

ALMA2019: Science Results and Cross-Facility Synergies



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ALMA unveils massive galaxies at $z > 3$ that are hidden from Hubble

Monday, October 14, 2019 12:20 PM (15 minutes)

Contributed Talk

Abstract:

“Our current knowledge on the cosmic star formation history at $z > 3$ is mainly based on galaxies identified in the ultraviolet (UV) light. However, such galaxies are known to be biased against massive galaxies, most of which are dim in the UV due to dust obscuration and/or old stellar populations. This raises important questions as to what is the true abundance of massive galaxies and star formation rate density in the early universe. While a few massive UV-faint galaxies have been identified at early cosmic times^{2–5}, most of them are extreme starbursts, which unlikely represent the bulk population of massive galaxies. Here we report ALMA-870 μm detections of ~ 40 massive star-forming galaxies at $z > 3$ that are undetected even in the deepest near-infrared imaging with HST. With a space density of $n \sim 2 \times 10^{-5} \text{ Mpc}^{-3}$ and star formation rates of $\sim 200 \text{ M}_{\odot}/\text{yr}$, these galaxies are representative of normal massive galaxies and contribute a total star formation rate density ten times larger than that from equivalently massive UV-bright galaxies (LBGs) at $z > 3$. Residing in the most massive halos at their redshifts, they are likely the progenitors of present-day largest galaxies in massive groups and clusters. Such a high abundance of massive and dusty systems in the early universe is unexpected in current models, and challenges our understanding of massive galaxy formation.”

Presenter: Dr WANG, Tao

Session Classification: Cosmology