

ALMA2019: Science Results and Cross-Facility Synergies



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The ALMA Galactic Center Molecular Cloud Survey

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Contributed talk

Abstract:

“Recent research has delivered fascinating insights into the physics of the Central Molecular Zone (CMZ; inner ~ 100 pc) of the Milky Way. The molecular clouds in the CMZ, though turbulent on large spatial scales (~ 5 pc), contain dense cores of 0.1 pc size that are not more turbulent than what is typically found closer to the Sun. Also, while these clouds are of a high average density on large spatial scales, the embedded cores are of a rather modest density.

In brief, this means that the gas in the CMZ on spatial scales immediately related to star formation “does not know” about the extreme physical conditions prevailing on large spatial scales. This finding has profound implications for ALMA-based studies of star formation under extreme environmental conditions, such as those that prevailed in the early cosmos and in starbursts.

But what causes these surprising trends in cloud structure? Are they, for example, consequences of cloud-cloud collisions or of the extreme magnetic field strength prevailing in the CMZ? The ALMA observations of the Galactic Center Molecular Cloud Survey (GCMS), a massive (i.e., ~ 25 h) survey of major clouds in the CMZ, were tailored to deliver answers. This in particular includes imaging of key diagnostic molecules (e.g., H₂CO and SiO) for clouds throughout the CMZ. This unique and comprehensive data set now allows us to understand the physics of the CMZ based on detailed modeling of the numerous processes affecting the molecular clouds in the Galactic Center.”

Presenter: Dr KAUFMANN, Jens

Session Classification: Galaxies