GALACTIC OBSERVATIONS OF THE MULTIPHASE MAGNETIZED ISM

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The physics of diffuse matter in galaxies is a cornerstone of galaxy evolution. The ISM plays a dual role because it is both a heat reservoir and a cooling agent. On the one hand, the turbulent multiphase structure of the ISM is driven by feedback processes and, on the other hand, the ability of this medium to cool controls the formation of gravitationally bound molecular clouds where stars form. This lecture will provide insights into the multi-wavelength Galactic observations that contribute to our understanding of ISM physics. While telescopes offer ever greater sensitivity and angular resolution to study the ISM in external galaxies, Galactic observations remain best suited to study some key aspects, notably the multiphase structure of interstellar matter, the turbulent energy cascade across scales and phases, and the interplay between gas dynamics and interstellar micro physics. I will illustrate these topics by showing how observations inform us about the structure and energetics of the ISM, interstellar magnetic fields and the life cycle of dust.