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Entitled

MOLECULAR CLOUD PROPERTIES IN HIGH-MASS STAR FORMING REGIONS

by

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Abstract

Using high spatial resolution observation of $^{12}\mathrm{CO}(2-1)$ and $^{13}\mathrm{CO}(2-1)$ emission, I present the molecular cloud properties of $\mathrm{N}42$ in the Small Magellanic Cloud. The observations were taken using the Atacama Large Millimeter Array observations. I conducted a thorough analysis of molecular gas properties to understand how the cloud properties of $\mathrm{N}42$ differ from those of Galactic clouds. My analysis shows that, in $\mathrm{N}42$, the majority of CO emission appears clumpy, while molecular cores with YSOs exhibit greater linewidths and masses. Massive clump cores are associated with YSOs. Virial analysis of the $^{12}\mathrm{CO}$ and $^{13}\mathrm{CO}$ emissions determine the clump masses. The clumps are concluded to be in self-gravitational virial equilibrium, according to the study of velocity dispersion versus radius (σ-v) relationship. The (σ-v) relation of the $^{12}\mathrm{CO}$ clumps is fitted with a power law index of 0.4 ± 0.1. This relation in $\mathrm{N}42$ has a power-law behaviour that is consistent with many Galactic clouds such as cloud N55 in the Large Magellanic Cloud irrespective of metallicity effect.

Keywords: ALMA, gravitational equilibrium, high-mass star formation, high-mass stars, HII region, molecular cloud cores, young stellar objects.