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Presentation Requested: oral

Category: Evolution of the Interstellar Medium and Star formation over Cosmic Time

Question: What have we or will we learn about the chemical evolution of galaxies over cosmic time with ALMA, JWST and other telescopes? Is there a metallicity density w/ redshift relationship? What molecular and atomic species have we detected with ALMA and how have they helped us better understand the composition and evolution of galaxies?

Dense gas in main-sequence galaxies at $z \lesssim 1$

The last few years have seen a dramatic increase in the number of main-sequence galaxies detected in CO line emission. While these observations have been able to answer critical questions about this important population of galaxies, still little is known about the properties of their molecular gas due to the lack of multiple line detections in these sources. Here, I will give a brief summary of current multiple CO line observations in massive main-sequence galaxies. Furthermore, I will present the first [OI]63 μ m emission line observations in a sample of 4 BzK galaxies at $z=1.5$ obtained with Herschel, and I will show detections of the CO(4–3) and [CI] 1–0 lines on one massive star-forming disk galaxy at $z=2$. The measurements are used to model the dense gaseous ISM in these galaxies.