

Properties of Lyman alpha emitters at $z = 4.86$ and $z=5.70$ in the COSMOS 2 square degree field

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ABSTRACT

We present results of surveys for Ly alpha emitters (LAEs) at $z = 4.86$ and $z=5.70$ based on optical narrowband (NB711 and NB816) and broadband (B, V, r', i', and z') observations of the Cosmic Evolution Survey (COSMOS) field using Suprime-Cam on the Subaru Telescope. We find 79 LAEs at $z=4.86$ and 119 LAEs at $z=5.70$ over a contiguous survey area of about 2 deg^2 . The Ly alpha luminosity function of LAEs shows little evolution between $z=5.70$ and $z=4.86$. We also have HST/ACS F814W images of the LAEs. Comparison with LBGs at high redshifts indicates little difference of size unlike the previous study.

Introduction

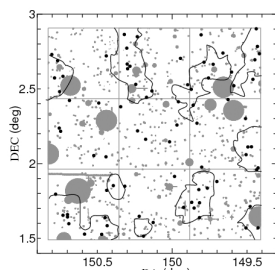
Although both Lyman break galaxies (LBGs) and Lyman alpha emitters (LAEs) are actively star-forming galaxies, there are systematic differences between them. To understand differences between the LAEs and LBGs at any given redshift and their properties with look-back time, one needs statistically large and complete samples of these galaxies at different redshifts. In this poster, we present results of a survey of Ly alpha emitters at $z=4.86$ and 5.70 covering the entire 2 deg^2 of the COSMOS field.

Sample

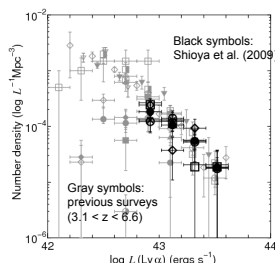
In the COSMOS field, 79 LAEs at $z=4.86$ and 119 LAEs at $z=5.70$ (Shioya+09 ApJ, 696, 546; Murayama+07 ApJS, 172, 523). For 85 LAEs at $z=5.70$, HST/ACS I814 images are available.

Results

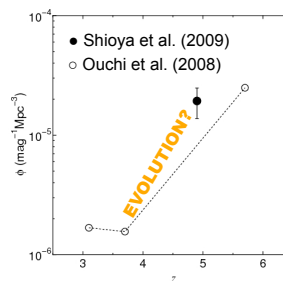
Spatial distribution



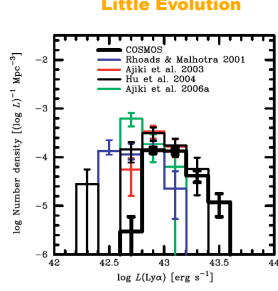
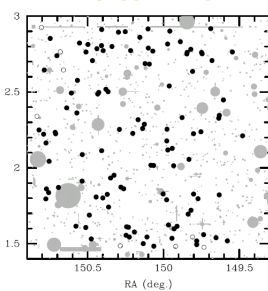
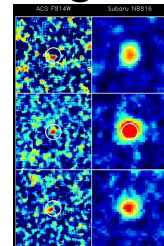
Lyman alpha luminosity function



Number density at $M_{UV}=-21.5$



ACS images vs. NB816 images (LAEs @ $z=5.7$)



For LAEs at $z=4.86$, we find a field-to-field variation of number density of LAEs as a factor of ~ 2 among the nine subfields with $0.5 \text{ deg} \times 0.5 \text{ deg}$. This finding is consistent with the scale of large scale structure we found, $50 \times 25 \text{ Mpc}^2$.

Our results supports the little evolution of Ly α luminosity functions in the range of $3 < z < 6$.

The number density of LAEs at $z=4.86$ at $M_{UV}=-21.5$ is similar to those of LAEs at $z \sim 5.7$ while larger than those of LAEs at $z \sim 3-4$.

By stacking the ACS images of all the detected LAEs at $z=5.70$, we obtain a Sersic parameter of $n \sim 0.7$ with a half-light radius of 0.13 arcsec (0.76 kpc), suggesting that the majority of ACS detected LAEs have not spheroidal-like but disk-like or irregular light profile.

The size-magnitude relation shows little difference between LAEs and LBGs at $z \sim 6$.

Diagram between R_{HL} and z_{850} for $z \sim 6$ galaxies

