Star formation density from a sample of ~200 Lyα emitters with 2<z<6.62

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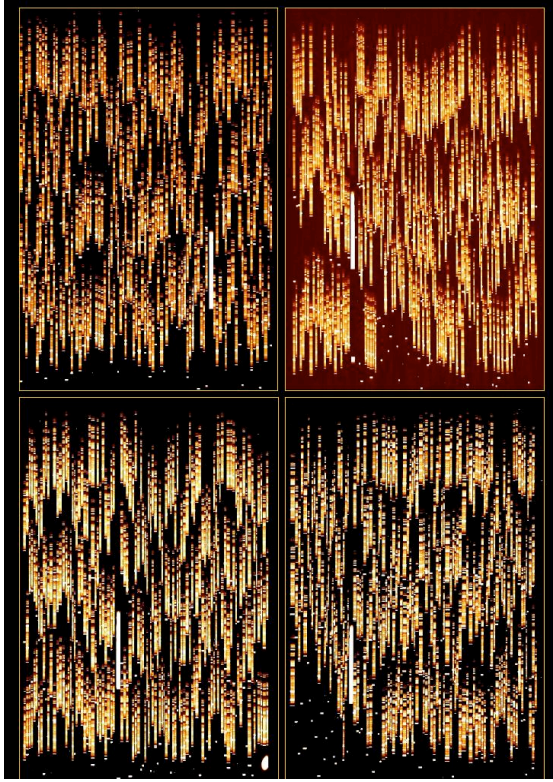
Serendipitous discovery of LAE in the slits of deep VVDS spectroscopic observations

VVDS: magnitude limited surveys



Sample	Selection	redshift	# galaxies Spectro-z	# galaxies z>1.4
Wide	$I_{AB} \leq 22.5$	0<z<1.5	35000	-
Deep	$I_{AB} \leq 24$	0<z<5	12000	970
Ultra-Deep	$I_{AB} \leq 24.75$	0<z<5	863	409
Lyα	Flux	2<z<6.5	204	204

A total of ~**1580 galaxies with 1.4<z<6.6** and spectroscopic redshifts

Check http://cencosnew.oamp.fr/ for public data

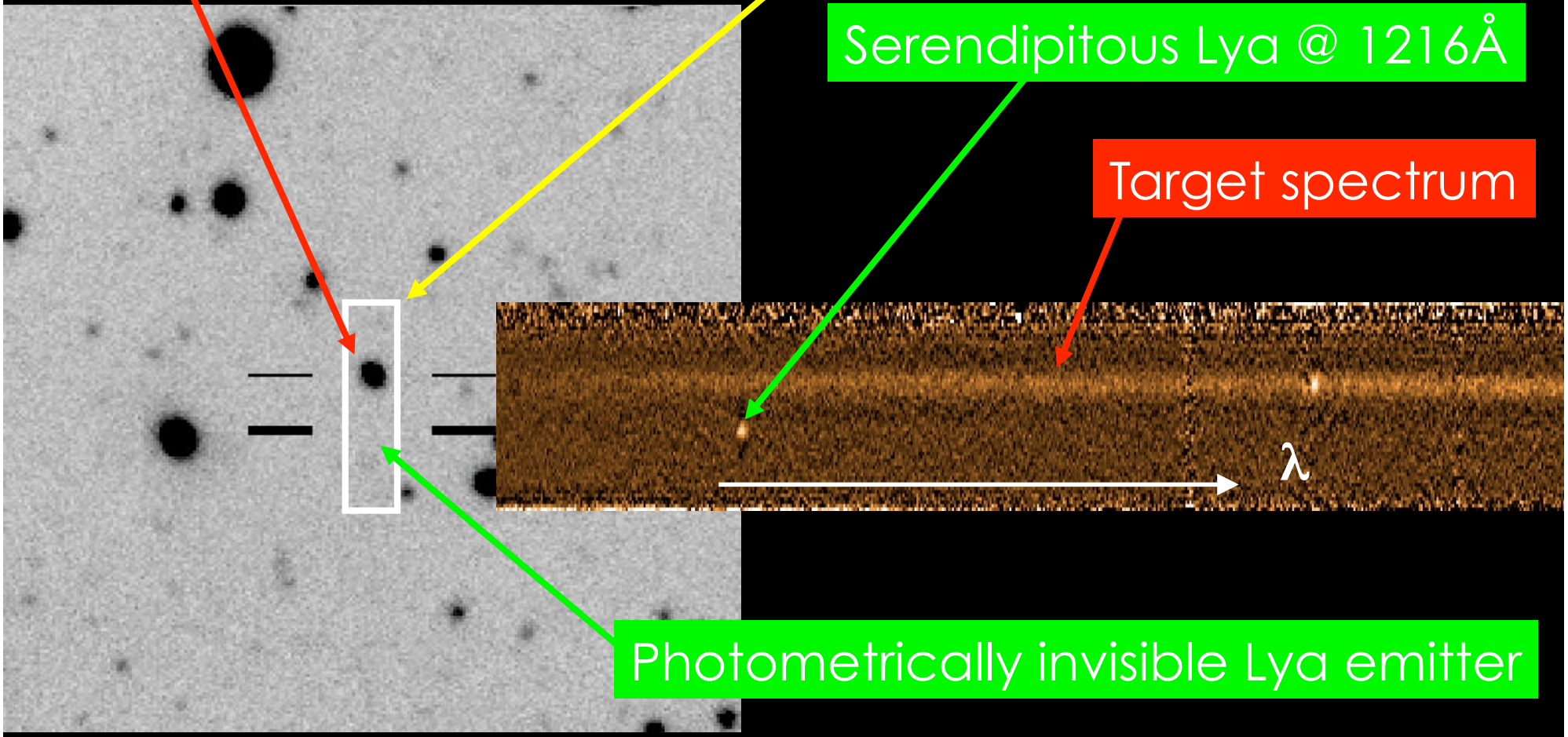
New Ultra-Deep sample

- Magnitude selected $I_{AB} \leq 24.75$
- 863 galaxies targeted with VLT-VIMOS
- 18h integrations in blue + 18h integrations in red with VIMOS-VLT
- 86% complete

AND

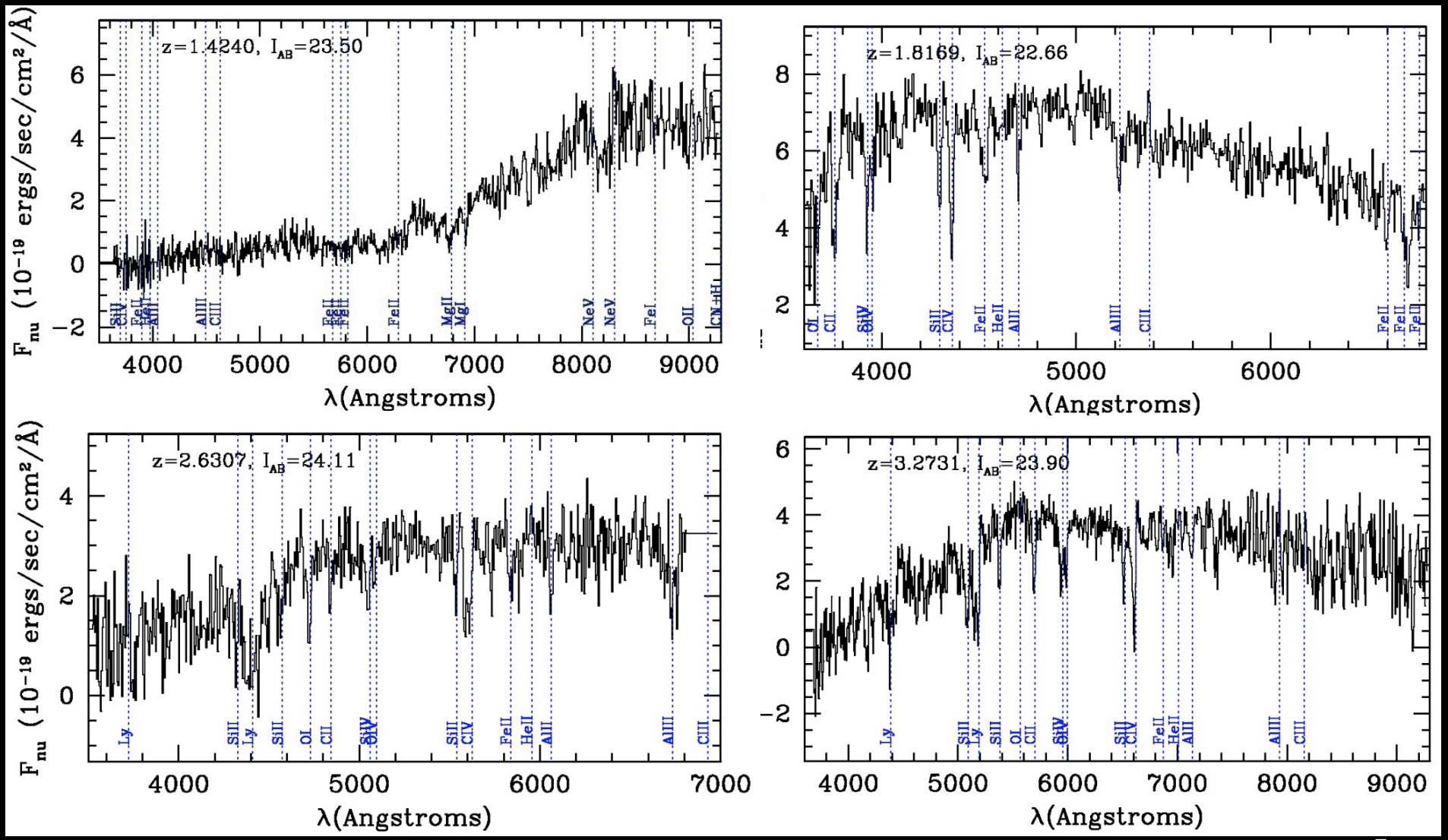
- Serendipitous objects appearing by chance in the slits

What are we looking for?

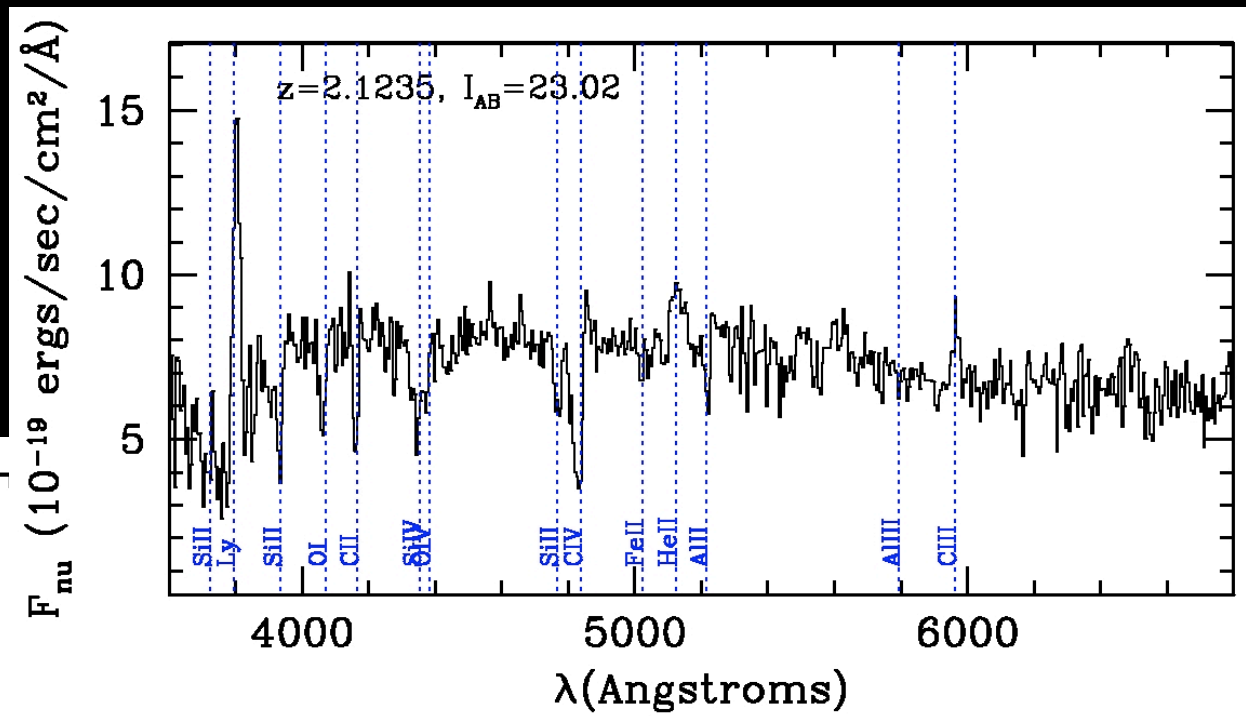


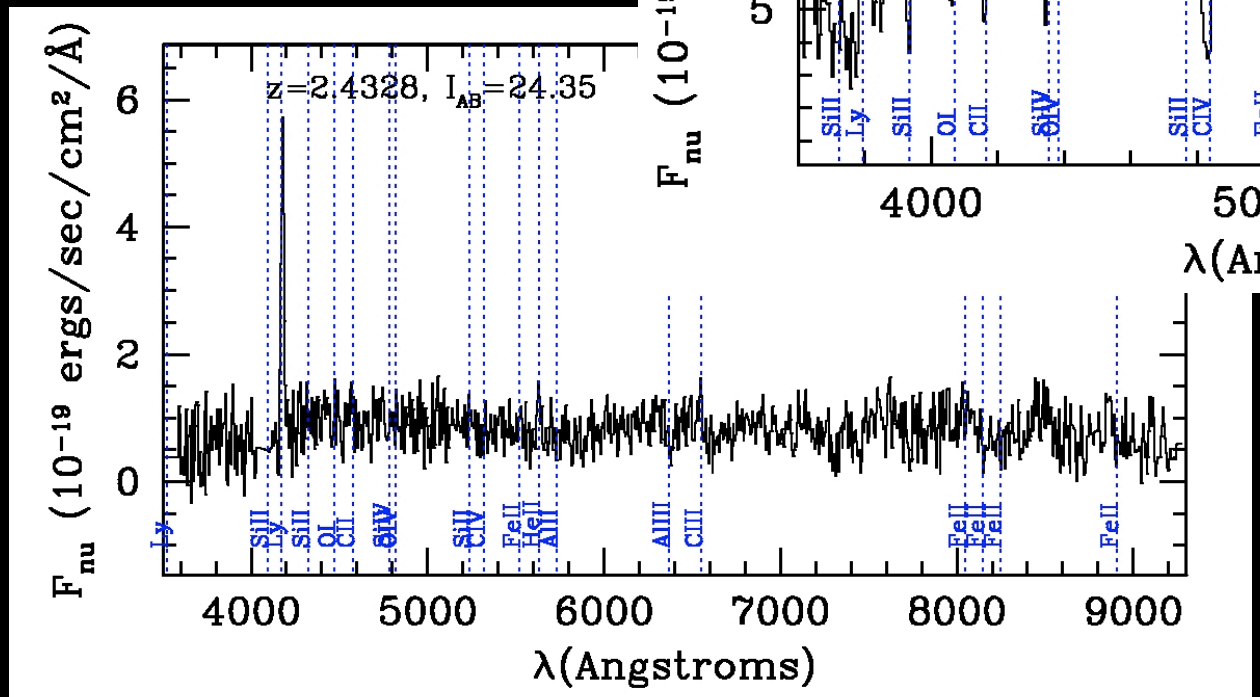
- 1200 slits, covering 3.3 arcmin^2, 3500-9500Å, exp. times 65000s
- 8000 slits, covering 22.2 arcmin^2, 5500-9500Å, exp. times 16000s

Absorption line galaxies

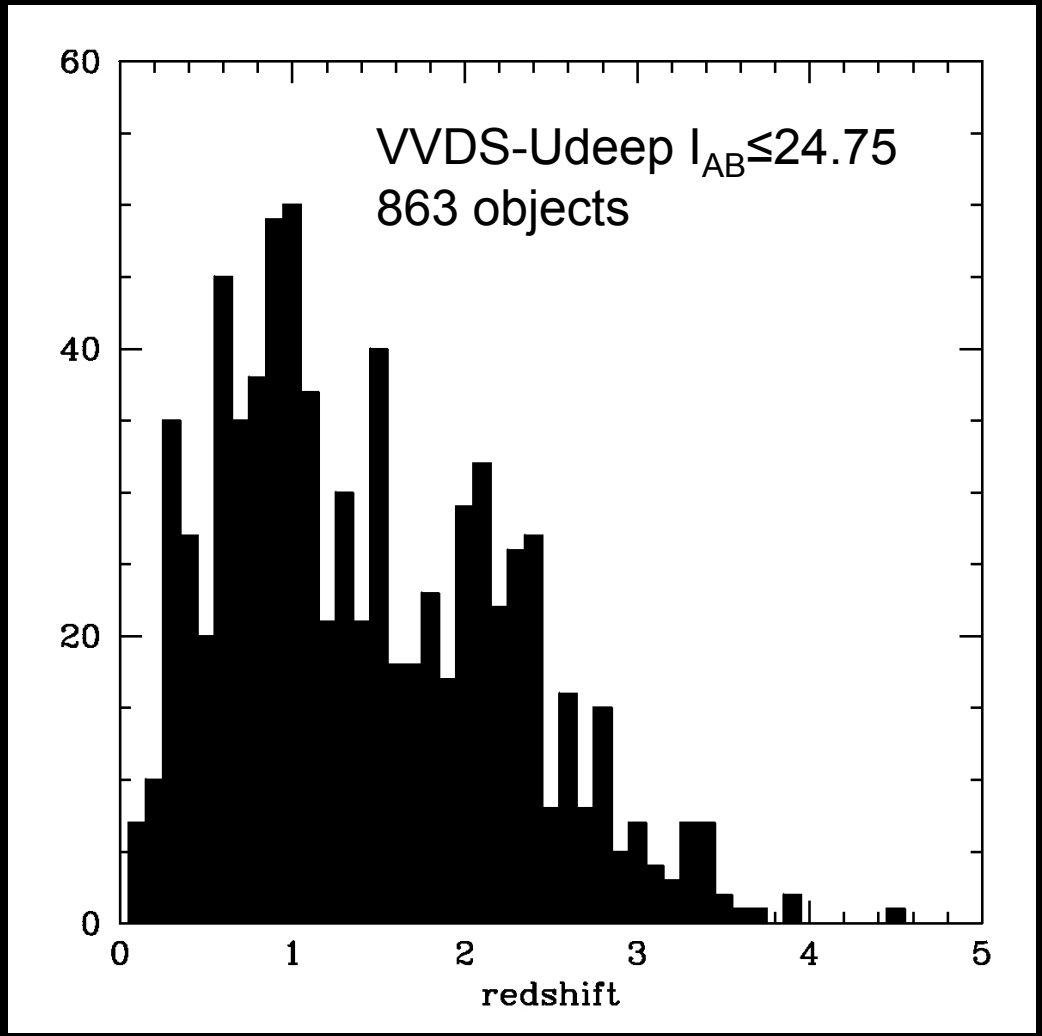


Emission line galaxies





Redshift distribution $I_{AB} \leq 24.75$



z_median=1.4
86% complete

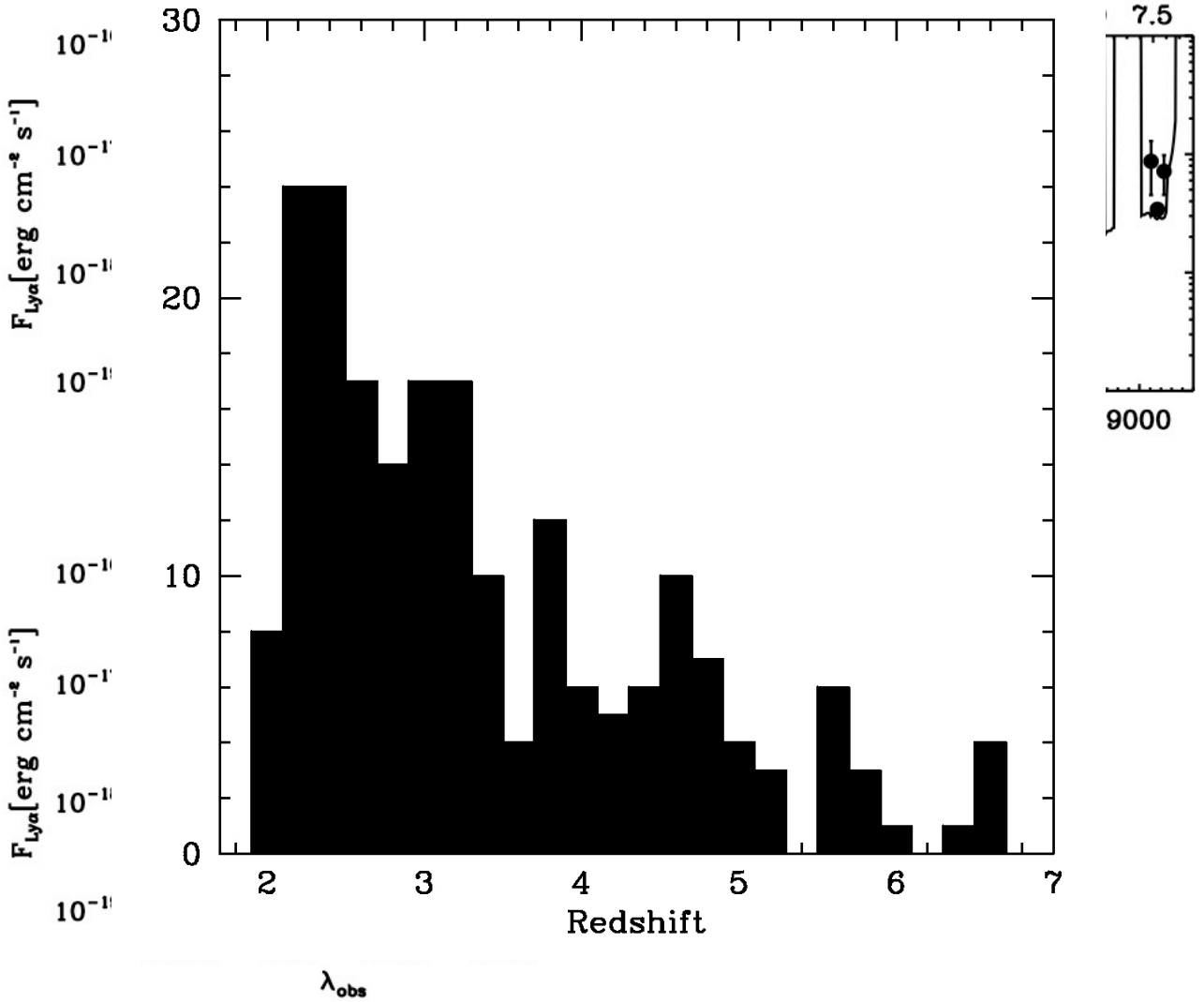
Well into redshift desert because of the 3600-9350A coverage

The VVDS Lyα emitters sample

- Main VVDS targets with $I_{AB} \leq 24.75$ and Lyα in emission
- Search for serendipitous emission in the slits of the VVDS Deep and Ultra-Deep observations
- Use the large wavelength coverage to isolate Lyα systems
- Use the exact knowledge of the sky background to estimate the flux limit F(λ)

→ A complete flux limited LAE survey

The LAE sample



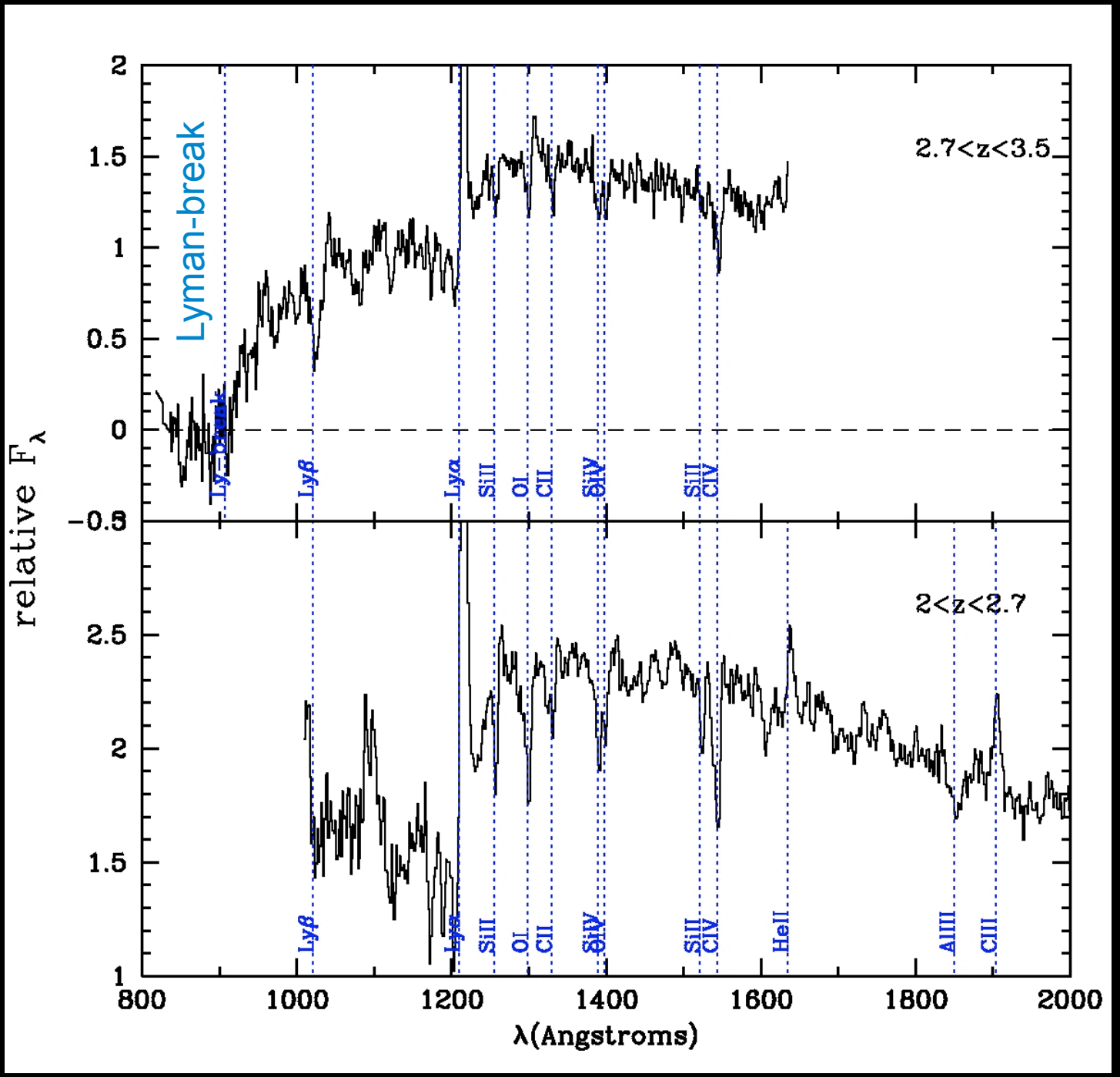
- Flux limit: ~1.5x10^{-18} erg.cm^{-2}.s^{-1}
- 86 Lyα from UDeep blue
- 25 Lyα from UDeep red
- 27 Lyα from Deep
- 66 main targets with $I_{AB} \leq 24.75$

204 emitters :

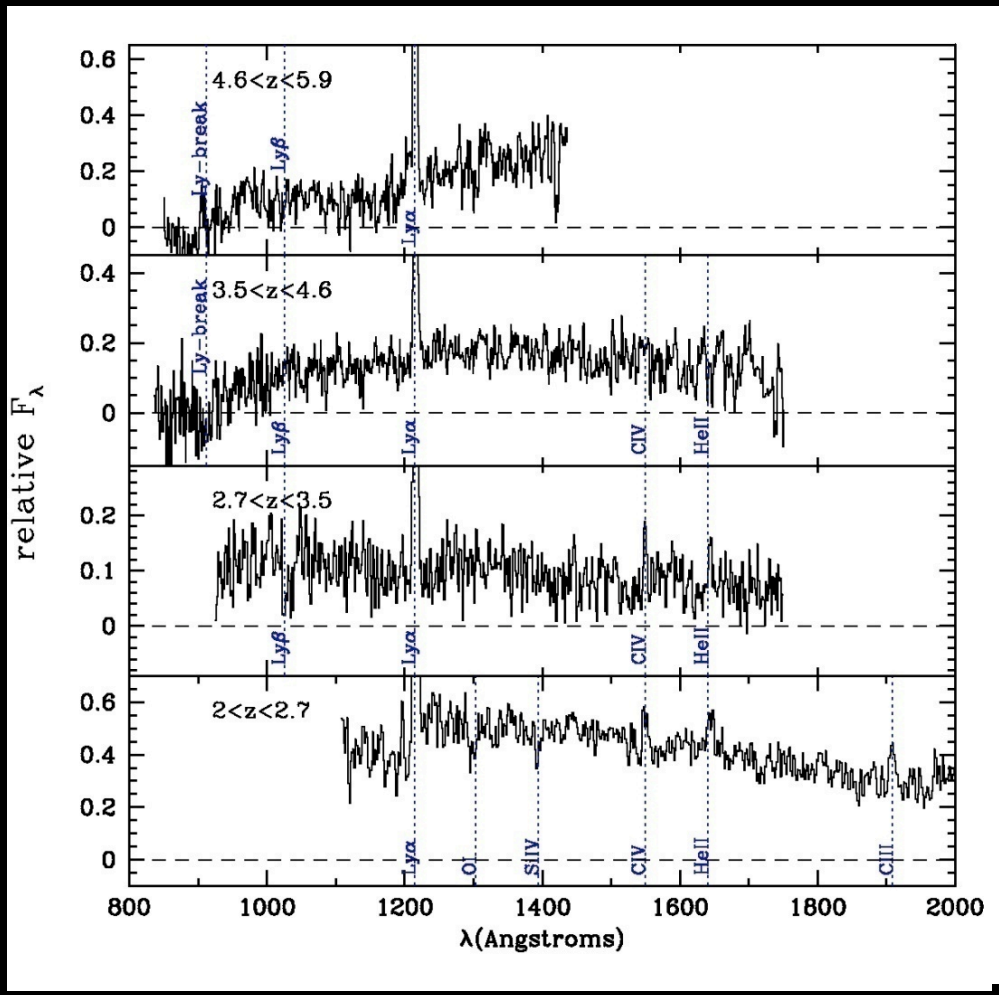
The largest LAE sample with confirmed spectroscopic z

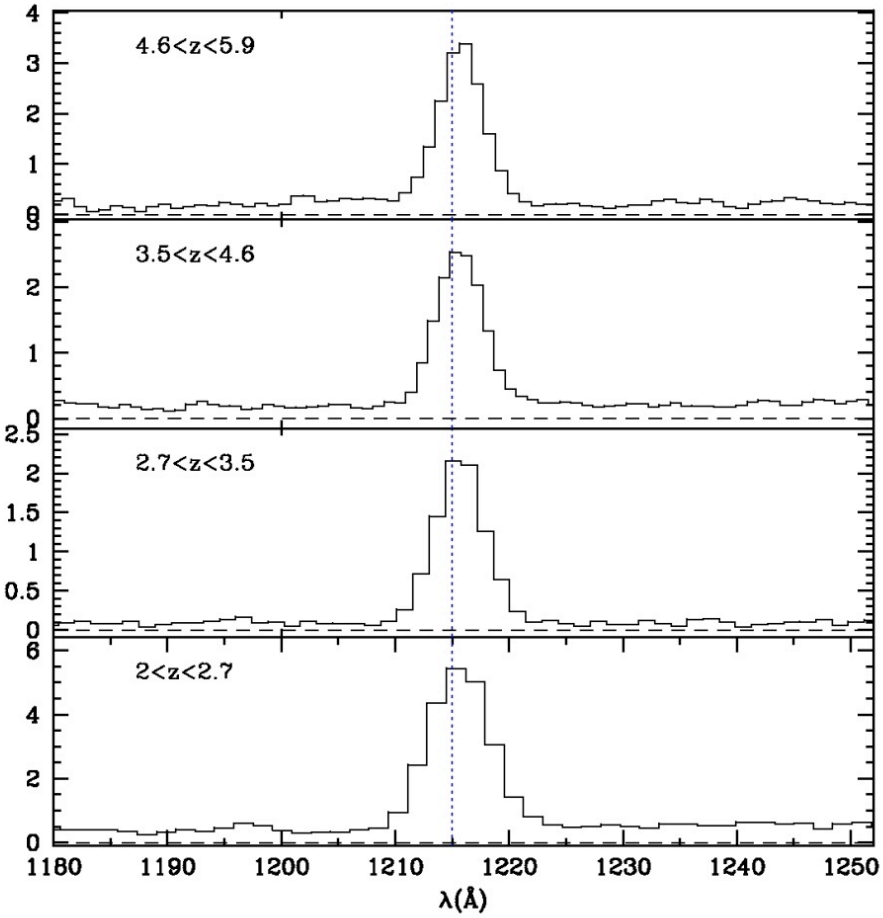
Main VVDS targets with $I_{AB} \leq 24.75$:

High S/N Combined spectra



Combined spectra of serendipitous Lyα emitters

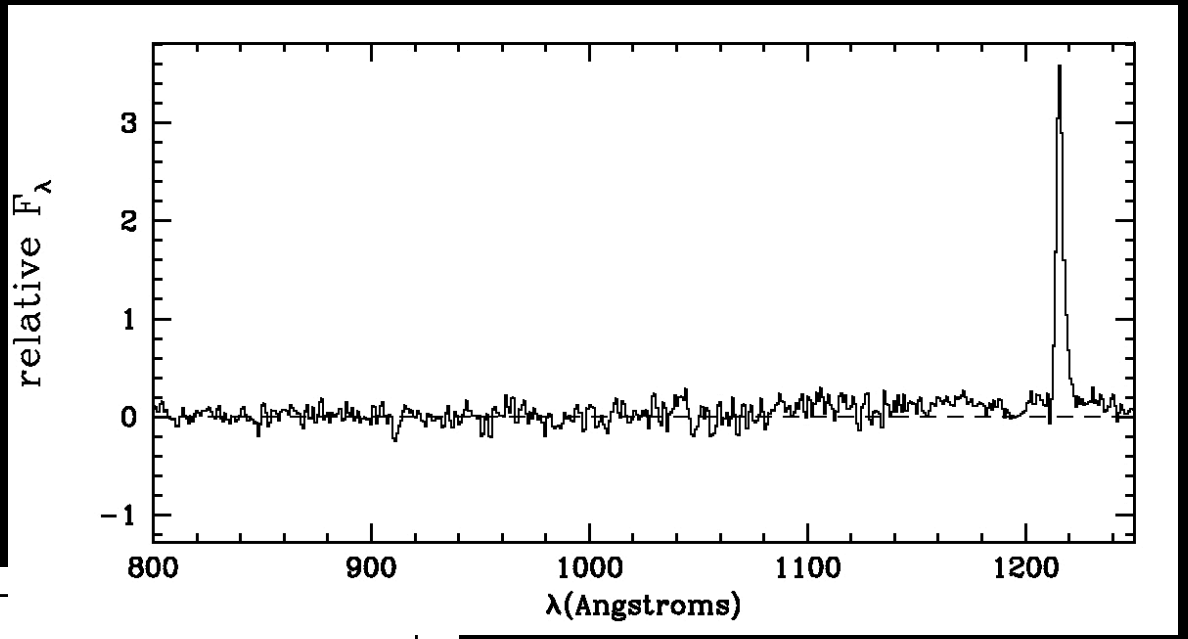


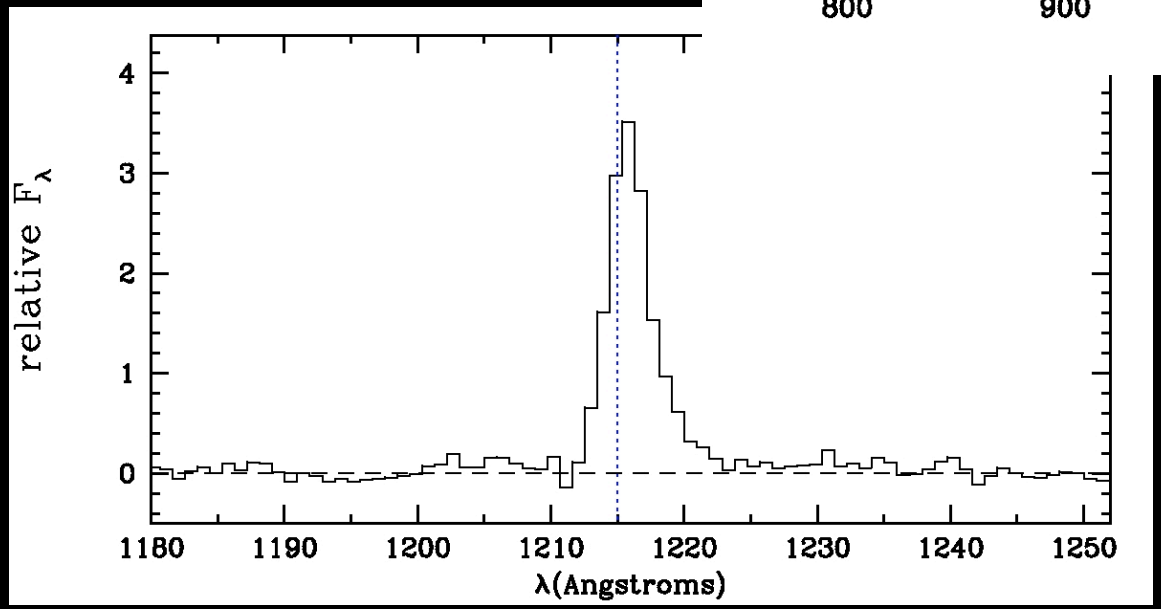


Combined spectra

Lyα line profile
Asymetric, as expected

6 Lyα emitters at 6<z<6.6

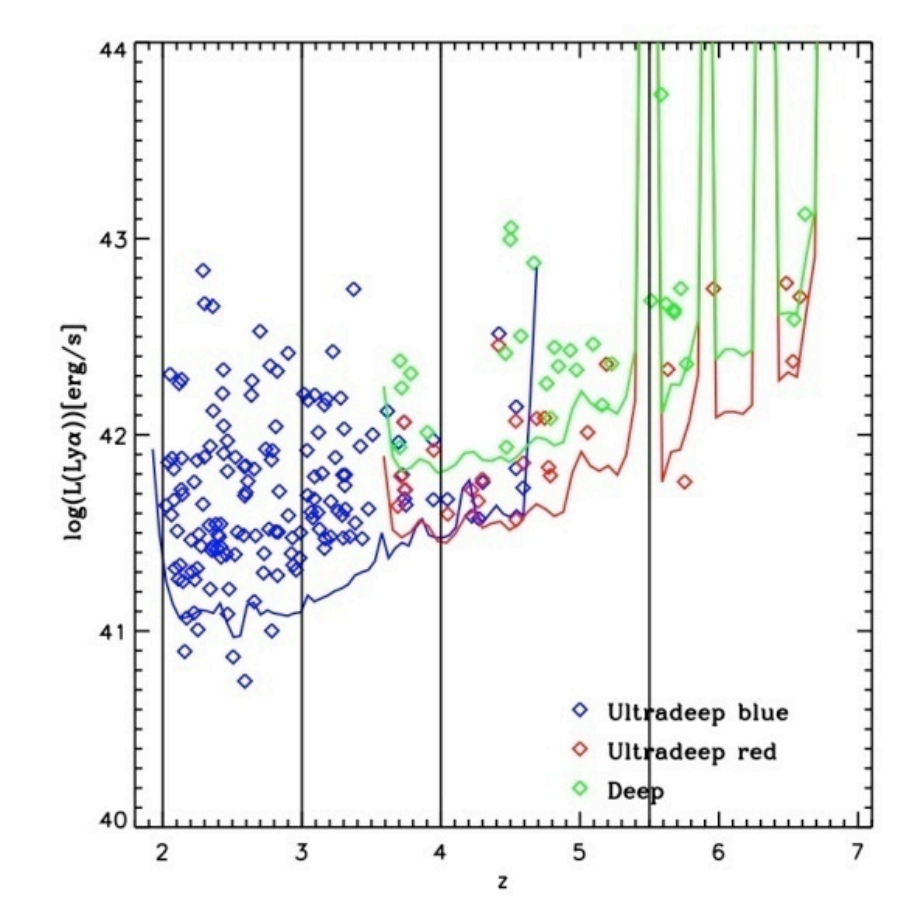


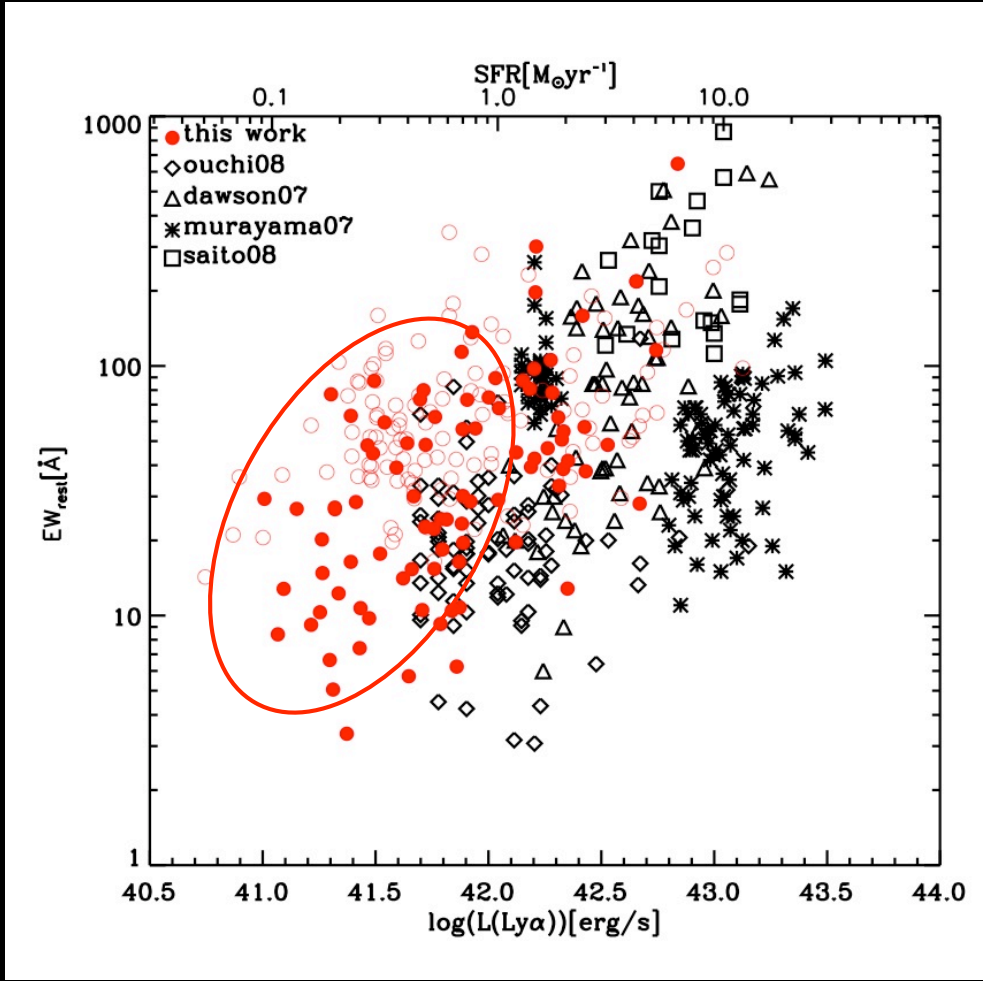


Le Fèvre et al., in prep

Redshift and Luminosity distribution

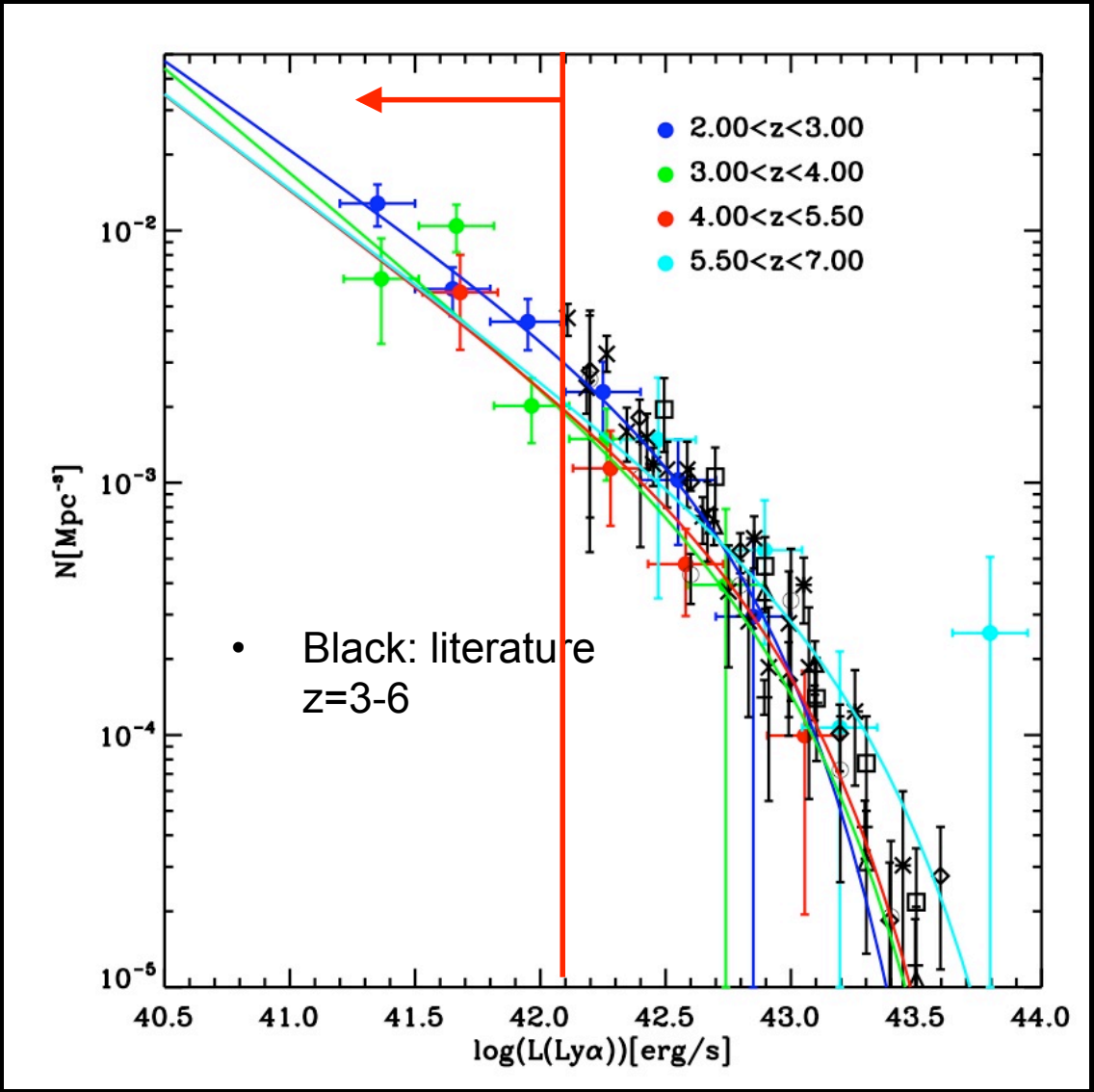
- UDeep blue
- UDeep red
- Deep





First exploration at faint luminosities 10^{41} erg/s

LAE Luminosity function



No apparent evolution from z=2 to z=6.6

But evolution when including dust and IGM corrections

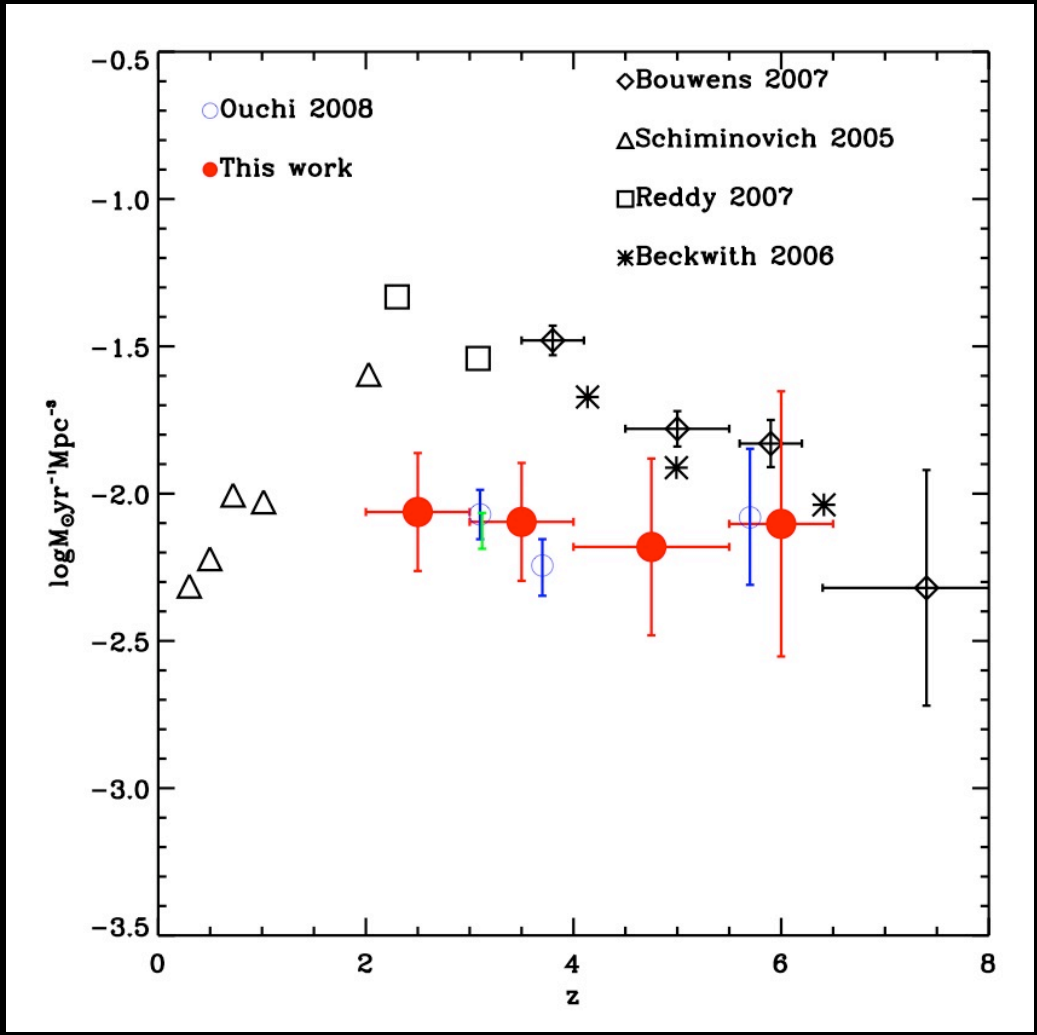
we reach log(lum)=41erg/s:

we can constrain α

α=1.75

Star formation density from LAE

If Lyα emission just comes from Star Formation…



- No correction for dust
- No correction for IGM absorption

- **Constant SFD from z=2 to z=6**
- **Lyα contributes 20% of the SFD at z=2.5, 30% at z=5, 50% at z=6**

Cassata et al., in prep

Summary

- 204 LAE with 2<z<6.62 from VVDS deep spectroscopic survey
- Serendipitous discovery of 138 very faint LAE in deep spectroscopic observations (Flux limit: ~1.5x10^{-18} erg.cm-^{2}.s^{-1})
- Faint Lyα emitters with log(Ly α)<42 are numerous, LF slope α=1.7 at z~2-6
- *LAE make up 30% of the total SFRD at z~3, becoming dominant at z~6*