

A08a **The AzTEC/ASTE Survey of Submillimeter Galaxies towards a Ly α -selected Proto-cluster Candidate at $z = 3.1$**

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We present the results from the AzTEC/ASTE 1.1-mm extragalactic survey towards the SSA 22 field, known as a proto-cluster candidate at $z = 3.1$ traced by overdensities of Ly α emitters (LAEs). The LAEs are likely to be much small, young galaxies that outline the large scale structure in SSA 22, whereas submillimeter galaxies (SMGs) can be more massive systems involved in massive dark matter haloes and trace the ‘backbone’ of dark matter structure that underlies the LAE structure. Therefore, investigating the degree of coexistence of the two different populations will be a test to observationally verify the existing structure formation scenarios.

Our AzTEC/ASTE observations during summer 2007 attained a new wide and deep map at 1.1 mm ($\simeq 0.1$ deg², $1\sigma < 0.9$ mJy/beam), and lead to find a couple of tens of $> 3\sigma$ sources in this field. The SMG number count in the map field is not much different from those found in blank field surveys, while the SMG density looks increasing toward the local density peak of LAEs by a factor of several. We used stacking analysis to investigate the statistical nature of cold dust in LAEs, and found a 2σ upper limit flux density of 0.12 mJy/beam, corresponding to a far-infrared luminosity of $L_{\text{FIR}} < 5 \times 10^{11} L_{\odot}$ (assuming $T_{\text{dust}} = 50$ K, $\beta = 1.5$) for the $z = 3.1$ LAEs. This confirms the predicted picture that LAEs do not have large amount of cold, metal-rich ISM.