

Molecular Gas in High-Redshift Submillimeter Galaxies

D. T. Frayer, N. Z. Scoville (Caltech)

We present CO and mm continuum observations of the luminous population of high-redshift sub-mm galaxies taken at the OVRO Millimeter Array. Studies of sub-mm galaxies are vital to our understanding of the formation and early evolution of galaxies since this population could account for a significant fraction of the total amount of star formation and AGN activity at high redshift. We discuss the CO detections for SMM J02399-0136 at $z = 2.8$ and SMM J14011+0252 at $z = 2.6$. The CO data show the presence of massive molecular gas reservoirs ($M(\text{H}_2) \sim \text{few} \times 10^{10} - 10^{11} M_\odot$) and provide the only two confirmed redshifts for the sub-mm population of galaxies. These data suggest that the sub-mm galaxies are gas-rich systems which have properties similar to ultraluminous infrared galaxies. Many sub-mm galaxies are thought to be at very high redshift ($z \gtrsim 3$) since their radio and optical emissions are extremely weak. In these cases, interferometric mm-continuum observations are required to obtain an accurate position for the sub-mm counter-part. We report the detection of mm-continuum emission from one sub-mm galaxy which has yet to be detected at optical/near-infrared wavelengths ($I \gtrsim 26$, $K \gtrsim 21$). These results highlight the importance that future mm/sub-mm observations will have on our understanding of the high redshift universe.

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