

## No Ly $\alpha$ emitters detected around a QSO at $z=6.4$ : Suppressed by the QSO?

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Understanding how QSO's UV radiation affects galaxy formation is vital to our understanding of reionization era. Using a custom made narrow-band filter, NB906, on Subaru/Suprime-Cam, we investigated the number density of Ly $\alpha$  emitters (LAE) around a QSO at  $z=6.4$ . To date, this is the highest redshift narrow-band observation, where LAEs around a luminous QSO are investigated. Due to the large field-of-view of Suprime-Cam, our survey area is  $\sim 5400 \text{cMpc}^2$ , much larger than previously investigated QSO environments at  $z=5.7$  ( $\sim 200 \text{cMpc}^2$ ).

In this field, we previously found a factor of 7 overdensity of Lyman break galaxies (LBGs). Based on this, we expected to detect  $\sim 200$  LAEs down to NB906=25 ABmag in the 30' field of view. However, our 6.4 hour exposure with Subaru telescope found none. The obtained upper limit on the number density of LAEs is more than an order lower than the blank field. Furthermore, this lower density of LAEs spans a large scale of 10 pMpc across. A simple argument suggests a strong UV radiation from the QSO can suppress formation stars in halos with  $M_{\text{vir}} < 10^{10} M_{\text{sun}}$  near the QSO within a Mpc. This could explain the observed lack of LAEs if LAEs are in less massive, and detected LBGs are in more massive halos than  $10^{10} M_{\text{sun}}$ .