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Investigating the origin of stellar masses with ALMA-IMF

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The origin of stellar masses and the link between core and stellar mass distributions (CMF and IMF respectively) are a central open issue in astrophysics. I will present the ALMA-IMF Large Program, whose goal is to determine if and how the origin of the IMF depends on the cloud characteristics and evolution. We surveyed 15 massive protoclusters covering a wide variety of Galactic environments and evolutionary stages (Motte et al. 2022; Galvan-Madrid et al. 2024). ALMA-IMF provides the community an homogeneous database of about 1000 cores (Louvet et al. 2024), 25% of which qualify as protostellar as they drive outflows (Nony et al. 2023) and hot cores (Bonfand et al. 2024).
ALMA-IMF results indicate that the mass distributions of cores in these massive environments of the Milky Way present an excess of high-mass cores with respect to the canonical IMF (Pouteau et al. 2022; Louvet et al. 2024). We propose that the CMF deviates from the canonical IMF form when and where a burst of star formation develops (Nony et al. 2023; Pouteau et al. 2023; Armante et al. 2024). Based on the combined analysis of the core distribution (CMF, mass segregation) and cloud structure (PDF), we propose an evolutionary sequence of massive protoclusters, which is in line with the dynamical scenarios of cloud and star formation (e.g., Motte et al. 2018a; Vazquez-Semadeni et al. 2019).

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