

X11b The Extended [C II] under Construction? Observation of the brightest high- z lensed star-forming galaxy at $z = 6.2$

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Over the past decades, several optical/near-infrared surveys have built large samples of high-redshift galaxies at $z > 6$. Further, recent rapid progress of [CII] $158 \mu\text{m}$ emission line surveys made it possible to reveal interstellar medium (ISM) properties for > 100 of galaxies at high redshift. To date, these high- z ISM observations, however, have been mostly limited to massive star-forming galaxies (e.g., $M_* > 10^{10} M_\odot$) and we only have small samples of less evolved, low-mass/low-SFR galaxies. This is because detailed ISM observations of relatively low-mass galaxies are still one of the major challenges even for extremely sensitive interferometer (e.g., ALMA) as they are intrinsically faint. One method to push to fainter limits is to adopt strongly lensed galaxies to investigate the detailed properties of high-redshift, low-mass galaxies in a feasible observing time.

In this talk, we report an observation of a strongly ($\mu \sim 22$) lensed $\sim L^*$ star-forming galaxy: MACS0308-zD1 at $z \sim 6.2$. We clearly detect a [CII] $158 \mu\text{m}$ emission line and measure the spectroscopic redshift of MACS0308-zD1 for the first time. Making use of high-resolution, high-sensitivity ALMA observations, we also study the velocity structure and morphology of the [CII] emission. These suggest multiple components of [CII] emission that are distinct in spatial and spectral directions. Further, with the extremely compact sizes of $r_e \sim 27 \text{ pc}$ and the high [CII] luminosity, MACS0308-zD1 represents one of the most extreme star-formation environments in the epoch of reionization.