X43a ALMA high-resolution study of CO(2-1) line and dust continuum emissions from cluster galaxies at $z = 1.46$

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How did massive elliptical galaxies in nearby clusters form their structure is still an open question. To shed a light on this problem, it is crucial to probe the star formation of high-z cluster galaxies around the peak of cosmic star formation. We present a result of spatially resolved CO(2-1) line observations of cluster galaxies in XCS J2215 at $z = 1.46$. Our sample comprises 17 galaxies at the cluster core, all of which have been detected in CO(2-1) previously. For nine galaxies, the effective radius of both CO(2-1) line ($\sim 0.4''$) and 870μm dust continuum ($\sim 0.2''$) emissions are robustly measured by modeling visibilities. We find that CO(2-1) line emission in all of the galaxies is more extended than dust continuum emission by factors of ~ 2. We also investigate the spatially resolved Kennicutt-Schmidt relation and reveal that the inner region of galaxies tends to have higher star formation efficiency (SFE) compared to the extended region. Overall, our result indicates that star formation is concentrated and enhanced at the central part of the galaxies, supposedly resulting in the formation of a bulge structure. Furthermore, we notice the consistency between the stellar radius of passive members and the dust radius of our galaxies, and discuss our galaxies will likely turn into passive members within 1 Gyr. Finally, we do not find any difference between galaxies with close companions and without them.