

ALMA2019: Science Results and Cross-Facility Synergies



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ALMA reveals a magnetically-regulated scenario for protostellar collapse: B335 & future perspectives.

Tuesday, 15 October 2019 09:55 (15 minutes)

Contributed talk

Abstract:

“Understanding the first steps in the formation of stars and protoplanetary disks is a great unsolved problem of modern astrophysics. Observationally, the key to constraining theoretical models lies in high-resolution studies of the youngest protostars. I will show our SMA and ALMA observations of the magnetic field topology in a sample of young protostars, and especially in the nearby B335 protostar where our ALMA observations have allowed to identify for the first time a scenario of magnetically-regulated collapse (Maury+ 2018). I will show how ALMA observations of the youngest, Class 0, disks confirm our early results (Maury+ 2019) that most young protostellar disks (>75%) are only found at very small radii <60 au, which may suggest magnetically-regulated models need to be considered for protostellar disk formation beyond the B335 case. I will also present our ALMA observations of the molecular line emission in a very young solar-type protostar suggesting a disk is currently forming in counter-rotation with respect to the protostellar core rotation, and discuss potential scenarios to understand this oddity (Maury+ in prep). I will argue that our ALMA observations of small disks, counter-rotating disks and organized magnetic fields in the youngest star-forming cores question the established paradigm of disk formation as a simple consequence of angular momentum conservation during the main accretion phase. They instead highlight the need to investigate magnetized models in order to unveil the mechanisms responsible, during the main accretion phase, for the pristine protoplanetary disk properties.”

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