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Distinguishing the Central Molecular Zone from Spiral Arms Using Fourier Space Filtering

Accurately determining the properties of the Milky Way's Central Molecular Zone (CMZ) poses a complex challenge for astronomers due to significant contamination from the Galactic Spiral Arms, through which we observe. In position-velocity space, the CMZ is characterised by signals exhibiting high velocity dispersion, while the Spiral Arms show extensive spatial dispersion. To address this obstacle, we have developed a novel method utilising Fourier transform and filtering techniques to effectively separate these signals. We apply these methods to the ^{12}CO & ^{13}CO J = 3 - 2 data obtained as part of the CHIMPS2 survey. By transforming the data to the frequency domain and applying band filtering techniques, we isolate the distinct frequency components associated with the CMZ and Spiral Arms. Preliminary results demonstrate the efficacy of our method in distinguishing between the CMZ and Spiral Arm signals, and shows promise for enhancing our understanding of the structure and dynamics of these regions and allowing for direct comparison of their properties from single data sets. Additionally, we can obtain preliminary measurements of the newly isolated Spiral Arm's physical properties. This method shows potential as a robust tool for astronomers to analyse complex galactic environments, facilitating more accurate interpretations of observational data.

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