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Unveiling the accretion-ejection connection in nascent Sun-like stars

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Disks around nascent stars are the birthplace of planets. However, many critical aspects of planet formation are still highly uncertain, in particular the impact of winds on disk evolution. Indeed, magnetic outflows launched from the disk surface (‘MHD disk-winds’) have recently been invoked to extract angular momentum and drive accretion, regulate dust growth, and prevent inward planet migration. The unique combination of sensitivity and angular resolution offered by ALMA and the future JWST is now allowing us to conduct stringent tests on the presence of MHD disk-winds and quantify their impact on planet-forming disks.
In this seminar, I first present an ALMA study of the Sun-like protostellar system HH212 that has uncovered a SO/SO2 rotating flow wider and slower than the axial rotating SiO jet. The global kinematics and the mass-flux of the flow down to 0.04-0.02” (16-8 au) scales may be fitted by an MHD disk-wind model launched out to the outer disk radius (∼40 au), with SiO tracing the dust-free streamlines from 0.05−0.3 au (Tabone+2017; Tabone+2020a). The surprising molecular richness of the dust-free part of the wind is further investigated with astrochemical models (Tabone+2020b). The extension of such tests to more evolved sources, together with tests based on the observed perturbation of the wind by bow-shocks (Tabone+2018), are also discussed. Finally, I present my ongoing modelling effort to derive the local UV radiation field - a key parameter that controls the chemistry of the disk and the launching of the wind - from the OH lines to be observed by JWST/MIRI.