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Mapping the Superstructure of Galaxies at High Redshift

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Dr. Toru Yamada is a professor of Astronomical Institute, Tohoku University. He completed his Ph.D. in Astrophysical Sciences at Department of Astronomy, Faculty of Science, Kyoto University in 1994. He is the Vice Chair of Astronomical Society of Japan since 2012. His research Field is Galaxy Evolution and Formation.

Abstract

We studied the large-scale distribution of the Lyman-Alpha Emitters at $z=3.1$ over the 1.4 deg^2 area at SSA22 field that involves one of the most conspicuous high-redshift "protocluster", or the high-density peak of star-forming galaxies known so far, at $z=3.09$.

Using Subaru Telescope, we have detected ~ 1500 emitters at $z=3.1$ including ~ 100 Lyman Alpha Blobs which are the extended Lyman Alpha emission halos. The "superstructure" of the emitters distributed over ~ 200 Mpc comoving scale contains the protocluster (density peak), its surrounding ~ 30 Mpc-scale "belt-like" high density region whose significance is also very high (overdensity is 1.13 ± 0.01 , still $\sim 10\sigma$ of the expected CDM fluctuation at such large scale), as well as the very under-dense "voids" of the emitters. We studied the distributions of the Ly Alpha luminosity, size, and equivalent width over the wide-range of density environment as well as the properties of the Ly Alpha Blobs in the field.

We have also obtained deep NIR image and spectra of the galaxies in the $z=3.09$ protocluster to study the properties of the massive galaxies and their activity. We have indeed detected the density peak of the K-band selected galaxies whose position coincides with the local peak of the LyAlpha emitters. Compared with the Coma cluster, ~ 30 - 40% of the stellar mass already formed in the protocluster. The massive galaxies are dominated by very red objects, little overlap with LBG and LyAlpha emitters, $\sim 50\%$ of them are quiescent (passively-evolving) spectra while many of the rest have very active and dusty star-formation activity. We're witnessing the formation of the cluster massive galaxies there.

All are welcome! Tea, coffee, biscuits will be served at 2:15 P.M.

You are welcome to nominate speakers to Weimin Yuan (wmy@nao.cas.cn), Mei Zhang (zhangmei@bao.ac.cn), Licai Deng (licai@bao.ac.cn), Xuelei Chen (xuelei@cosmology.bao.ac.cn), Shude Mao (smao@nao.cas.cn)