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The efficiency of star formation in the Antennae galaxies[1] ALLISON MATTHEWS, KELSEY JOHNSON, University of Virginia, Department of Astronomy — Using Atacama Large Millimeter Array (ALMA) Cycle 0 data and Hubble Space Telescope (HST) images, we calculate the spatially resolved star formation efficiency (SFE) in the Antennae galaxies, a nearby major merger to the Milky Way. The SFE describes how effectively a galactic environment converts the gas in molecular clouds to stars, and is a fundamental parameter for simulations of galaxy evolution in the early universe. Specifically, we implemented new and objective methods (i.e. a weighted Voronoi tessellation) to divide the CO($J = 3 - 2$) integrated intensity map, which traces star forming gas, into intensity-weighted bins which intelligently encapsulate star forming regions. This provides us with an empirical and standardized method to calculate spatially resolved SFE. By using the ALMA CO($J = 3 - 2$) flux as a tracer of the total gas mass in conjunction with the mass of the stars derived from the optical and near-infrared images from HST, we calculated the star formation efficiency. We find a correlation of SFE with the age of the spatially coincident star clusters. With this correlation, we better constrain the timescales on which star formation occurs and determine the effect that young, massive stars have on the efficiency of star formation.

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