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Probing the Physical Conditions of Massive Cluster Formation With ALMA

Globular clusters must have been formed prolifically a few billion years after the Big Bang, and these clusters are commonly used as "test particles" for tracing galaxy mergers and evolution. However, observationally constraining the physical conditions that give rise to massive star clusters has been a long-standing challenge. Our team's ALMA observations of the Antennae Galaxies confirm and characterize a potential proto-globular cluster molecular cloud. This CO has no associated Pa_{β} or thermal radio emission, indicating that star formation has not yet begun – this allows us to assess the physical conditions *before* the onset of star formation. The observed CO(3-2) intensity and size of the cloud imply a mass of at least 10^7 M_{sun}. The observed properties indicate that this cloud appears to be subject to remarkable external pressure (potentially as high as P/k$\sim$ 10^8 K cm$^-$3). A comparison with ALMA CO(2-1) science verificat! ion observations and non-LTE analysis yields an excitation temperature of $\sim$25K; an equilibrium state would require significant internal nonthermal pressure. I will give an overview of the ALMA observations, discuss the properties of this extraordinary source, and put these results in the context of what we know about the formation of globular clusters.