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The Highly Filamentary Central Molecular Zone Revealed by ACES

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The Central Molecular Zone (CMZ) of the Milky Way primarily controls the gas flow from the disc of the Galaxy towards the central nucleus. The CMZ is well-documented to have extreme gas properties that clearly distinguish it from the rest of the Galaxy. While this region has been the subject of intense research, the CMZ-wide properties of the molecular gas at high angular resolution are relatively unexplored. Using Band 3 data from the ALMA ACES (ALMA CMZ Exploration Survey) program, we reveal the highly filamentary nature of CMZ molecular gas at unprecedented resolution (˜0.1 pc) seen in the HNCO 4(0,4)–3(0,3) line, while these features are seen in other molecular tracers as well. Visual inspection of these data suggest that there are two morphological classes of elongated structures, which we identify as: i) large-scale (> 5 pc) filamentary structures (LFs) potentially connected to the CMZ orbital streams; ii) a ubiquitous population of small-scale < 0.5 pc filamentary structures (SFs). Here, we present the morphological and kinematic properties of these structures, their association with magnetic fields, and their degree of chemical complexity.

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