

**X30a            A Search for  $z=7.3$  Ly $\alpha$  Emitters behind Lensing Clusters**

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We searched for  $z = 7.3$  Ly $\alpha$  emitters (LAEs) behind lensing clusters, Abell 2390 and CL 0024, using the Subaru Telescope Suprime-Cam, a narrowband filter NB1006 ( $\lambda_c = 1005$  nm, FWHM = 21 nm) and deep images taken with the Hubble and Spitzer Space Telescopes. The combination of the fully depleted CCDs of the Suprime-Cam, sensitive to  $z \sim 7$  Ly $\alpha$  emission, and magnification by the clusters is potentially a powerful tool to detect faint distant LAEs. However, we could not detect any objects consistent with the color of  $z = 7.3$  LAEs to the unlensed Ly $\alpha$  flux limit of  $7.6 \times 10^{-18}$  erg s $^{-1}$  cm $^{-2}$ .

Comparison with the previous  $z \sim 7$  LAE field searches suggests that a blank field survey covering an area  $> 2$  times larger than a lensing survey is more efficient in finding bright ( $L > L^*$ ) LAEs at  $z \sim 7$  than a lensing survey probing to a deeper limit, as expected from the bright end slope of  $z \sim 7$  Ly $\alpha$  luminosity functions.

We also inspected NB1006 images of three  $z \sim 7$   $z$ -dropout galaxy candidates previously detected in Abell 2390 and found that none of them are detected in NB1006. Two of them are consistent with the predictions from the previous studies that they would be at lower redshifts. The other one has a photometric redshift of  $z \sim 7.3$ , and if it is at  $z = 7.3$ , its unlensed Ly $\alpha$  flux would be  $< 4.4 \times 10^{-18}$  erg s $^{-1}$  cm $^{-2}$  ( $1\sigma$  upper limit) or equivalent width of  $< 26\text{\AA}$ . Its Ly $\alpha$  emission might be suppressed by neutral hydrogen, as recent studies suggest the smaller fraction of Ly $\alpha$  emission among Lyman break galaxies at  $z \sim 7$  than those at lower redshifts.