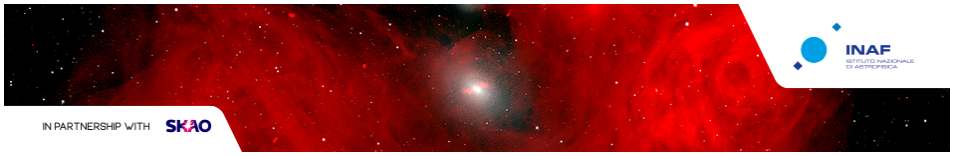

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The importance of feedback and magnetic fields from diffuse medium to dense cores and protostellar jets in our Galaxy: radio continuum and synchrotron emission in the SKA era

Wednesday, 29 November 2023 11:30 (40 minutes)

The massive star formation process involves various scales, spanning from giant molecular clouds, parsec-scales structures, down to the innermost regions of the star-forming cores. To fully understand the whole process, it is essential to analyse key interstellar medium properties, such as the interplay between gravity, turbulence, and magnetic fields, along with the impact of feedback from young high-mass star-forming regions. Recently, large-scale surveys using telescopes such as Herschel, APEX, and ALMA enabled the investigation of the role of gravity and turbulence from tens of parsec down to thousands of AU scales. Two critical aspects remain unexplored: 1) a comprehensive understanding of feedback at different scales and 2) the role of magnetic fields in star-forming regions.

Both feedback and magnetic fields can be investigated through radio emission observations in massive regions in the most unbiased way across the various environments in the Galaxy. A first Galactic Plane survey in L-band with MeerKAT has been recently performed, and a first pilot survey of a portion of the Galactic Plane at 3GHz, using MeerKAT(+), is underway to further demonstrate their potential as SKA precursors. A future Galactic Plane survey carried out with SKA at ~15 GHz aims to supplement these ancillary data, providing for the first time enough spectral coverage on a large portion of the Galaxy. This comprehensive approach will enable the first complete census of HII regions. Using specifically developed theoretical models, we will be able to shed light on the pristine phases of star-forming regions, quantify the energetics released as feedback onto natal clumps, and make clear the role of magnetic fields in the dynamical evolution.

Reasearch area

Our Galaxy

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