

Proposal Abstract:

Surveys of molecular gas in the Solar neighbourhood and the inner Galaxy have shown that molecular clouds are statistically virialized between the turbulent kinetic energy (E_k) and the self-gravitational energy (E_g), namely the virial parameter $\alpha_{\text{vir}}=2E_k/|E_g|\sim 1$. Nevertheless, our recent work shows that α_{vir} decreases towards the metal-poor outer Galaxy and is systematically smaller than unity at Galactocentric radii $R_{\text{gc}} > 15$ kpc. This suggests that turbulence cannot support against the cloud's self-gravity in such conditions. While we show that the magnetic field (B) is the most plausible mechanism to provide the additional support, we are in lack of direct measurements. In this proposal, we aim to measure the B -fields of two outer disk molecular clouds using the Zeeman effect of HI Narrow line Self-Absorption (HINSA). This will be the first measurement of B -field of molecular clouds in the outer Galaxy and will highlight the importance of B -field in influencing the dynamics of molecular clouds.