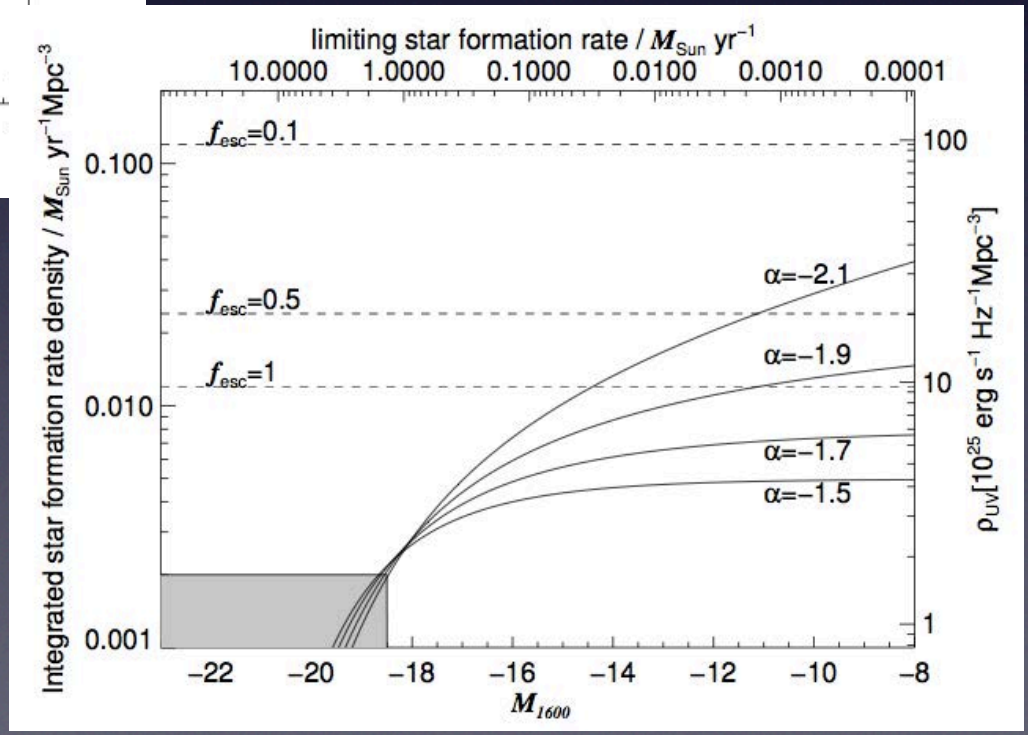


LF evolution



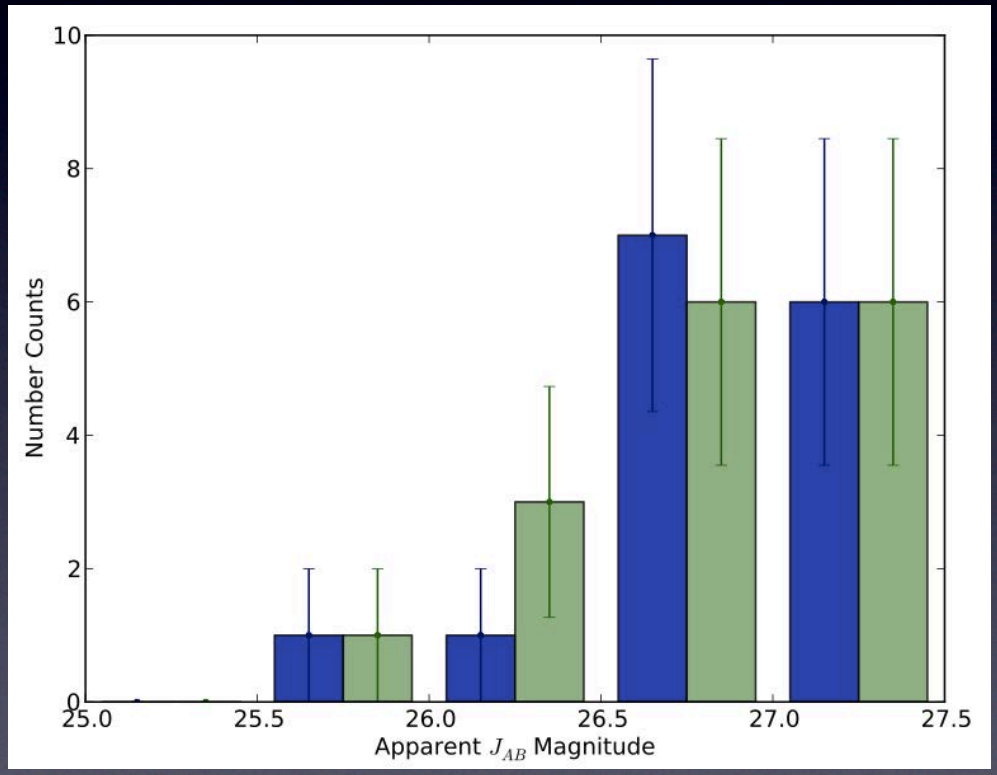
Implications for reionization



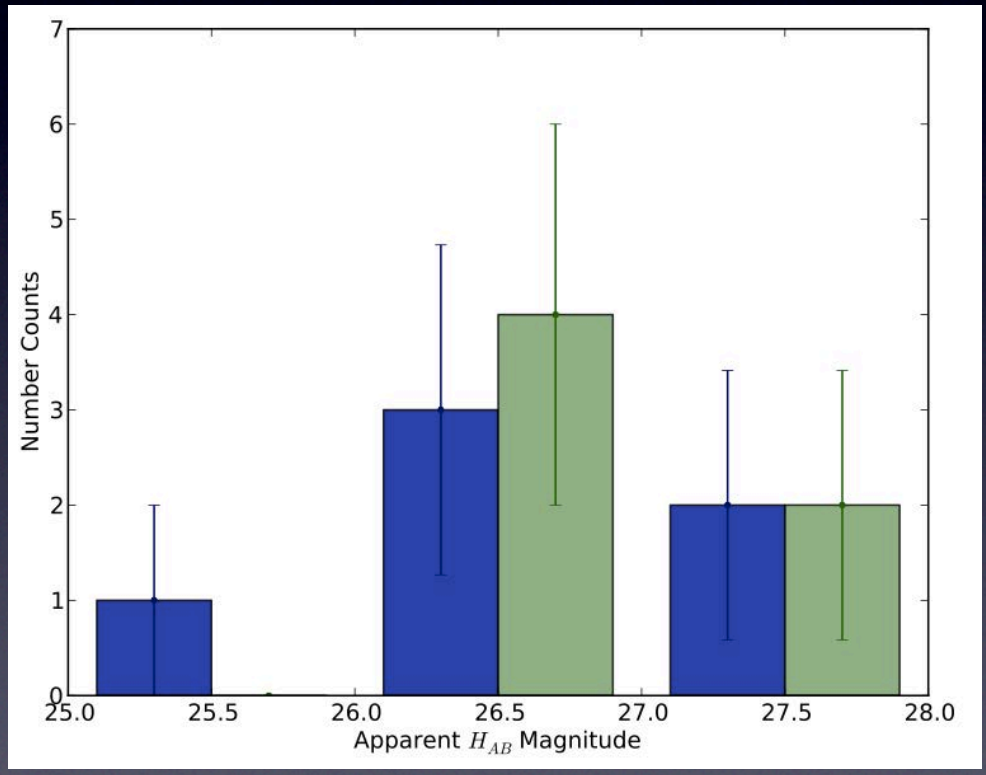


Cosmic variance

z-drops



Y-drops



GOODS-North GOODS-South

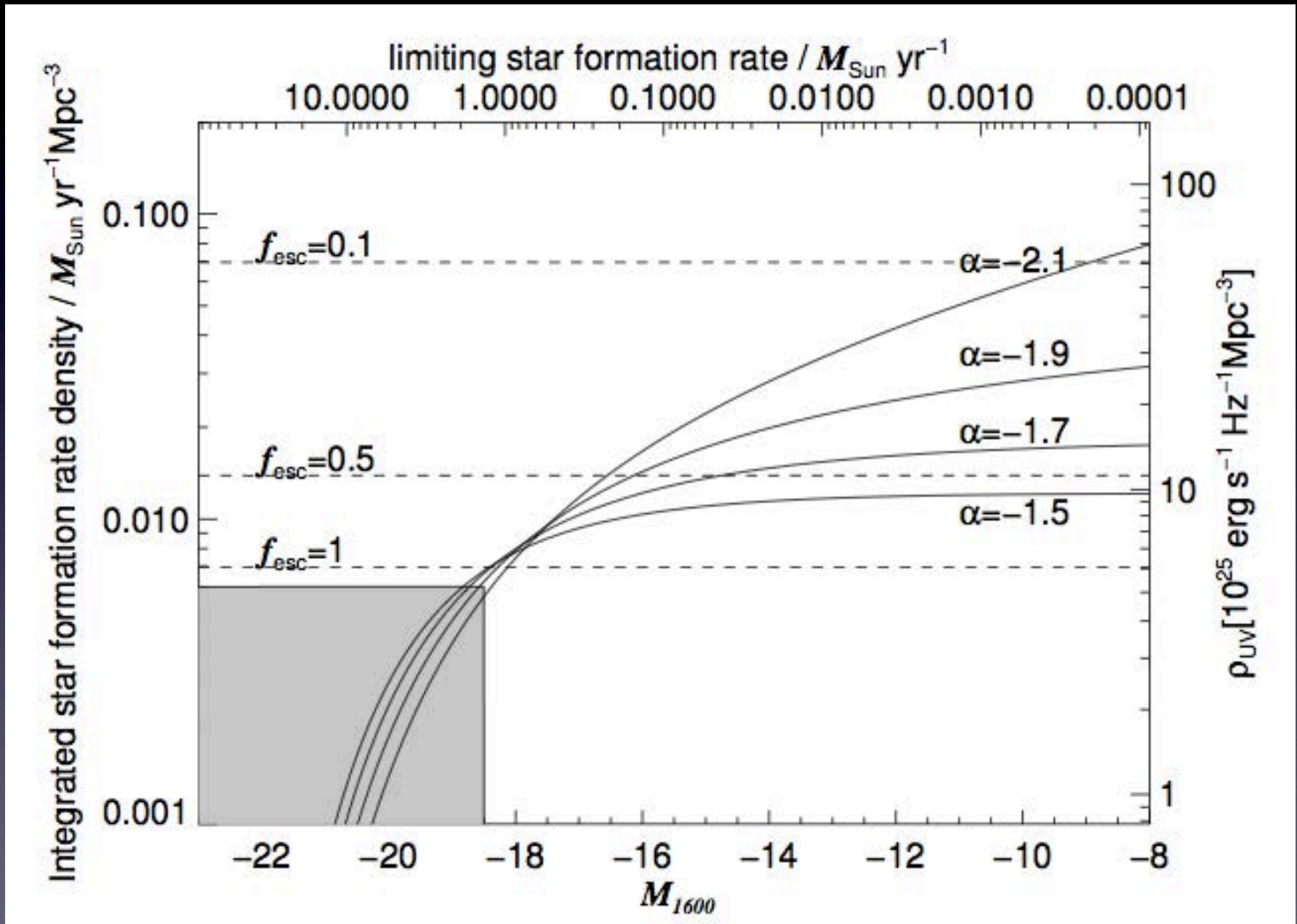
Elbert et al., MNRAS submitted

Summary

LF evolution:
- clear from $z = 3$
- evidence for evolution from $z \sim 7$ to $z \sim 8$
- both in φ^* and M^*
- not enough data to constrain the faint end slope

Reionization:
- candidates we detect have insufficient flux for reionization, but a steep faint end slope, low metallicity population and a top-heavy IMF could all be factors that might provide enough ionizing photons.

Cosmic variance:
- within the expected Poisson noise
- compatible with theoretical predictions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10.0000
1.0000
0.1000
0.0100
0.0010
0.0001
Integrated star formation rate density / M_{Sun} yr^{-1}Mpc^{-3}
0.100
0.010
0.001
f_{esc}=0.1
f_{esc}=0.5
f_{esc}=1
α=−2.1
α=−1.9
α=−1.7
α=−1.5
100
10
1
ρ_{UV}[10^{25} erg s^{-1} Hz^{-1}Mpc^{-3}]
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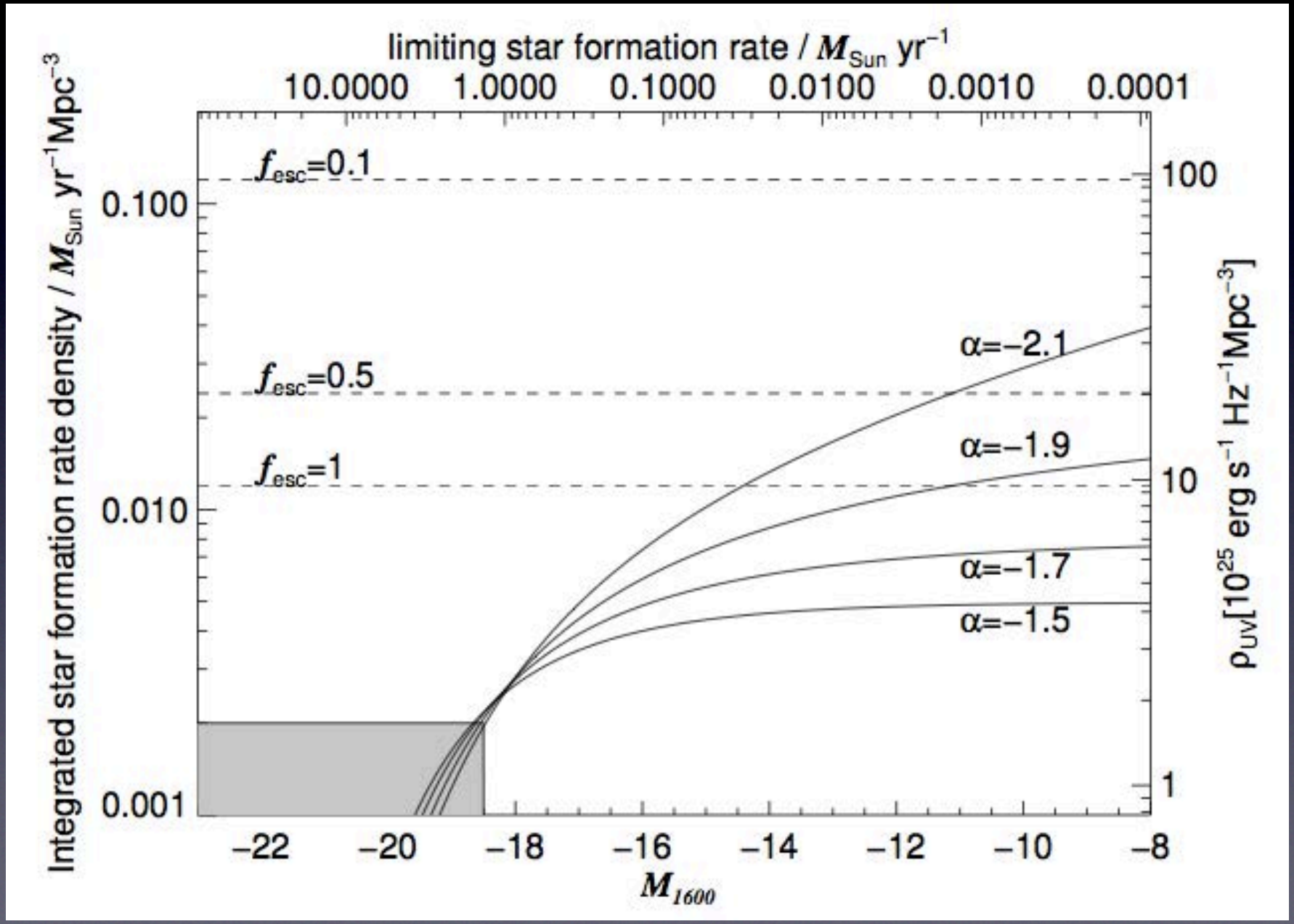
−20
−18
−16
−14
−12
−10
−8
M_{1600}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