

Z103a Molecular gas reservoirs of cluster galaxies at cosmic noon

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Galaxy clusters in the local Universe are occupied by massive quiescent galaxies. The environment is one of the critical factors to govern galaxy evolution, however, the specific quenching processes remain unclear. Our Subaru observations have revealed that many galaxies located in the core regions of galaxy (proto-)clusters at $z \sim 1.5\text{--}2.5$ still keep star formation activity. These cluster galaxies must enter a quenching phase soon, given that galaxy clusters at $z \sim 1$ are already dominated by quiescent galaxies. In this talk, we would like to discuss the gas content of cluster galaxies which is closely linked to star formation. We conduct ALMA observations for four galaxy (proto-)clusters at $z \sim 1.5\text{--}2.5$ to know molecular gas reservoirs of the member galaxies. The cluster galaxies with $\log(M_*/M_\odot)=10\text{--}11$ tend to have the fraction of molecular gas mass and the depletion time scale larger than field star-forming galaxies at similar redshifts. The environment of galaxy cluster may help feed the gas through inflow to the member galaxies and also reduce the efficiency of star formation. On the other hand, more massive galaxies at $z > 2$ have molecular gas comparable to or smaller than expected from the scaling relation of field galaxies. The gas fraction of quiescent galaxies in the very center of the cluster at $z \sim 1.5$ is $< 10\%$. The environmental effects on gas properties are likely mass-dependent and also the massive galaxies in the cluster center must quench the star formation activity while consuming most of the gas reservoirs.