

Extended Ly α Halos around z~2-7 LAEs Investigated by Intensity Mapping Technique



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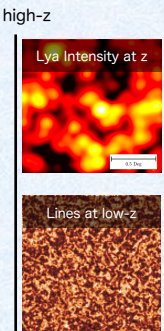
1. Introduction

- ◻ Circumgalactic medium (CGM) is where a galaxy forms.
- ◻ CGM → observed as a Ly α halo (LAH)
- ◻ Q: Do normal star-forming galaxies have extended LAHs?

2. Method

① Intensity Mapping

Cross-correlation between line intensity map and galaxy positions
 → increase S/N ratio of average line signals from targeted galaxies.



CROSS CORRELATION = Ly α SB of the galaxies

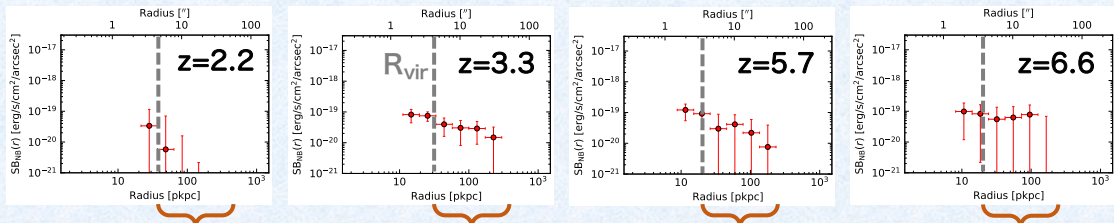
CROSS CORRELATION = 0

② Subaru/Hyper-Suprime Cam (HSC) Data

- ◻ Data of HSC-SSP (Aihara+19) & CHORUS (Inoue+20)
- ◻ Deep narrow-band images (NB387, NB527, NB816, NB921)
- ◻ Latest catalog of ~2,000 Ly α emitters (LAEs) at z=2.2-6.6 (Ono+ in prep.)

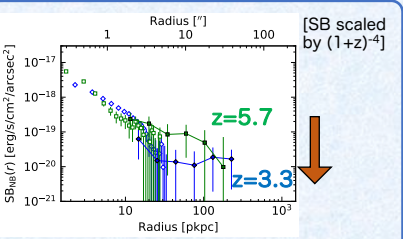
3. Results

◻ Ly α surface brightness radial profiles of LAHs



Very extended (>virial radius) and diffuse (~10⁻²⁰ erg/s/cm²/arcsec²) LAHs around LAEs at z~2-7!

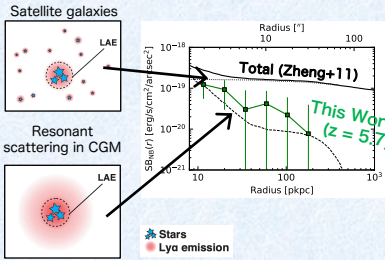
4. Profile Evolution?



Possible decreasing trend of Ly α SBs at z~6→3

5. LAH Origin?

◻ Compare to cosmological HD + Ly α RT simulation at z=5.7 (Zheng+11)



Implication:
 LAHs (z=5.7) are originated from resonant scattering in CGM

Intensity Mapping x Roman Telescope:
 Ha (z<2) & [OIII] (z<3)
 → Test the possibilities of other scenarios (fluorescence / halo star formation)

Illustration from Momose+16