

Proposal Abstract:

The interstellar magnetic field is one of the most important physical quantities regulating star formation in molecular clouds. The Zeeman effect is the only feasible method to directly measure magnetic field strength in molecular clouds, but remains extremely difficult with only three tracers available for systematic measurements. Recently, we have obtained the first HI Narrow Self-Absorption (HINSA) Zeeman detection (Ching et al. 2022, Nature cover article), and our ongoing results indicate that HINSA can become the fourth Zeeman probe. Because FAST Zeeman observation can only trace the line-of-sight magnetic field at a relatively low angular resolution, here we propose synergy works with JCMT dust polarization observations for plane-of-sky magnetic field and VLA Zeeman observations in order to construct 3-dimensional structures of magnetic fields and reveal the magnetic fields from outside to inside of the star-forming dense cores.