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Presentation Requested: oral

Category: Assembly of Galaxies / Mass & Structure Evolution

Question: Other

Physical Conditions for Star Formation in Typical Galaxies and Extreme Starbursts within the First Giga-Year of Cosmic Time

Dusty starburst galaxies at very high redshift represent an important phase in the early evolution of massive galaxies. They typically represent large-scale, gas-rich major mergers that trigger intense, short-lived bursts of star formation, which consume most of the available gas and drive the morphological transition to spheroids. At early cosmic epochs, these hyper-luminous galaxies commonly trace regions of high galaxy overdensity, and may be directly related to the formation of galaxy clusters and their giant central ellipticals. Molecular and atomic gas plays a central role in our understanding of the nature of these often heavily obscured distant systems. It represents the material that stars form out of, and its mass, distribution, excitation, and dynamics provide crucial insight into the physical processes that support the ongoing star formation and stellar mass buildup. I will present our recent progress on identifying and studying the first significant sample of dusty starbursts within the first billion years of cosmic time (at redshifts greater than 5) using CARMA, the Jansky Very Large Array, the Plateau de Bure interferometer, and the Atacama Large (sub)Millimeter Array (ALMA). Detailed imaging of the environment of one of our starbursts in the [CII] 158 micron line with ALMA has also resulted in the first detections of the star-forming interstellar medium in "typical" galaxies at $z > 5$. I will discuss the properties of these comparatively faint objects, and the potential impact of this discovery on future [CII] surveys at the highest redshifts with ALMA and CCAT.