Contribution ID: **66** Type: **Review/Invited talk**

Magnetized star formation

Wednesday 7 May 2025 11:10 (30 minutes)

Molecular clouds have a tiny fraction of ions, but high enough to make them to be dynamically sensitive to the presence of the interstellar magnetic field. The role of the magnetic field in the dynamics of the molecular clouds at all scales, and in the process of the star formation, have been a source of vivid debate for the last 3 decades. A relatively strong magnetic filed can prevent fragmentation and removes efficiently the angular momentum through the magnetic braking process. The magnetic field can also play an important role in the formation of planet-forming disk and their early evolution. However, there are several physical processes that can diminish its importance, such as ambipolar diffusion, Ohmic dissipation, the Hall effect or turbulence reconnection. Measuring the properties of magnetic fields relies mostly on the linear polarization of aligned aspherical dust grains, in the Zeeman effect of species such OH and CN, and in the Goldreich-Kylafis effect in molecular lines. In this talk, I will also talk about the recent progress done since ALMA offered polarization capabilities in some frequency bands. There have been various attempts to better characterize the properties of the magnetic fields at core scales (<0.1 pc) in various surveys such as MagMaR (Magnetic Fields in Massive Star-forming Regions), BOPS (B-field Orion Protostellar Survey) o ALPPS (ALMA Perseus Polarization Survey). The first results of these works will also be presented here.

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Session Classification: Session 3