X34a High-resolution mapping of molecular gas in starburst galaxies at $z \sim 1.6$ with ALMA

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Starburst galaxies provide excellent laboratories to study the physical conditions of the interstellar medium most conducive to rapidly forming stars, particularly in a gas-rich regime at high redshift. Locally, galaxy mergers are well understood to induce gas inflow to the nuclear region thus resulting in a central starburst and, in some cases, an accreting supermassive black hole. Such mergers are major events in the life cycle of most massive galaxies through which they rapidly build up their stellar mass. Are such phenomenon as effective at high redshift where most of the constituent galaxies have significantly higher gas fractions? To answer this question, we have been carrying out an investigation with ALMA of the molecular gas content, as traced by the CO 2-1 and 5-4 transitions, of 12 starburst galaxies at $z \sim 1.6$. Our program is establishing the gas content, star formation efficiency (i.e., gas depletion timescale), and role of mergers in driving galaxies to such extremes from the more typical star-forming population (Silverman et al. 2015, 2018a,b). We will report on our ALMA program including observations of CO 5-4 at higher spatial resolution (0.1-0.3") on 1 - 2 kpc scales where we detect individual components of a major merger in one case (PACS-787) and two other starbursts being closer to final coalescence. We find rapid consumption of molecular gas in starbursts with an efficiency (depletion time) that increases (decreases) in a continuous fashion with the boost in star formation.