Subaru/HSC Determination of Lya LF at z=7.0

27/3/2018

Sakura CLAW

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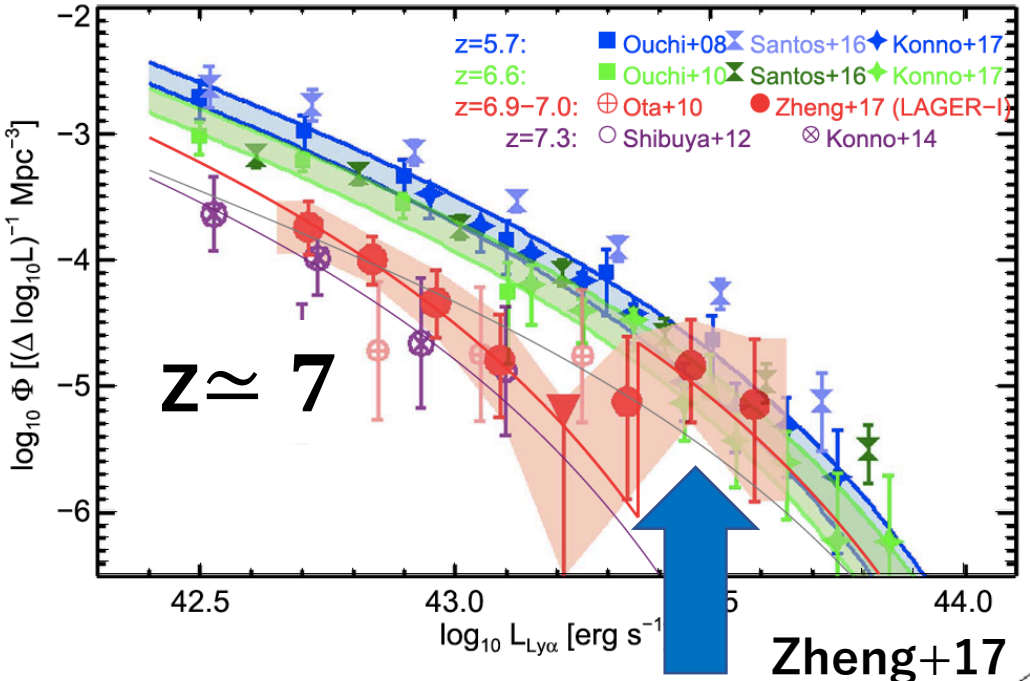
Itoh et al. (Submitted to ApJ)

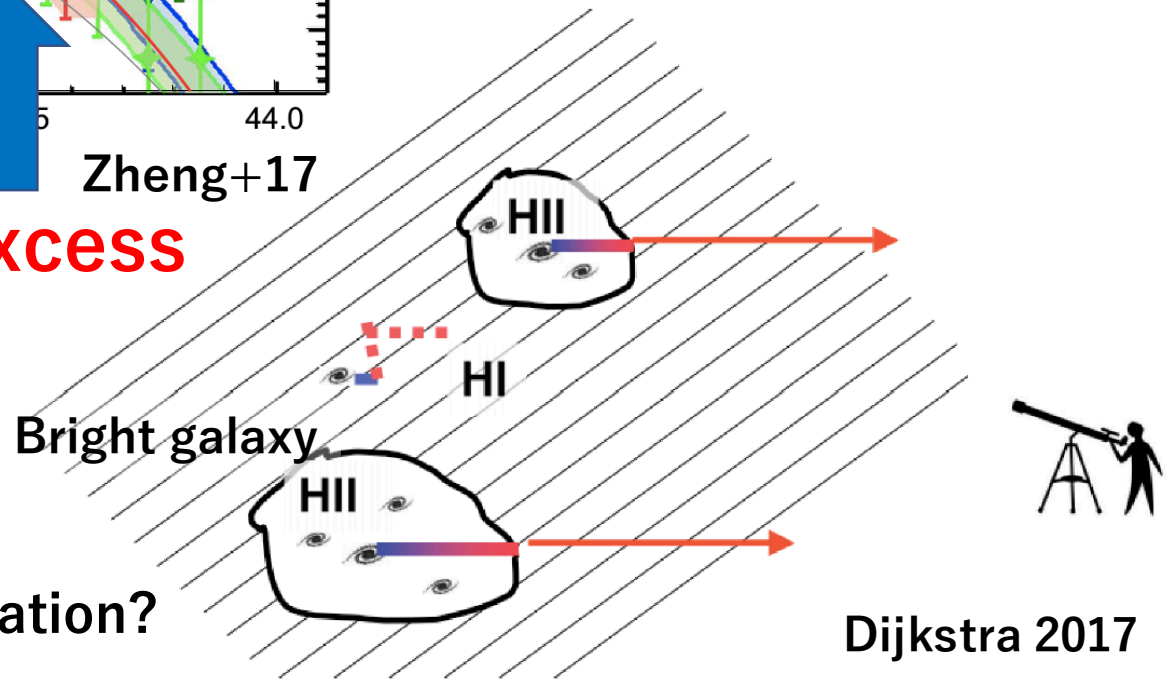
INTRODUCTION

Lyα LF at $z \simeq 7$: Bright-end excess?



Zheng+17

Bright-end excess



Dijkstra 2017

Large ionized bubble at the epoch of reionization?

Itoh et al. (Submitted to ApJ)

INTRODUCTION

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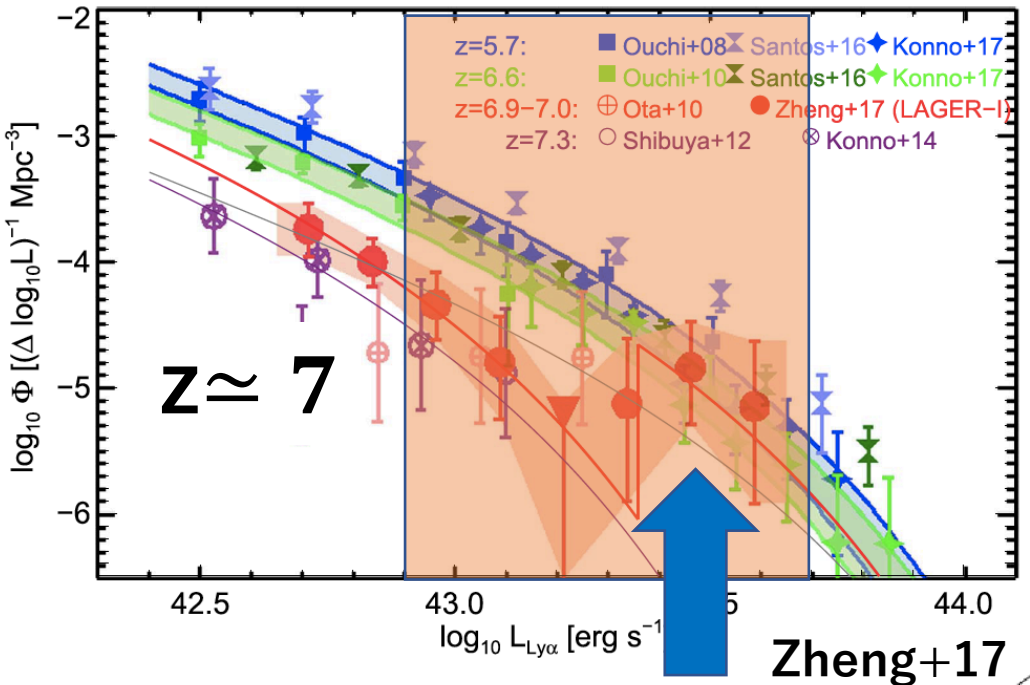
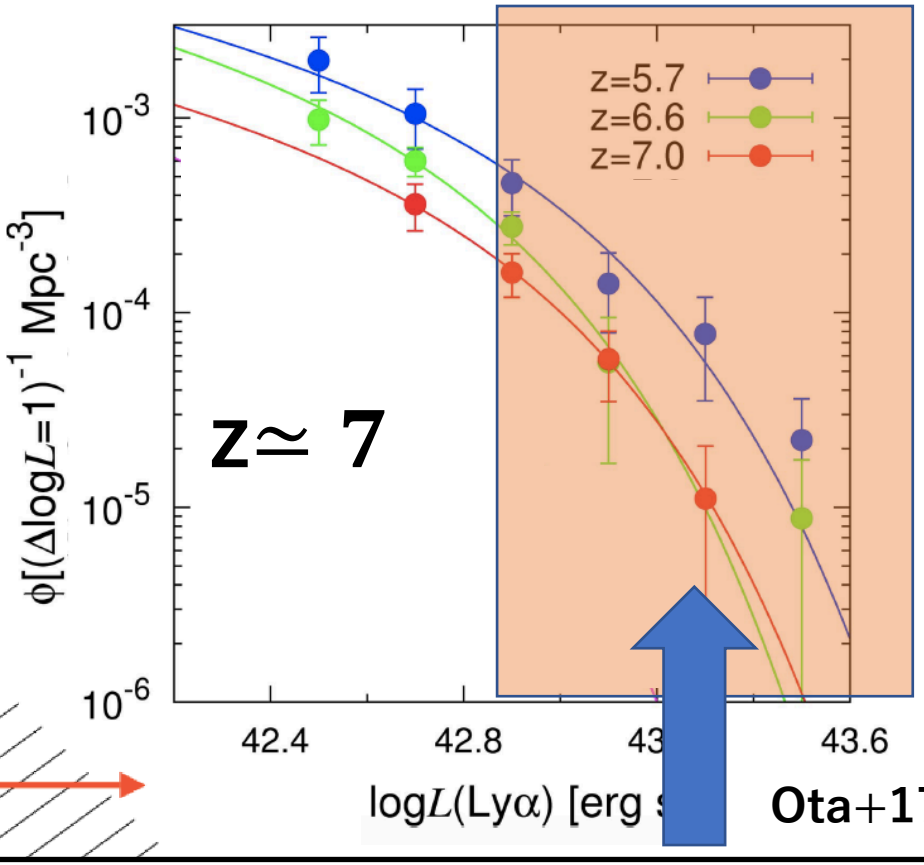
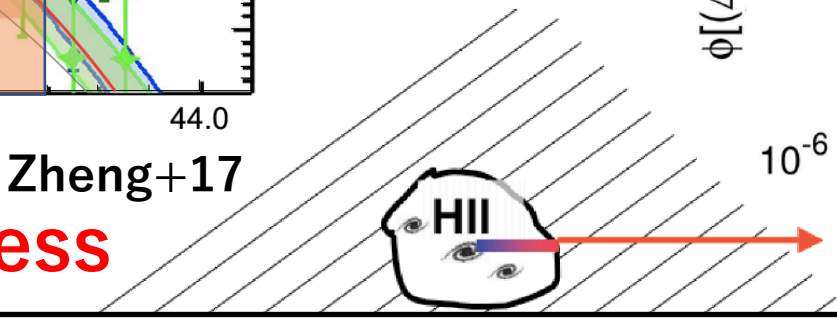


Zheng+17

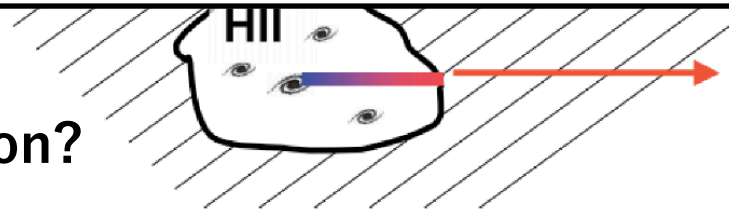


Ota+17

Bright-end excess



New large-area & deep data necessary!



Large ionized bubble
at the epoch of reionization?

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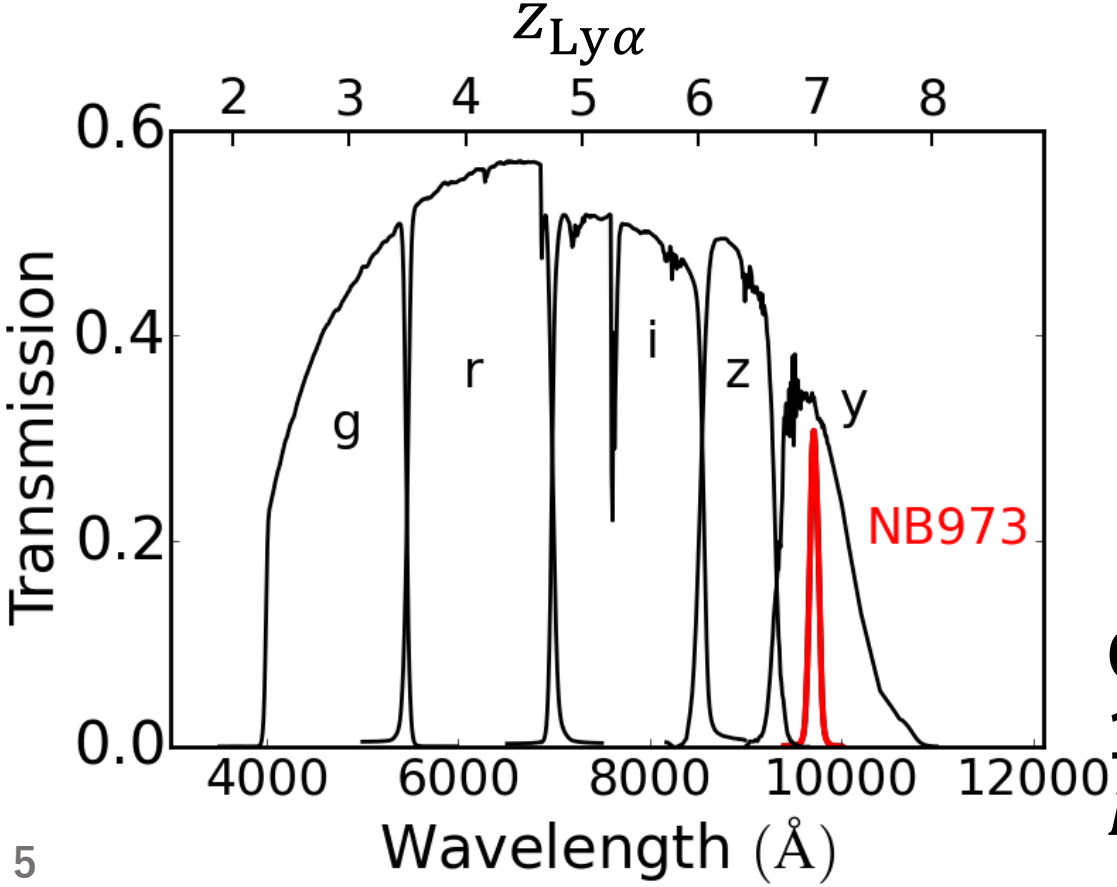
DATA

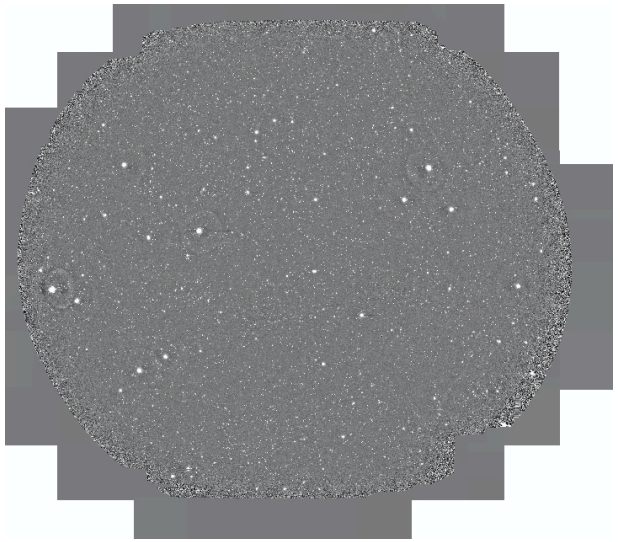
Subaru/HSC Data

Cosmic HydrOgen Reionization Unveiled with Subaru (CHORUS; PI: A.K. Inoue)
+ HSC Subaru Strategic Program data (Aihara+18)

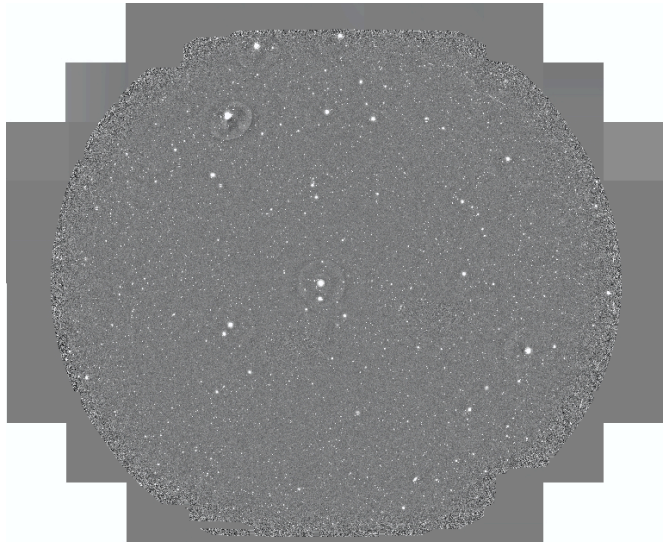
NB973 $\lambda_c = 9715$Å, $\mathrm{FWHM} = 100$Å

→ LAEs at $z = 7.0$





COSMOS
15 hours, 1.6 deg^2
$NB973_{5\sigma} = 25.0$ mag



SXDS
5 hours, 1.5 deg^2
$NB973_{5\sigma} = 24.3$ mag

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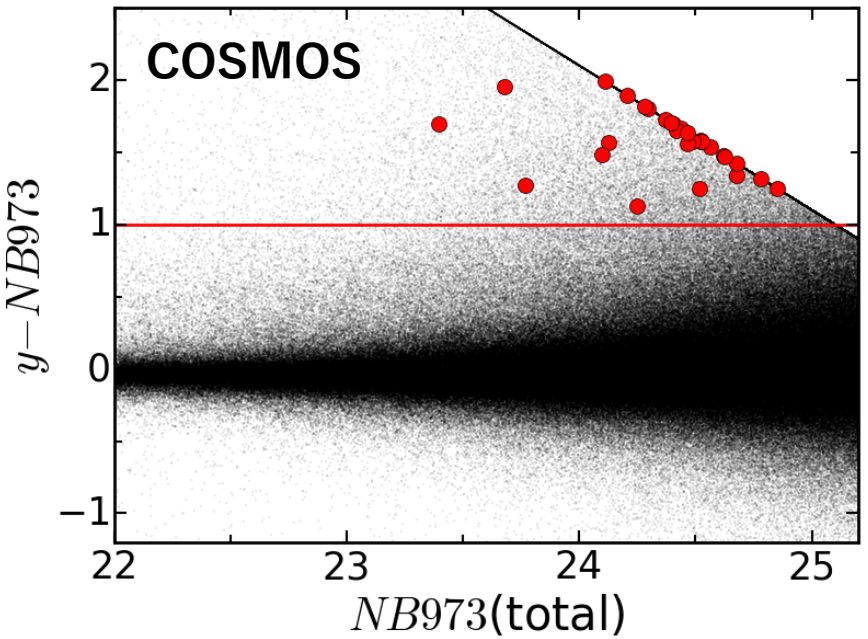
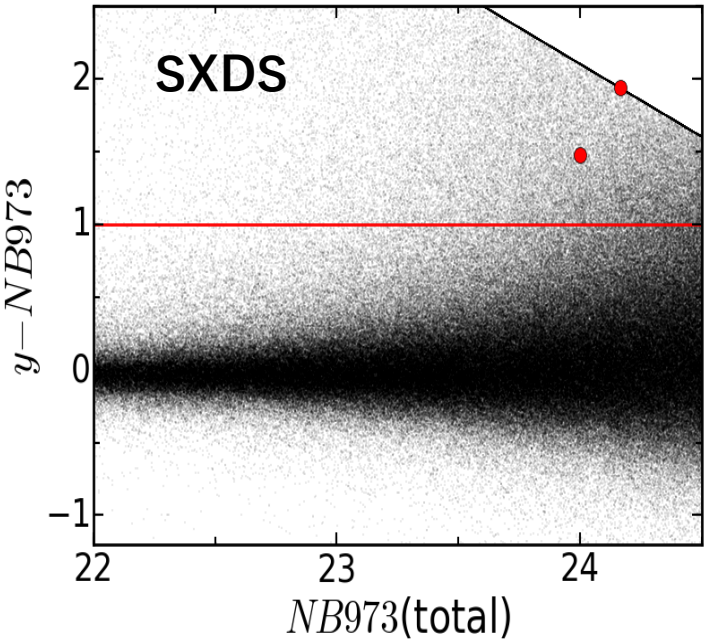
LAE SAMPLE





Selection Criteria

$$NB973 < NB973_{5\sigma}$$

$$\text{and } y - NB973 > 1.0$$

$\boldsymbol{EW_0 \geq 20}$Å

$$\text{and } [(z < z_{3\sigma} \text{ and } z - y > 2.0) \text{ or } z > z_{3\sigma}]$$
$$\text{and } g > g_{3\sigma} \text{ and } r > r_{3\sigma} \text{ and } i > i_{3\sigma}$$
$$\text{and } NB718 > NB718_{3\sigma} \text{ and } NB816 > NB816_{3\sigma}$$
$$\text{and } NB921 > NB921_{3\sigma},$$

32 LAE candidates are identified

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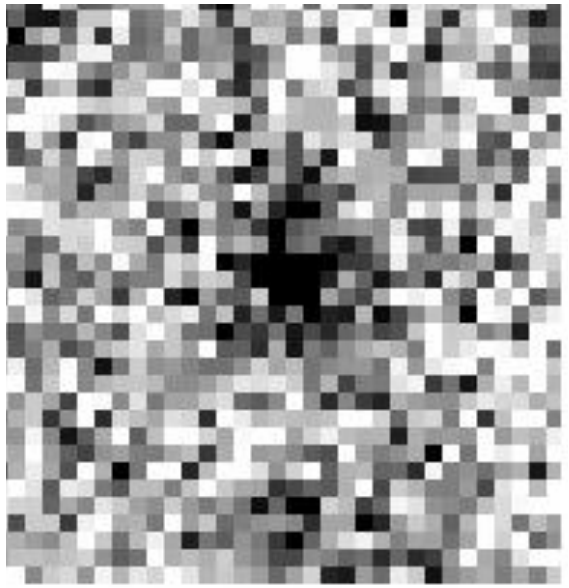
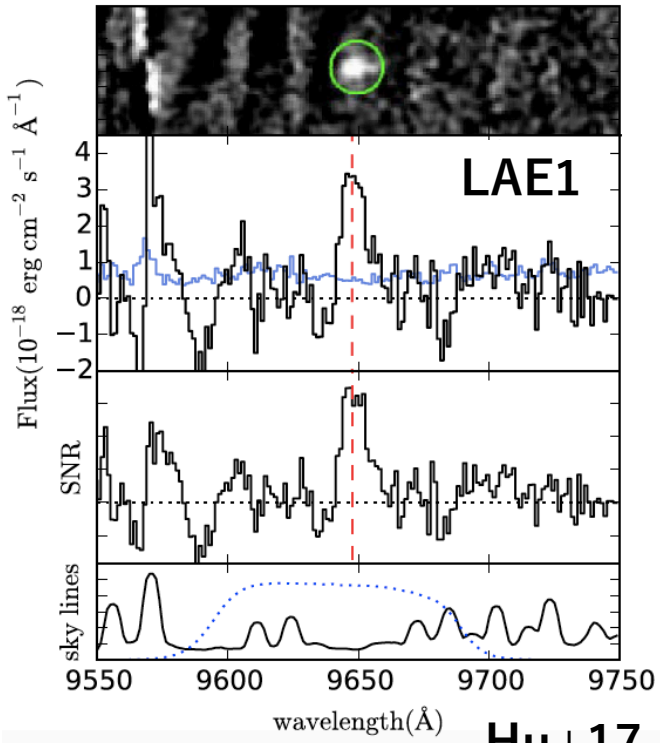
LAE SAMPLE

Spectroscopy

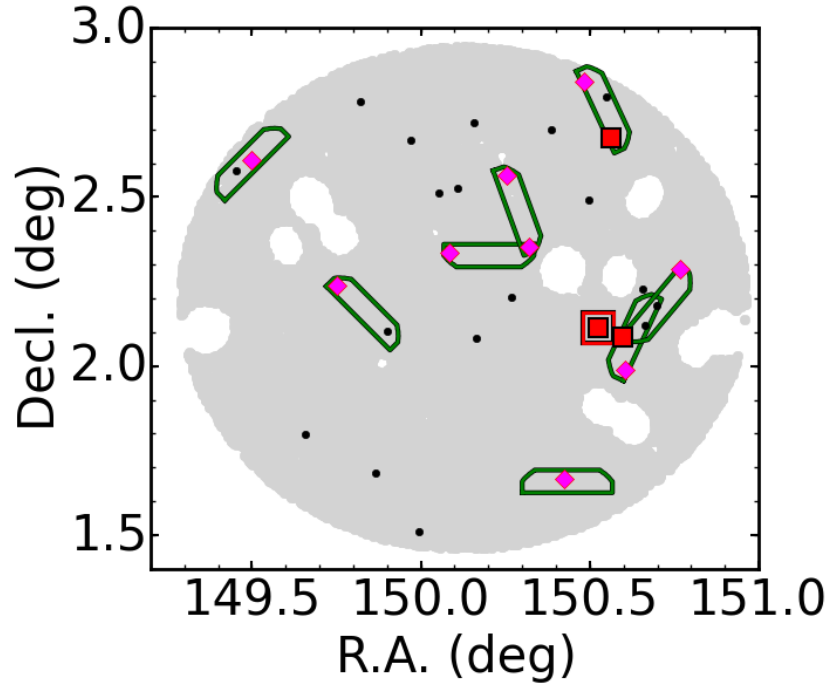


HSC-z7LAE3 at z=6.936

Magellan



Hu+17



DEIMOS follow-up observations (Planned)

One LAE is spectroscopically confirmed

See Zheng/Hu's presentation

Contamination rate: $f_{esc} = 0 - 30\%$ (Shibuya+18)

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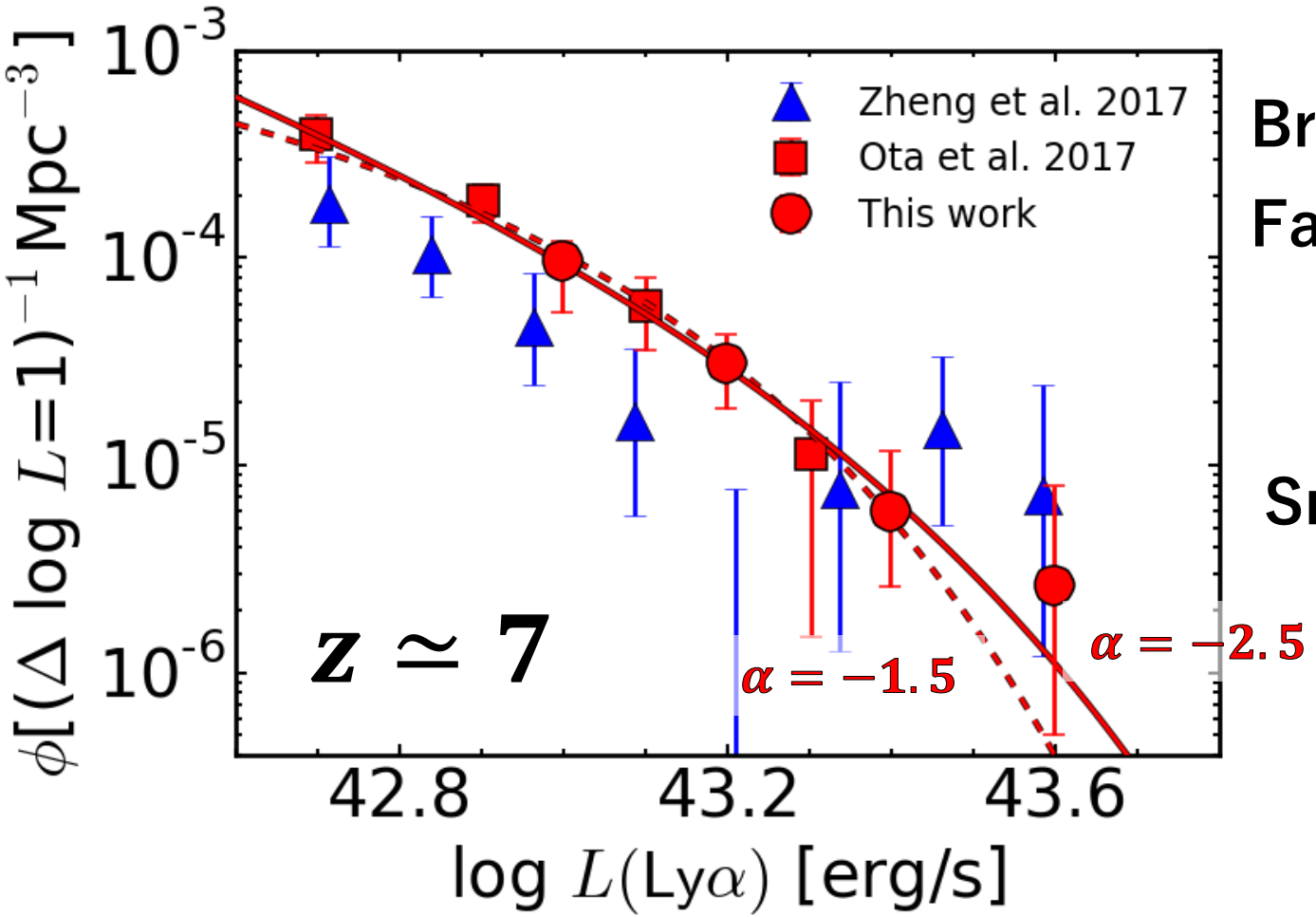
RESULTS

Lyα LF at $z = 7.0$



Bright end: Consistent with Zheng+17

Faint end: Consistent with Ota+17

Smooth LF with steep faint-end slope

$\alpha = -2.5$

Similar to recent HSC (Konno+18) & MUSE (Drake+17) results

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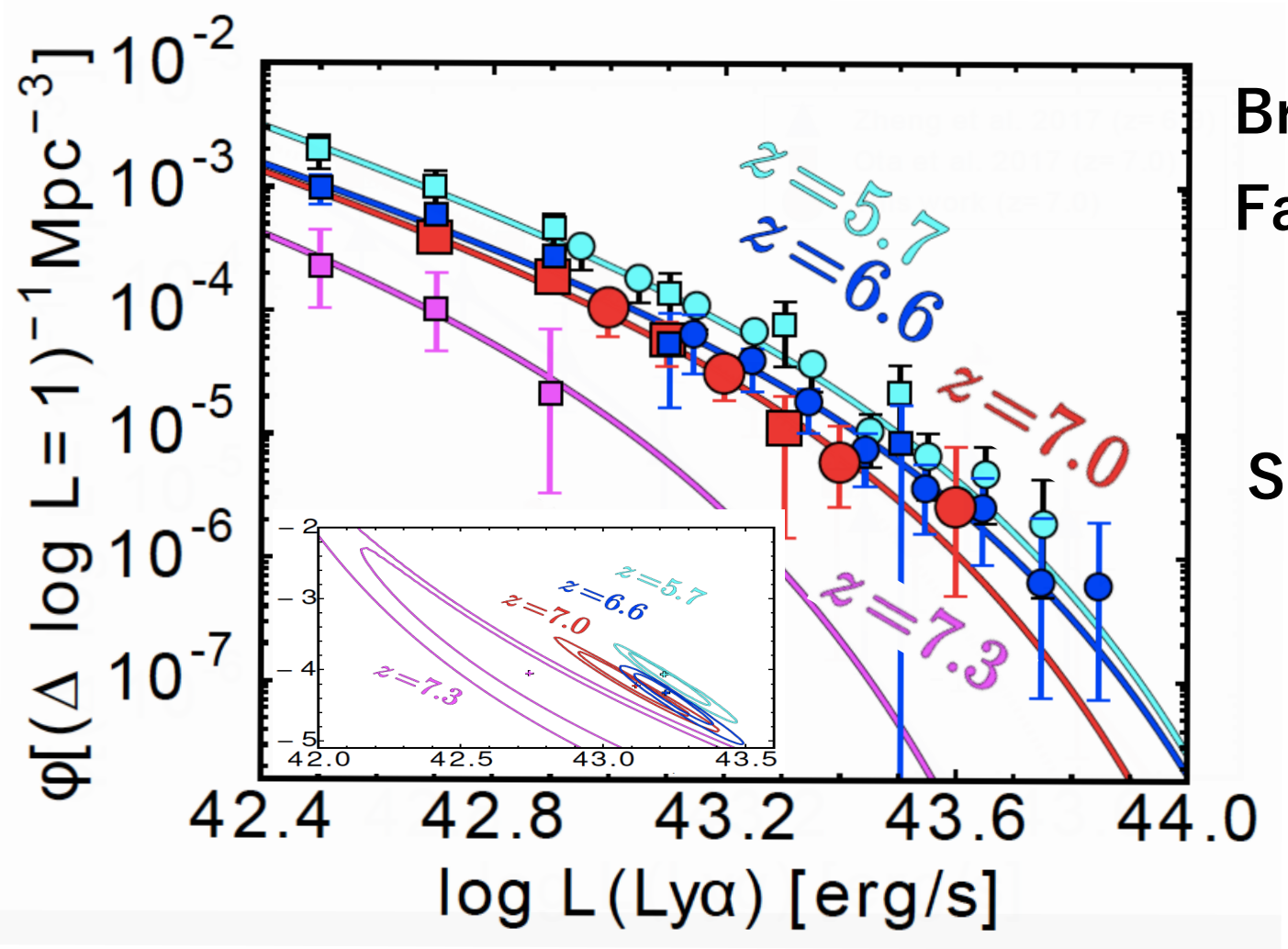

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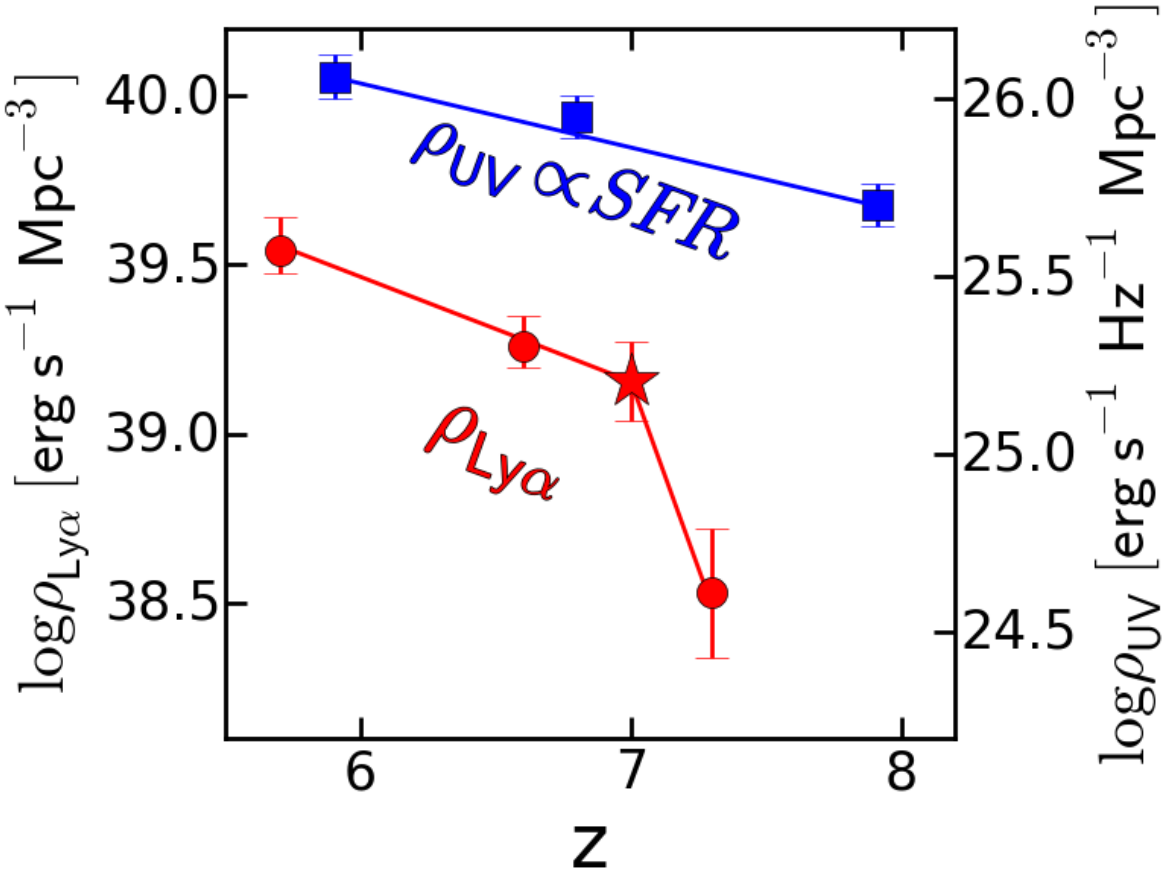
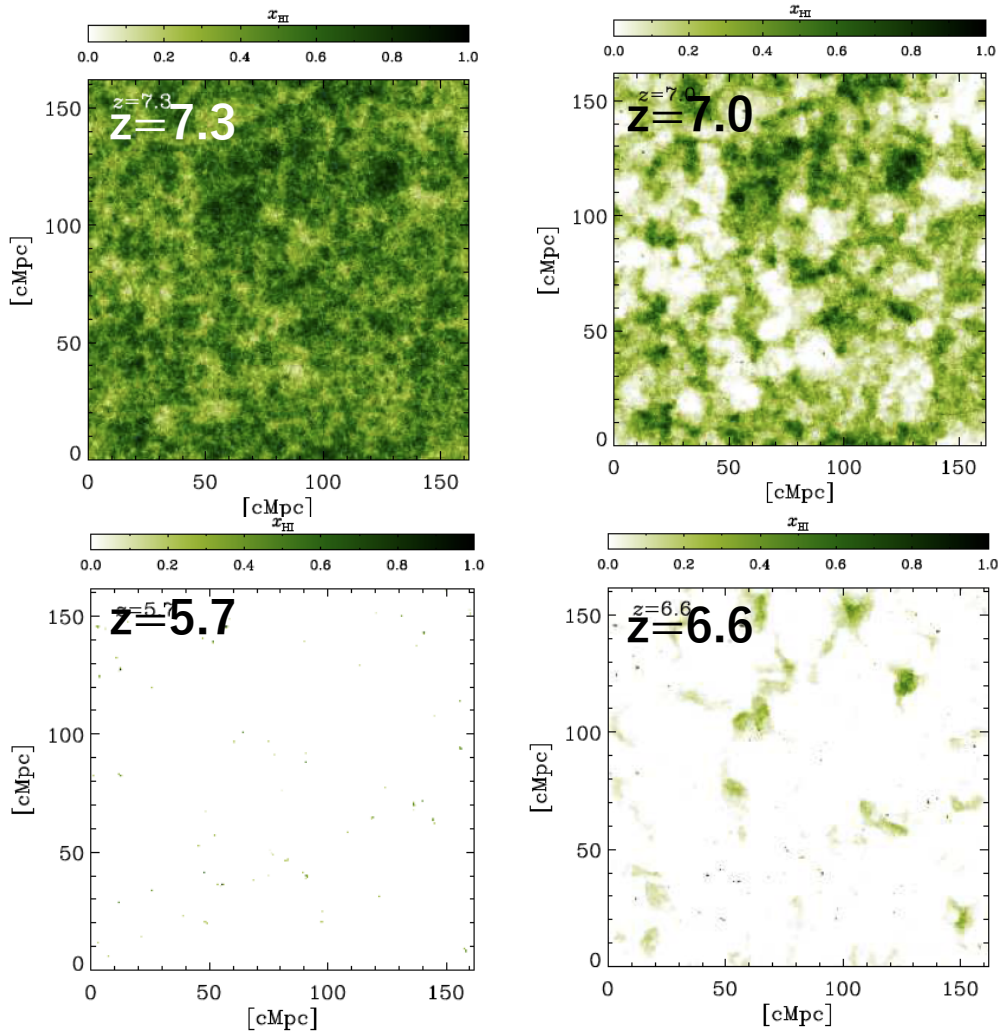
DISCUSSION

Neutral Hydrogen Fraction

Inoue+18





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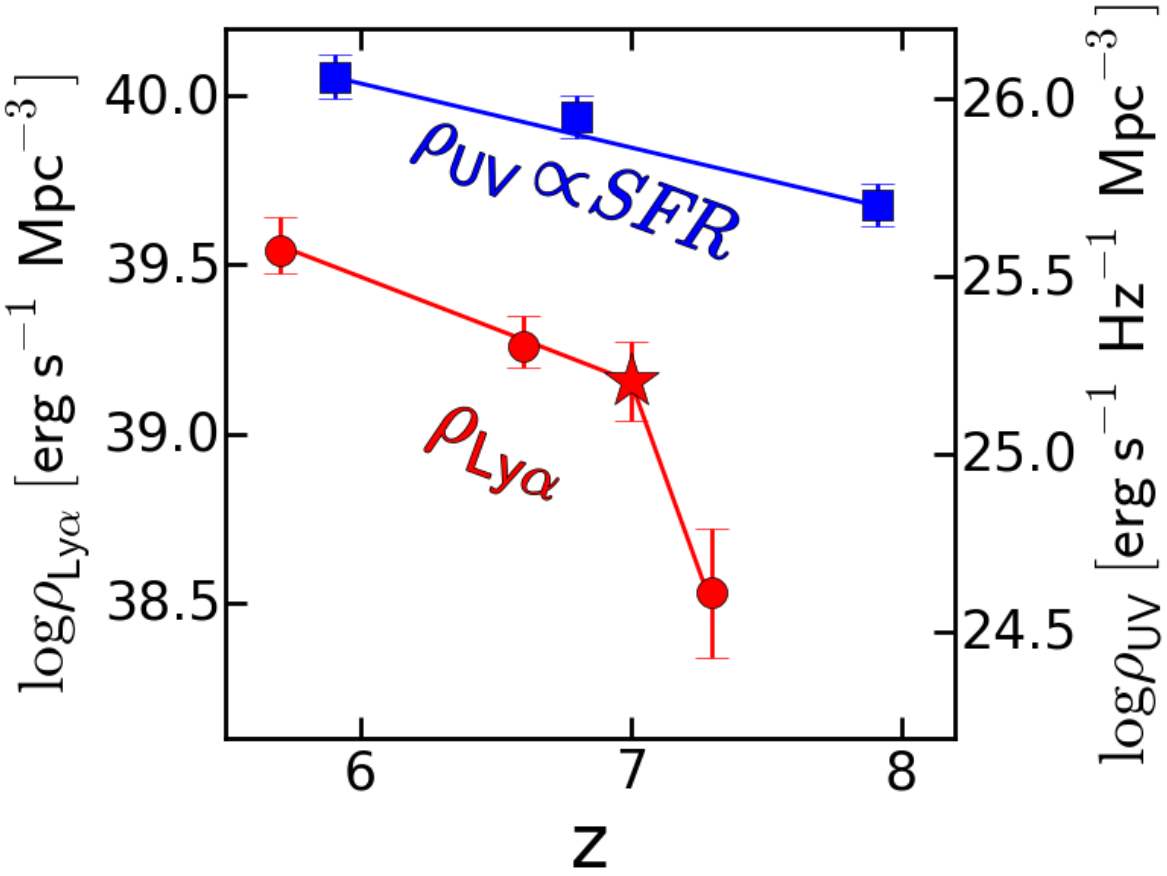
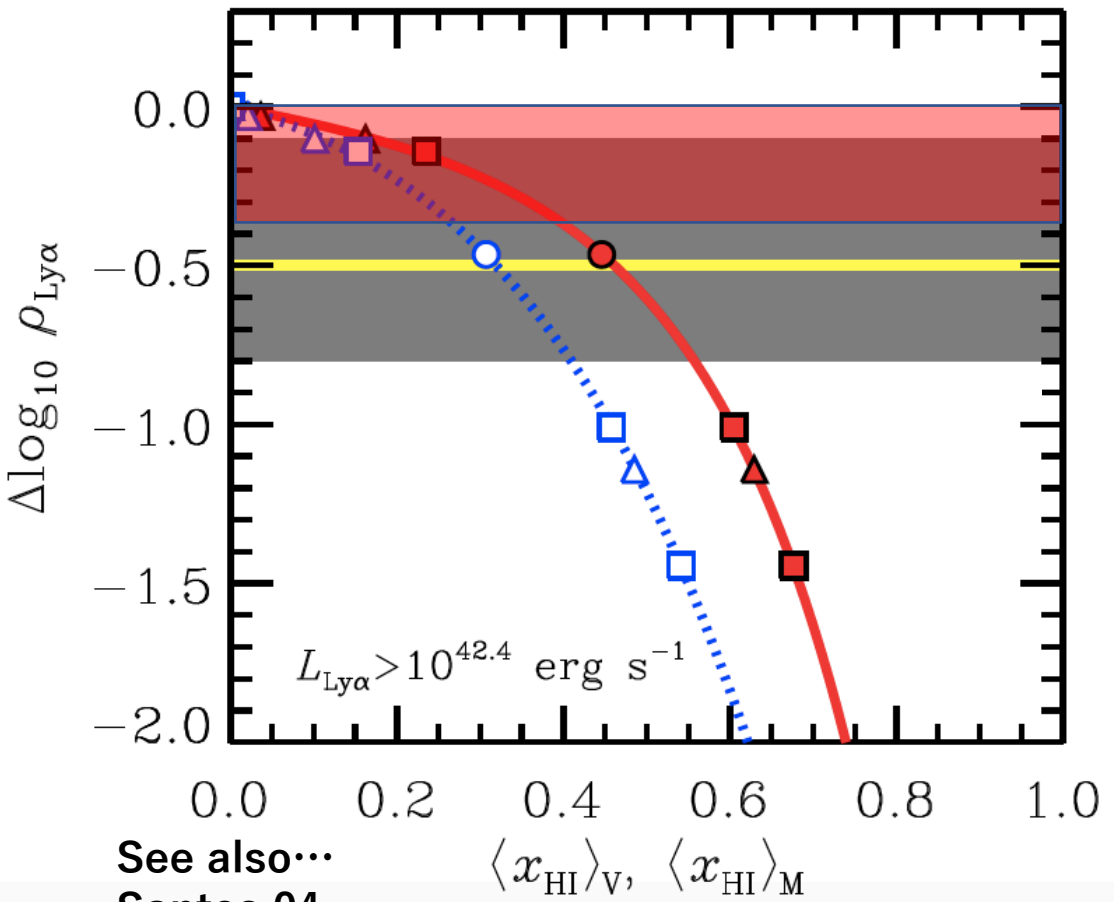


$$\Delta \log_{10} \rho_{Ly\alpha} \equiv \log_{10} \rho_{Ly\alpha}^{obs} - \log_{10} \rho_{Ly\alpha}^{NoIGM}$$



See also…
Santos 04
Dijkstra+07 & Furlanetto+06
McQuinn+07

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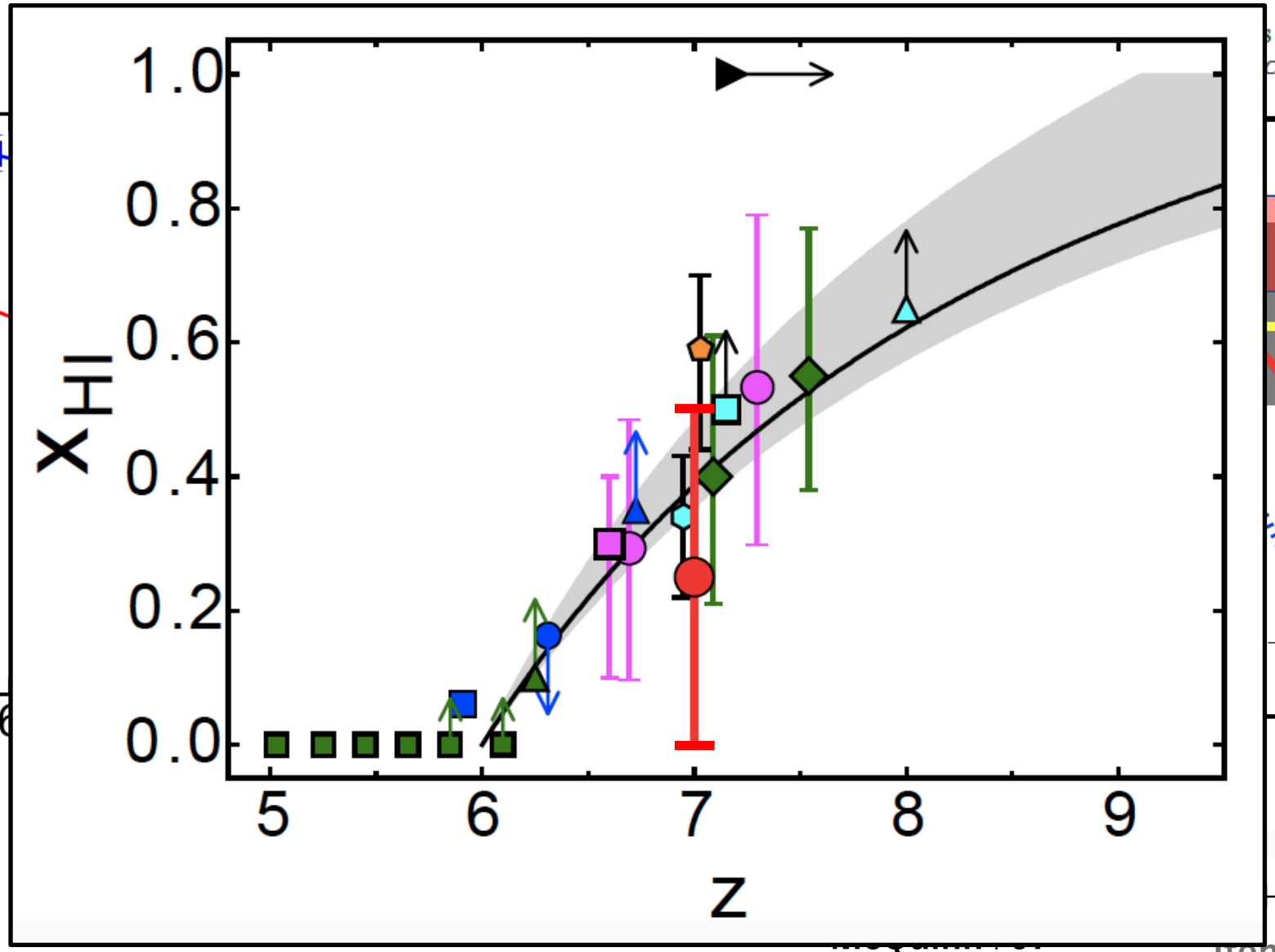

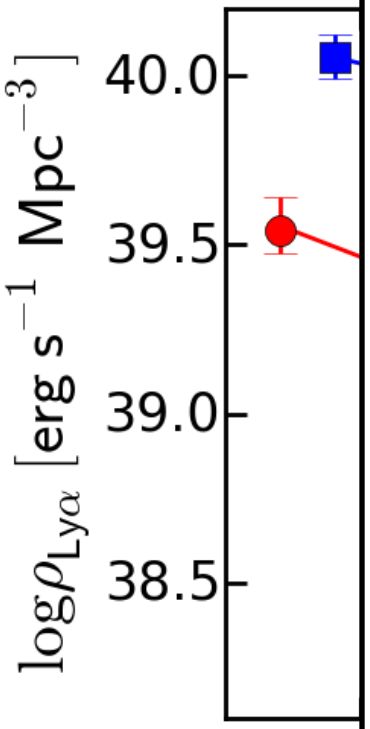

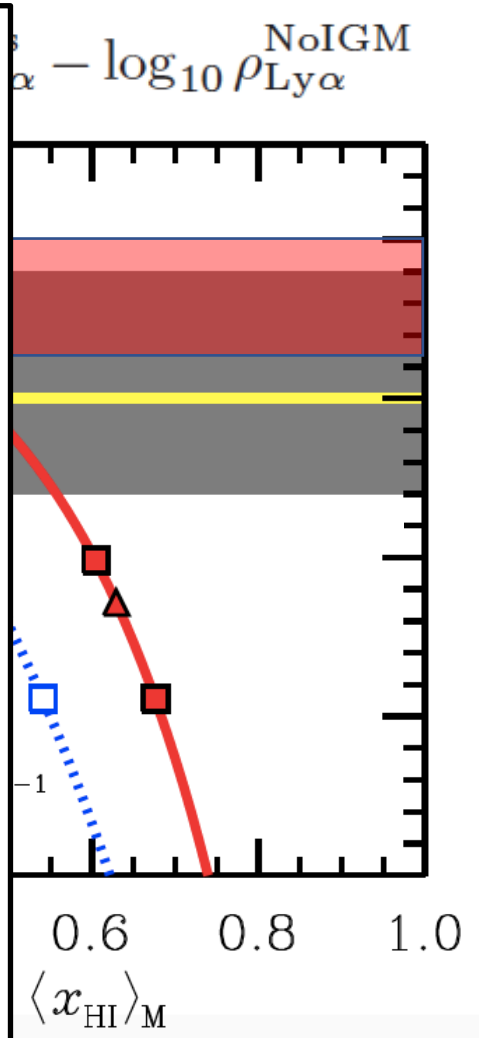

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SUMMARY

HSC NB973 data

・Identified 32 LAE candidates at z=7

Question:

z=7 Lyα LF bright-end excess?

➡ No clear excess

HSC Lyα LF: Smooth, steep slope ($\alpha \simeq -2.5$)

・Neutral hydrogen fraction constraint at z=7

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