LINEAR POLARIZATION OF INTERSTELLAR MOLECULAR LINES

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Linear polarization of spectral line radiation from molecular gas was proposed theoretically 25 years ago to occur under anisotropic conditions, but this effect has only been detected in the interstellar medium in the last few years. The prediction is that linearly polarized radiation of a few percent is likely to be detected from molecular clouds in the presence of a magnetic field. The direction of this polarization should be either parallel or perpendicular to the magnetic field, depending on the angles between the line of sight, the magnetic field, and the direction associated with the anisotropic excitation. Mapping of linear polarization of the J=1-0 and J=2-1 transitions of CO toward the DR21OH molecular cloud with the BIMA array has shown the surprising result that the polarizations of the two lines are orthogonal. I briefly describe the physics that can produce linearly polarized line emission, a model of the DR21OH molecular cloud, and a theoretical treatment of the multilevel excitation and radiative transfer of CO in order to interpret these observations and to infer physical conditions in the molecular cloud. Samples of observations toward other molecular clouds will also be shown.