Challenging the relation between cores masses and stellar masses: from W43-MM1 to the ALMA-IMF large program

- Thomas Nony

The ALMA-IMF large program (PIs: Motte, Ginsburg, Louvet, and Sanhueza) aims at investigating the origin of the IMF in 15 massive protoclusters. After introducing this ongoing project, I will present the results of our pilot study on W43-MM1, the archetype precursor of galactic starburst clusters ($\sim$ 2 x 10^4 Msun within 6 pc^2 , SFR = 6000 Msun/Myr). Thanks to the high angular resolution of ALMA, W43-MM1 images revealed about 130 cores with typical sizes of 2000 AU. The Core Mass Function (CMF) built from this sample covers an unprecedented mass range and contains cores forming solar-type stars up to the highest-mass stars. The CMF slope is quantitatively flatter than that of the reference IMF of Salpeter. This seriously challenges our understanding of the origin of the IMF. In the second part of my talk, I will describe the best high-mass prestellar core candidate we found in W43-MM1. The mass of this core, $\sim$60 Msun within 1300 AU, associated with its cold dust temperature $\sim$ 20 K and the lack of CO and SiO outflow ejection, makes it an unique object in our sample. Further investigation such as line surveys are necessary to better characterize the evolutionary status of the core.

Clusters