Evolution of Diffuse Lya Halos Around Star-forming Galaxies at z=2-7

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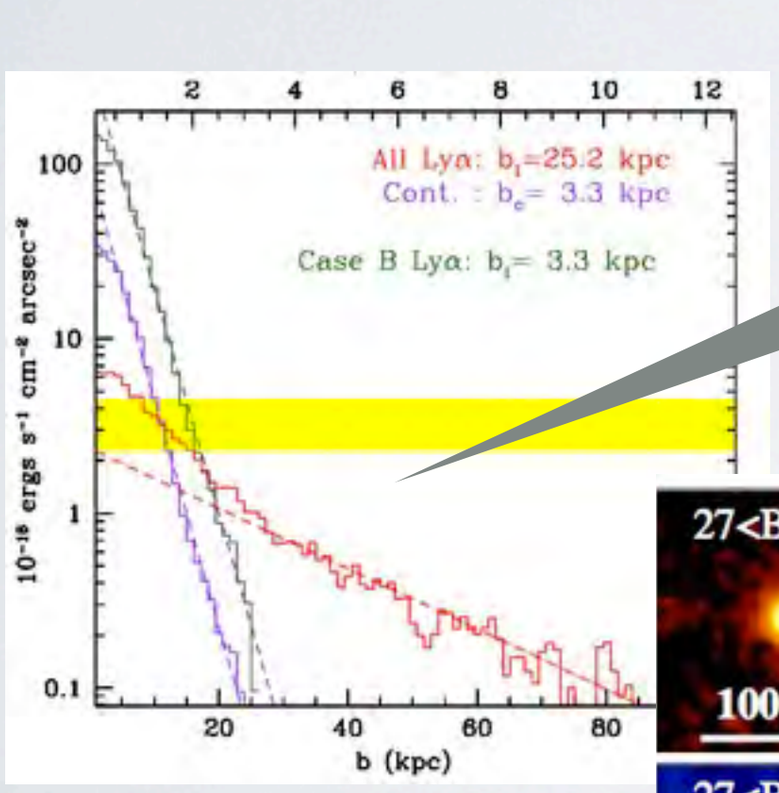
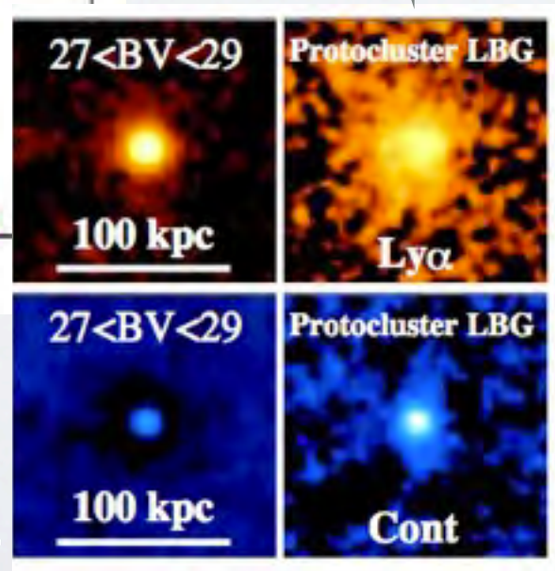
BACKGROUND - HALO WORLD! -

- Diffuse Lya halos are generic property of high-z galaxies (e.g. Rauch+08, Steidel+2011, Matsuda+2012, Feldmeier+2013)
- Theoretical model also predicts Lya halo (e.g. Zheng+11, Dijkstra & Kramer 12)

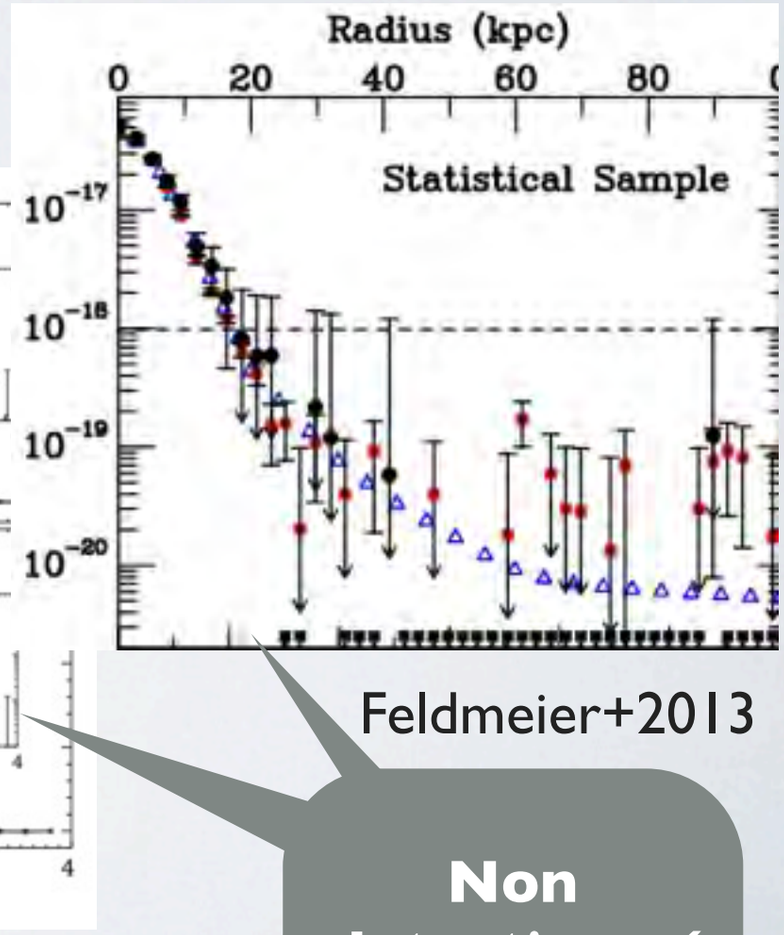


Steidel+2011

Halo :)



Matsuda+2012



Jiang+2013

Feldmeier+2013

Non detection x(

UNIQUENESS OF OUR WORKS

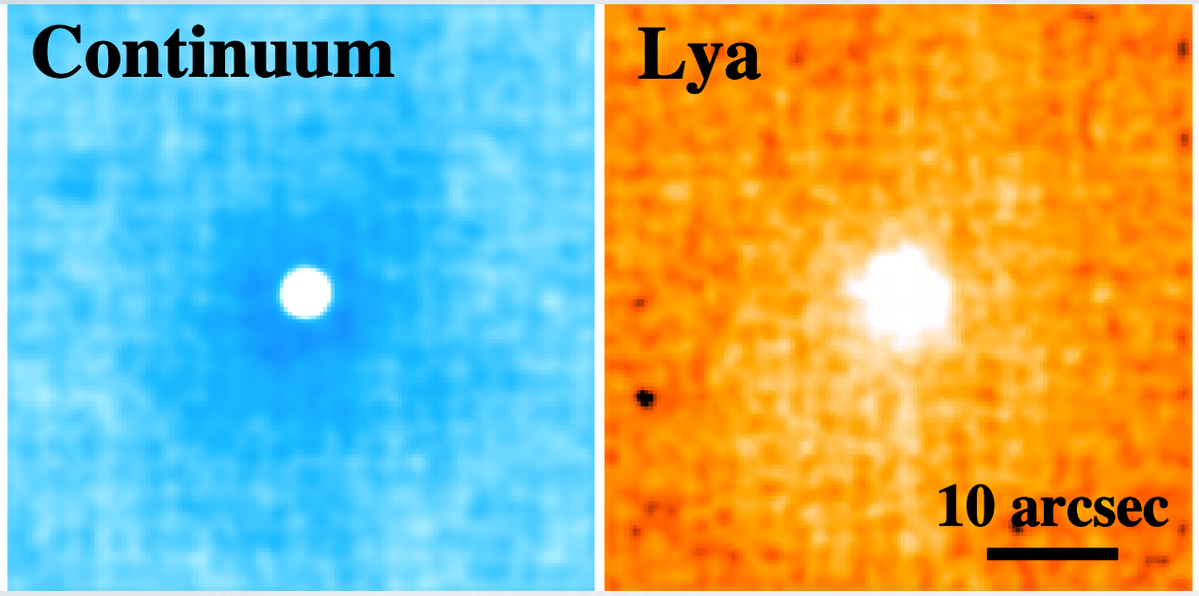
- Unique of our data!
  - large sample found by deep image of Subaru observations (Ouchi +2008, 2010, Nakajima et al. 2012)
  - wide redshifts range (z=2-7)

to find an existence of Lya halo
to track the size evolution

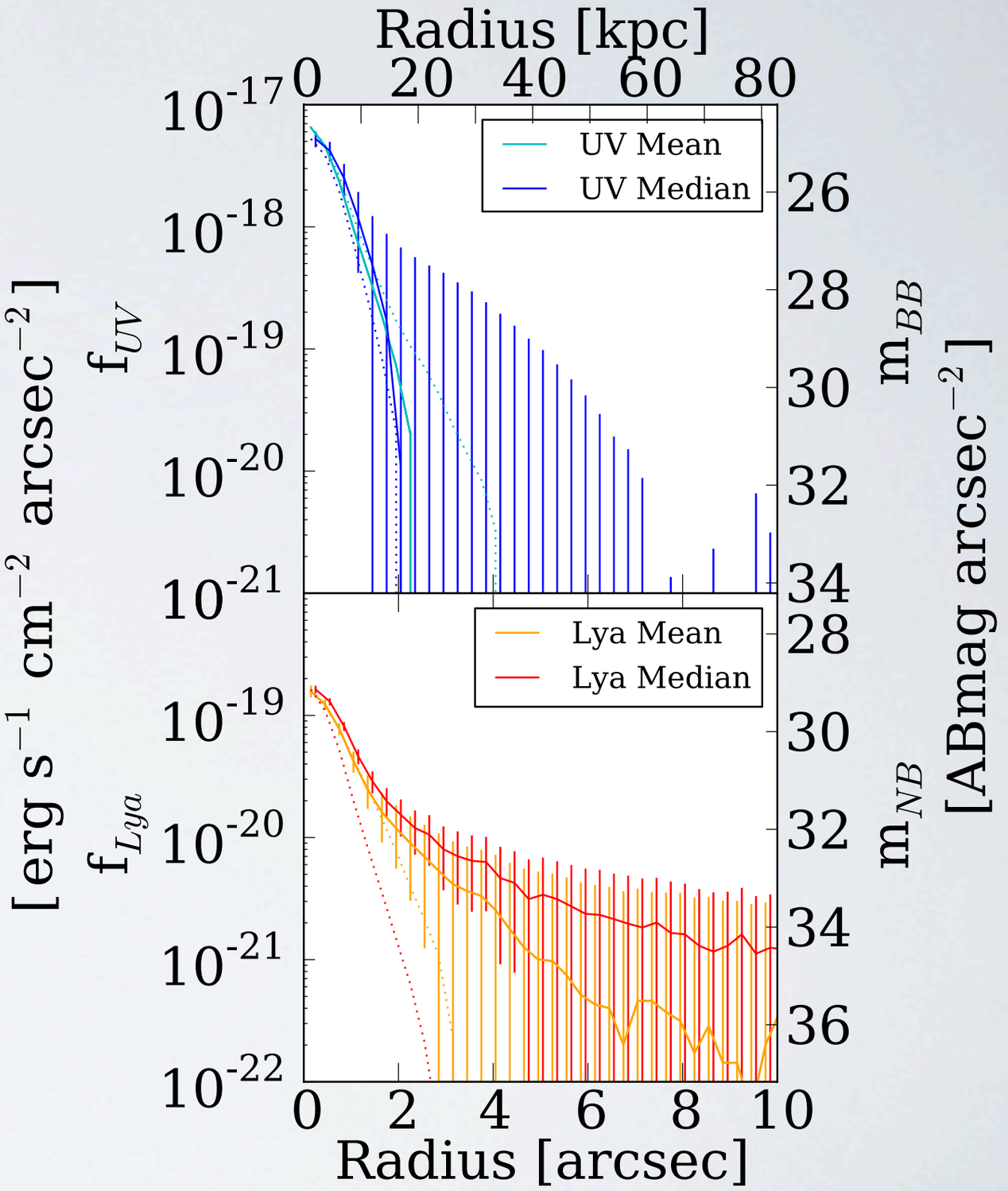
sub \ z	2.2	3.1	3.7	5.7	6.6
other works	92 @z~2.7 (Steidel+2011)	22 (Hayashino+2004)		43 (Jiang+2013)	40 (Jiang+2013)
	187 (Feldmeier+2013)	241, 179 (Feldmeier+2013)			
		> 2000 (Matsuda+2012)			
This work!	3665	316	100	397	119

$$z = 2.2$$

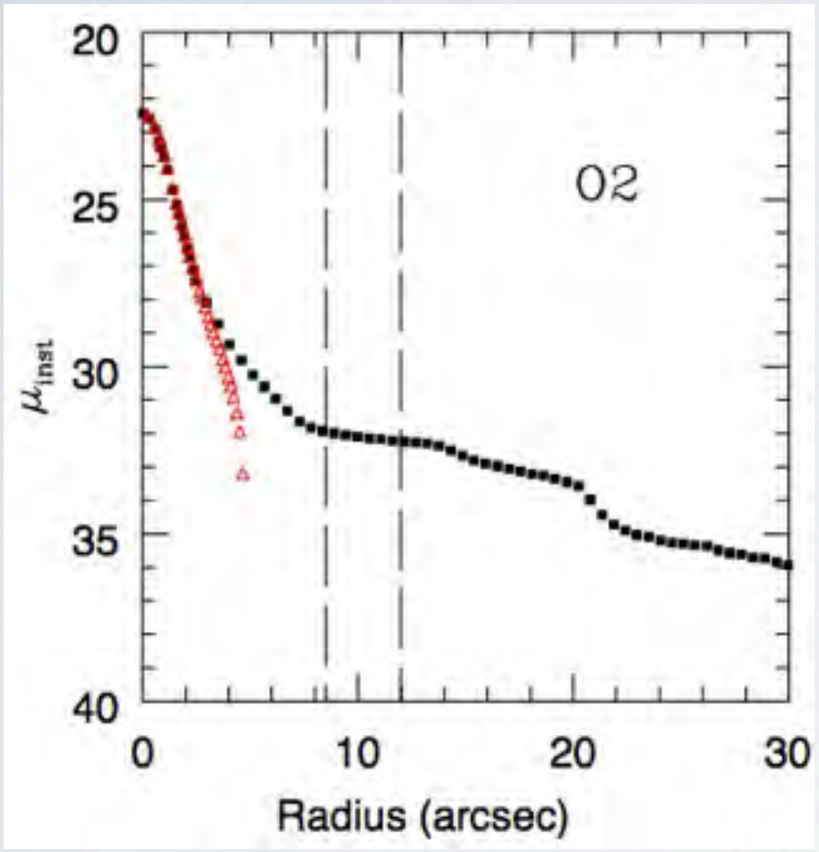
RESULTS OF Z = 2.2



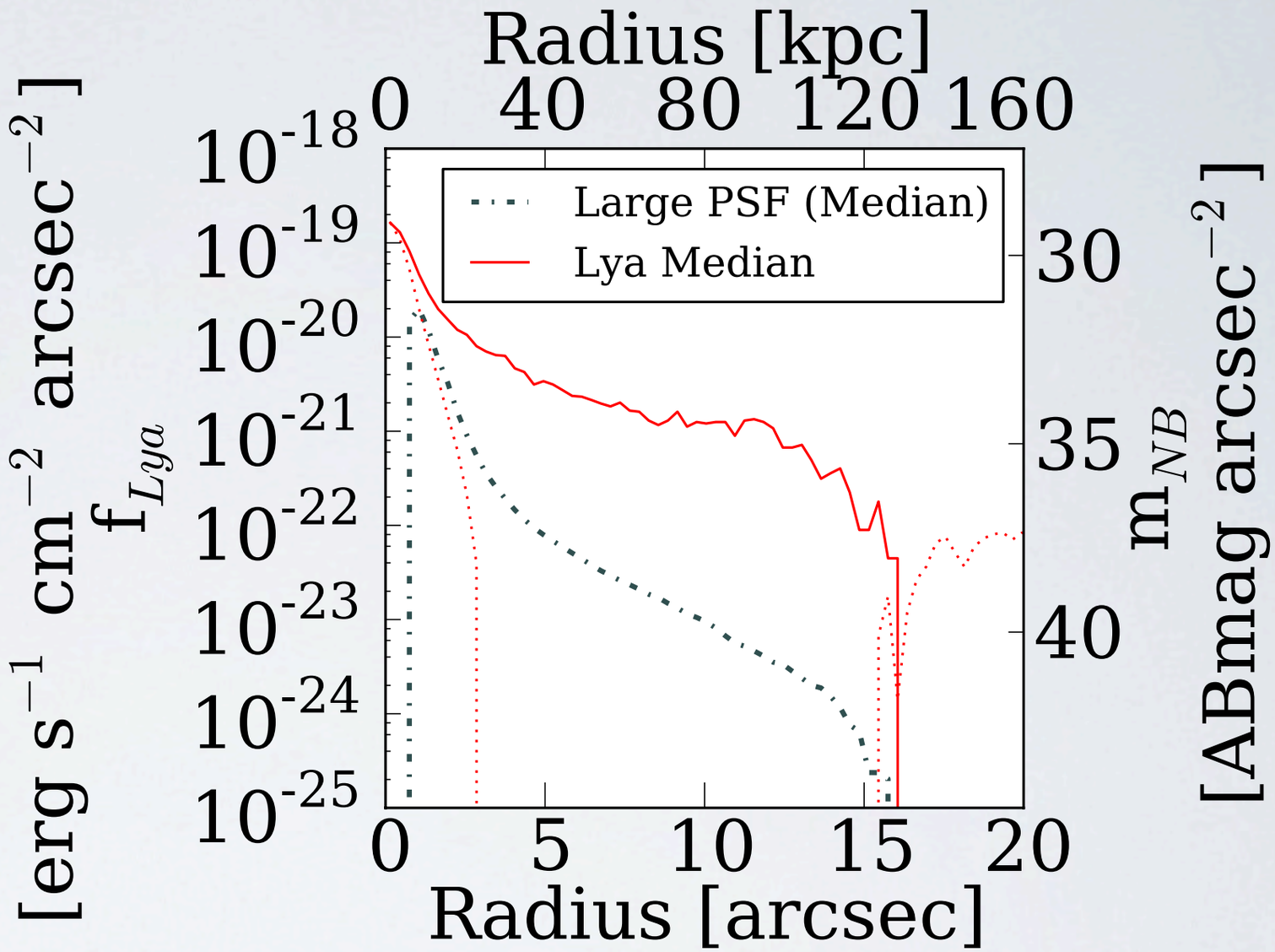
- Stacked LAEs with mean & median
- Stacked Lya emission is extended
  - than PSF
  - than continuum emission



FAKE HALO

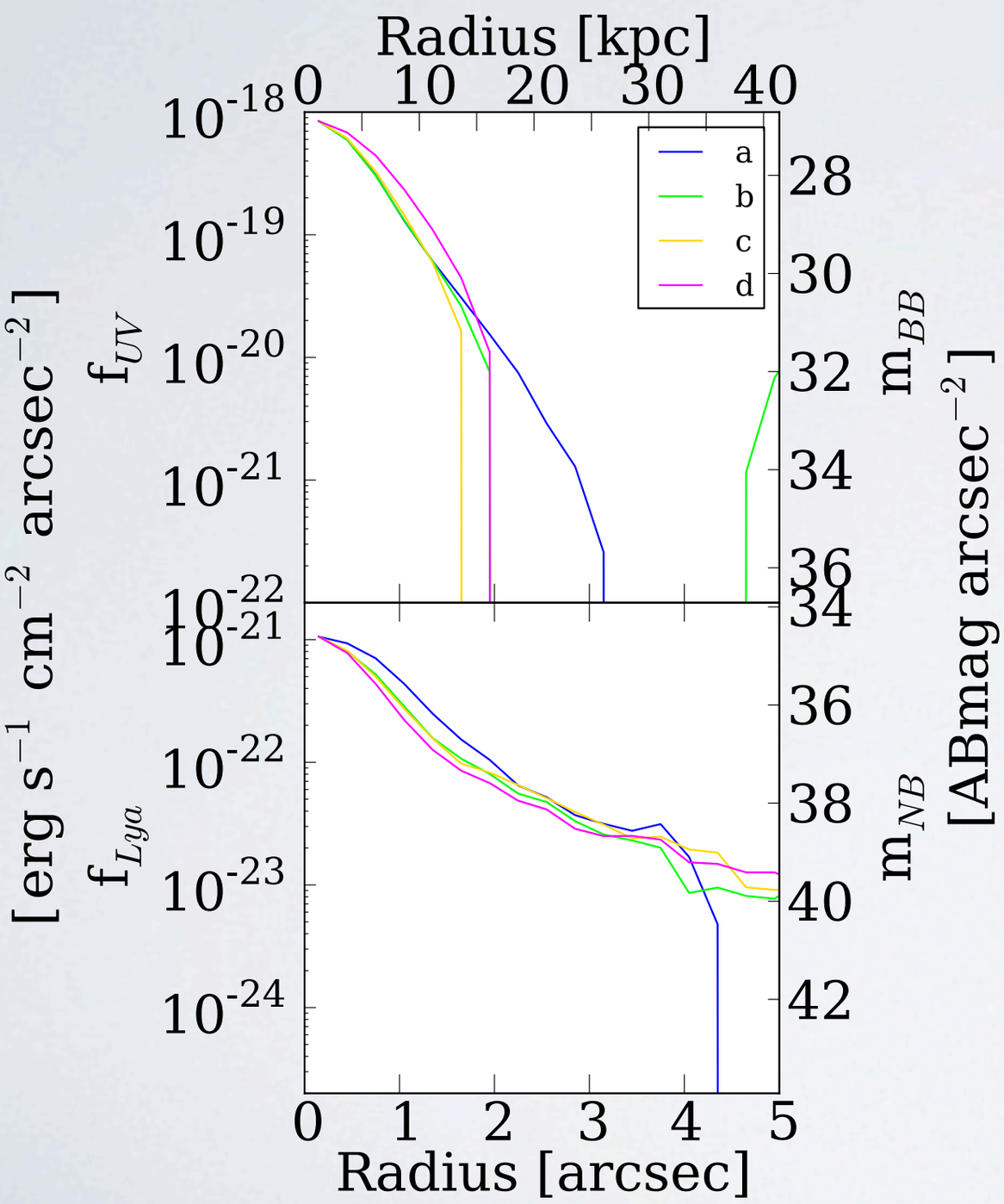


Feldmeier+2013

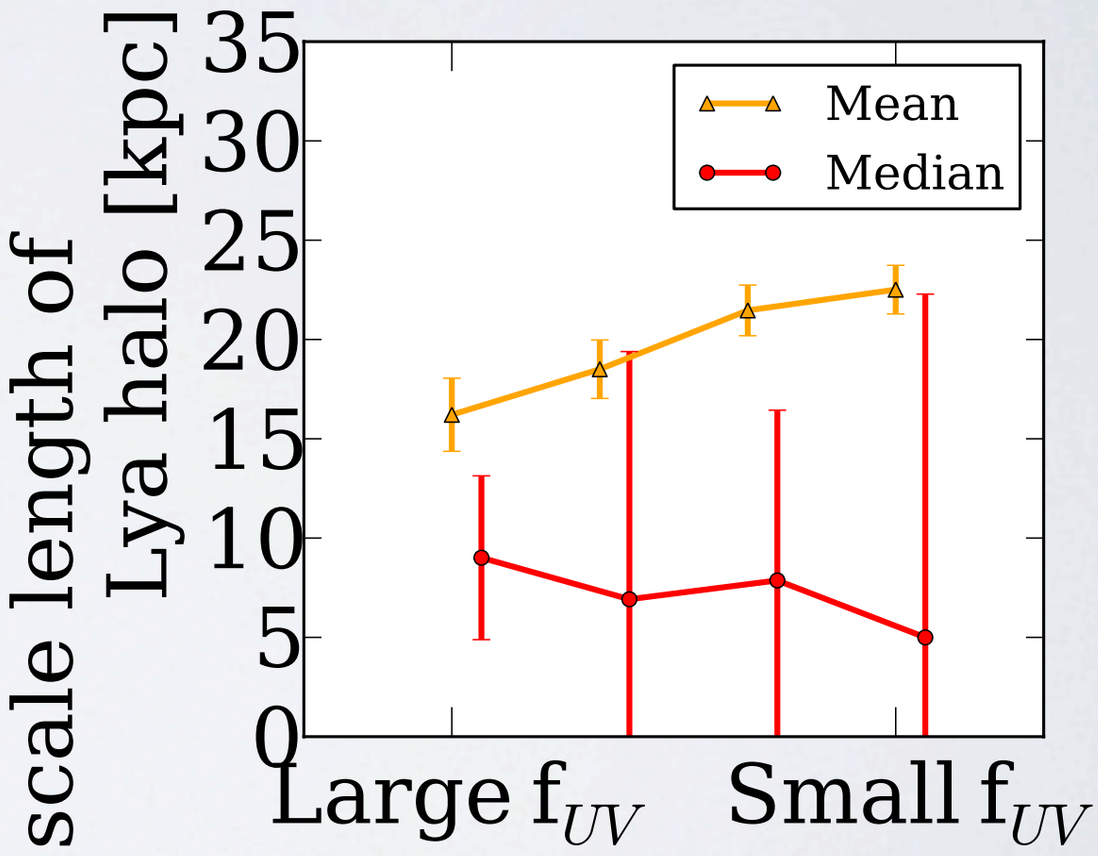


- Large-scale PSF can cause fake Lya halo (e.g. Feldmeier+2013)
- Lya halos which we found seem to be real (spread from r~2")!

DEPENDENCE ON PROPERTIES

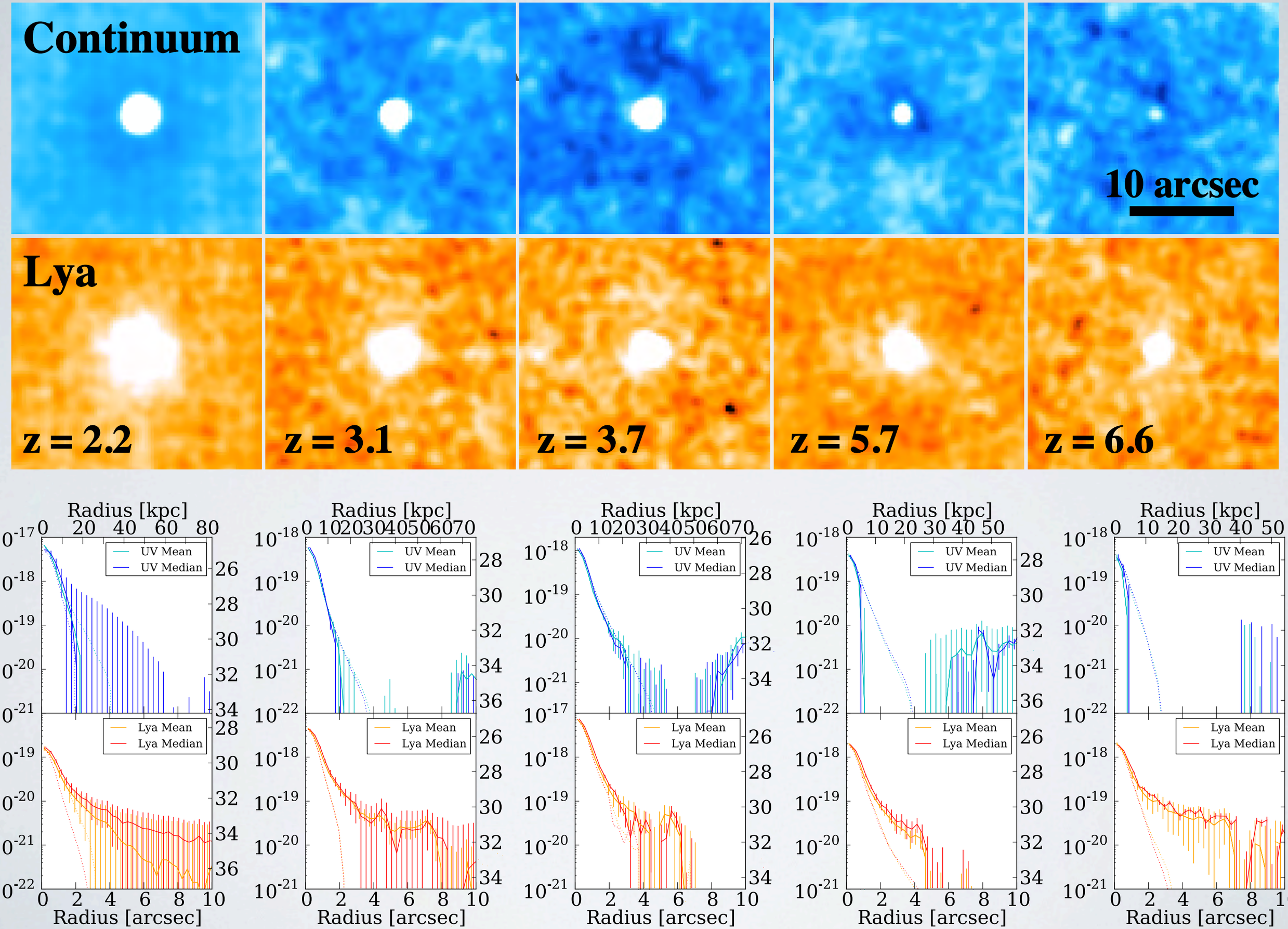


- Estimate scale length of diffuse Lya halo assuming exponential profile

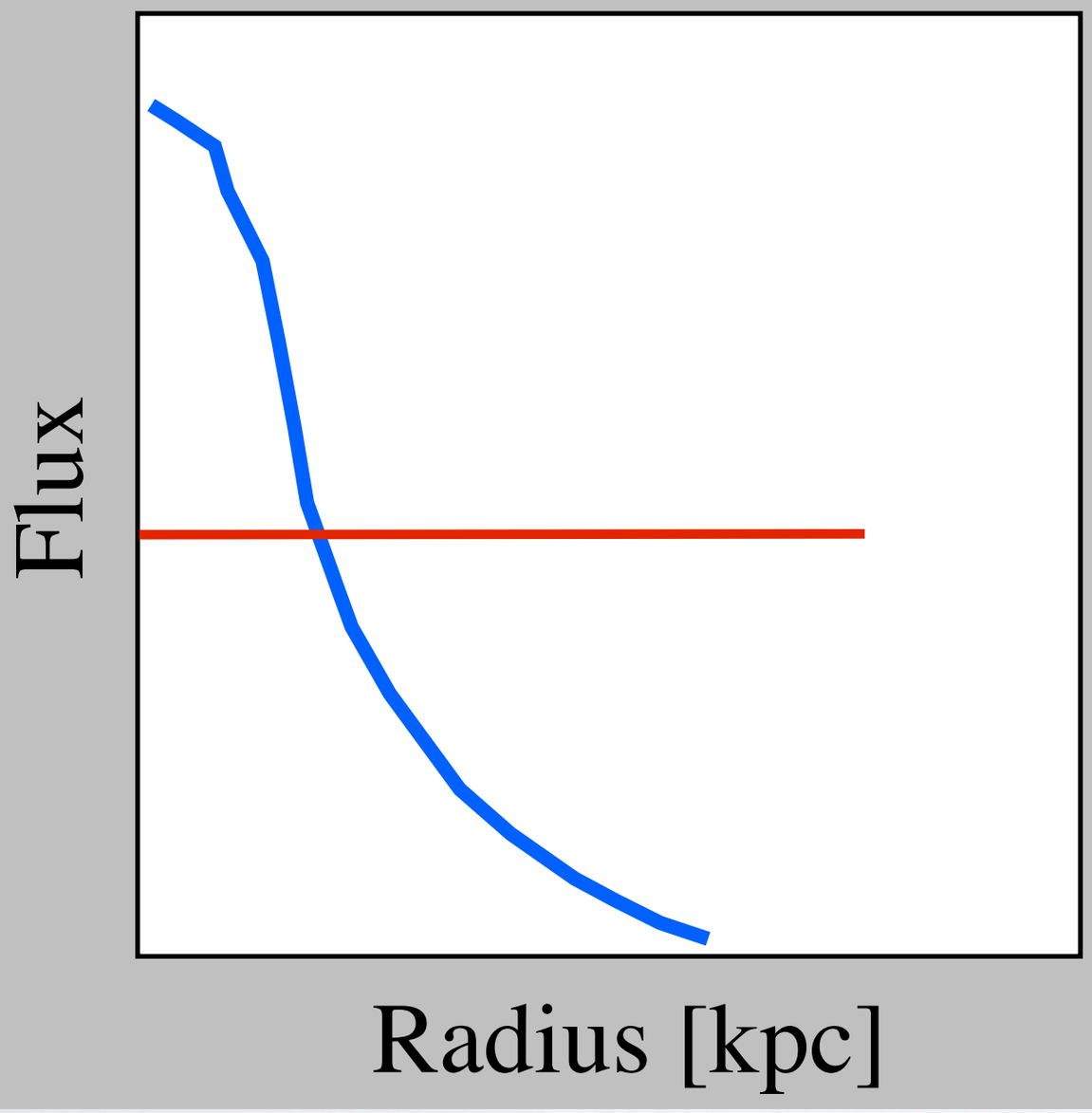


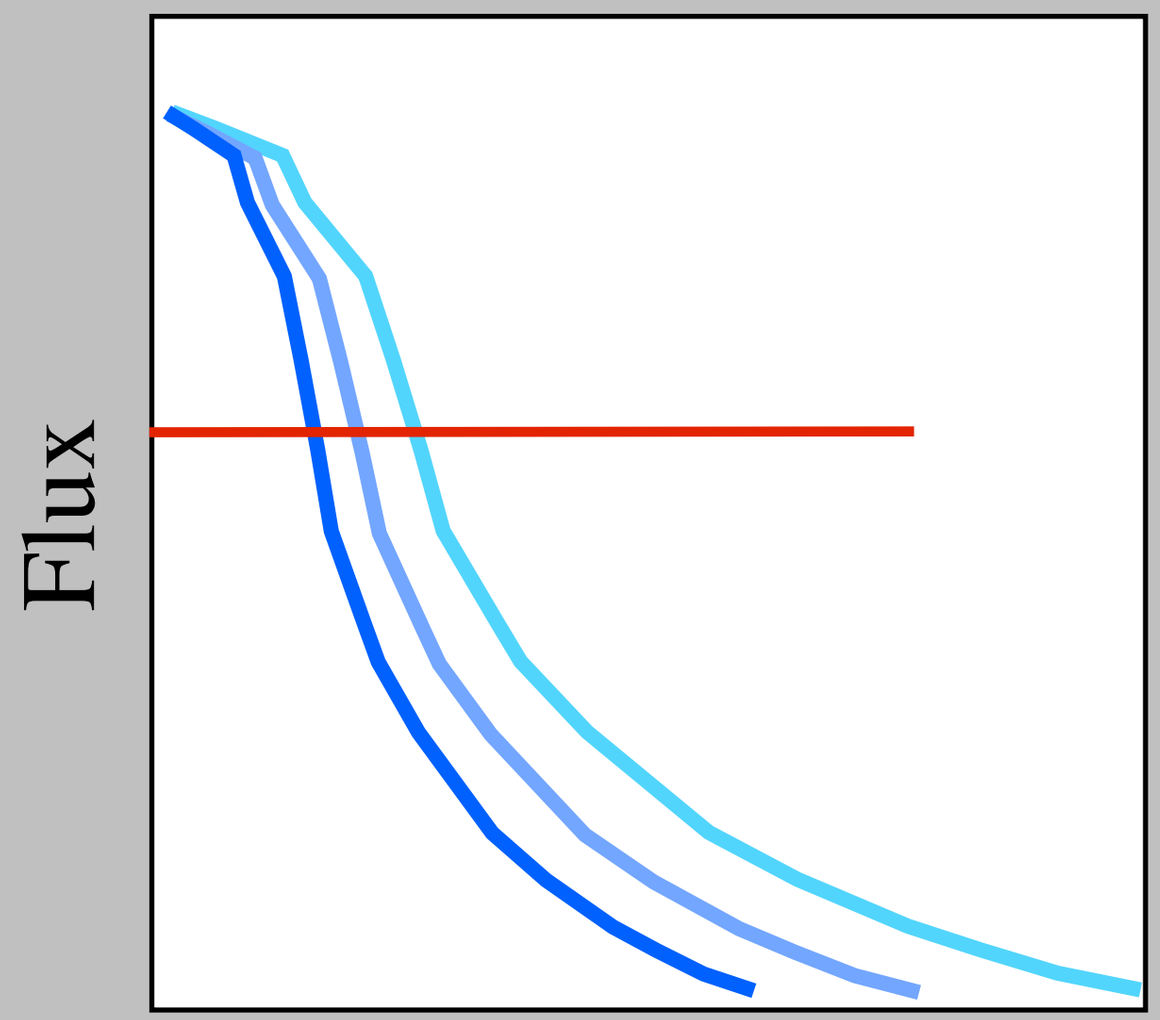
no dependence

OVER REDSHIFTS


Continuum
10 arcsec
Lya
z = 2.2
z = 3.1
z = 3.7
z = 5.7
z = 6.6
Radius [kpc]
UV Mean
UV Median
Lya Mean
Lya Median
Radius [arcsec]

SIZE EVOLUTION





- Estimate scale length of diffuse Lya halo assuming exponential profile

SIZE EVOLUTION

PRELIMINARY!

- Estimate scale length of diffuse Lya halo assuming exponential profile

- Lya halo becomes smaller to high-redshifts until z = 5.7

SUMMARY

- We stacked more than hundreds of LAEs to find diffuse Lya halos
- **We found diffuse Lya halos from z = 2.2 to 6.6 around LAEs based on large sample found by Subaru**
  - Halo sizes independent of f_{UV}
  - Lya halo becomes smaller at higher redshift until z = 5.7
- Large LAE samples obtained by future HSC survey will enable us to track the size evolution over redshifts