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ALMA-IMF Large program, toward the understanding of the origin of the IMF

Monday, 14 October 2019 15:00 (25 minutes)

Invited talk

Abstract:
"Understanding the processes that determine the stellar Initial Mass Function (IMF) is a critical unsolved problem, with profound implications for many areas of astrophysics (Offner et al. 2014). In molecular clouds, stars are formed in cores, gas condensations which are sufficiently dense so that gravitational collapse converts most of their mass into a star or a small clutch of stars. In nearby star-formation regions, the core mass function (CMF) is strikingly similar to the IMF, suggesting that the shape of the IMF may simply be inherited from the CMF (e.g. Testi & Sargent 1998).
Studying extreme protoclusters is necessary to test if the IMF is universal - emerging naturally from any initial conditions in molecular clouds. During cycle 2 of ALMA, we mapped the W43-MM1 hypermassive molecular cloud. This structure, being extreme in terms of cloud concentration and star formation activity, is a case-study to confront models up to their limits. The 1 mm image reveals a rich cluster of about 300 cores with 2000 AU sizes and masses ranging from 1.6 to 100 Msun.
The resulting core mass function (CMF) is 'top-heavy', meaning that there is an important deficit in low/intermediate mass cores despite our excellent detection threshold of 1.6 Msun. This was the first measure of divergence between CMF and IMF. This result motivated the proposition of the Large-Program ALMA-IMF that was accepted in cycle 5. I will describe the strategy we adopted within the ALMA-IMF large program and present its first results."

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Session Classification: ISM, SF