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The structure and dynamics of the 30 Doradus molecular cloud as revealed by ALMA

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We present results of a wide-field (approximately 60×90 pc) ALMA mosaic of CO(2-1) and $^{13}\text{CO}(2-1)$ emission from the molecular cloud associated with the 30 Doradus star-forming region. Three main emission complexes, including two forming a bowtie-shaped structure extending northeast and southwest from the central R136 cluster, are resolved into complex filamentary networks. Consistent with previous studies, we find that the central region of the cloud has higher line widths at fixed size relative to the rest of the molecular cloud and to other LMC clouds, indicating an enhanced level of turbulent motions. However, there is no clear trend in gravitational boundedness (as measured by the virial parameter) with distance from R136. Structures observed in ^{13}CO are spatially coincident with filaments and are close to a state of virial equilibrium. In contrast, ^{12}CO structures vary greatly in virialization, with low CO surface brightness structures outside of the main filamentary network being predominantly unbound. The low surface brightness structures constitute $\sim 10\%$ of the measured CO luminosity; they may be shredded remnants of previously star-forming gas clumps, or alternatively the CO-emitting parts of more massive, CO-dark structures.