A Multiscale View of Three Massive Molecular Clouds in the Central Molecular Zone: Fragmentation in an Extreme Environment

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Fragmentation is a key process linking molecular clouds to star formation, yet its behavior under extreme environmental conditions remains poorly understood. The Central Molecular Zone (CMZ), characterized by high gas temperatures, strong turbulence, strong magnetic fields, and high cosmic-ray ionization rates, provides a unique laboratory for testing how molecular clouds collapse and fragment to form stars. In this talk, I present a study of multiscale fragmentation in three massive CMZ clouds: the 20 km s^{-1} cloud, Sgr C, and Sgr B1-off/Dust Ridge cloud e. Using high-resolution submillimeter interferometric observations, we characterize dense structures from ∼0.1 pc cores to ∼2000 au condensations and ∼300 au fragments. We find that fragmentation from 0.1 pc to 2000 au appears active and broadly similar to that in Galactic disk high-mass star-forming regions. In contrast, fragmentation from 2000 au to 300 au is much less efficient, with most condensations showing no detected substructure. Virial analysis including external pressure suggests that many childless condensations are pressure-confined rather than self-gravitating, implying that their lack of substructure may reflect their transient or prestellar nature. These results indicate that extreme physical conditions in the CMZ may impede fragmentation at small scales, potentially contributing to the suppressed star formation observed in the CMZ.