# Measuring Magnetic Fields in Interstellar Molecular Clouds

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The role of magnetic fields in the physics of dense molecular clouds and in the star formation process remains unclear. If sufficiently strong, magnetic fields may support clouds against gravitational collapse and thus prevent or delay star formation. They appear to provide the only viable mechanism for transporting angular momentum from collapsing cores – necessary for subsequent star formation. Finally, magnetic fields may play a significant role in the physics of bipolar outflows that accompany protostar formation. All techniques available for probing the strength and morphology of magnetic fields in molecular clouds involve measuring the polarization of continuum or spectral-line radiation. Such polarization observations are non-trivial because this polarization is typically only a few percent of the strength of the total intensity, and because instrumental polarization is often significant.

Techniques that may be used for molecular clouds are measurement of the Zeeman effect in molecular spectral lines, measurement of the Goldreich-Kylafis effect (linear polarization in spectral lines due to anisotropic radiative transfer), and linear polarization in dust emission or absorption. Although only the Zeeman effect directly yields magnetic field strengths, a statistical method first proposed by Chandrasekhar and Fermi can yield field-strength estimates with the other techniques. I will briefly review these techniques and the instrumental requirements that radio telescope systems must meet. Data for DR21OH will be presented to illustrate study of magnetic fields in one dense molecular cloud. SCUBA dust-emission polarimetry has mapped the large-scale morphology of the field while BIMA synthesis imaging of dust polarization has mapped the small-scale field morphology in the high-mass double core of DR21OH. BIMA has mapped a double CO bipolar outflow originating in the double core; its relation to the magnetic field will be discussed. The Goldreich-Kylafis effect has been mapped in both the CO J = 2 - 1 and 1 - 0 transitions; polarization directions are orthogonal in the two transitions. Finally, the Zeeman effect has been measured in CN N = 1 - 0 transitions with the IRAM 30-m telescope. Thus, a fairly complete picture of the magnetic field strength and morphology is available, making it possible to discuss the role of the magnetic field in the physics and evolution of this dense molecular cloud core.