Abstract Submitted
for the MAS21 Meeting of
The American Physical Society

Tracing 3D Magnetic Field Structure Using Dust Polarization and the Zeeman Effect[1] BRANDON SHANE, Rutgers University, BLAKESLEY BURKHART, Rutgers University, Center for Computational Astrophysics, LAURA FISSEL, Queen's University, SUSAN CLARK, Stanford University — Tracing the full three-dimensional magnetic field structure of a molecular cloud is vital for models that predict star formation rates and essential for studies of galaxy evolution. However, it is difficult to observationally trace the magnetic field in star forming regions. We compare Plane-of-Sky (POS) tracers of the magnetic field direction via the polarization of dust grains with the Line-of-Sight (LOS) magnetic field as traced by the Zeeman effect. We use 3D numerical simulations of star forming clouds run with the AREPO code to determine the statistical relationships between the LOS and POS magnetic fields in order to determine the inclination angle of the magnetic field. We find trends between the synthetic polarization measurements and the inclination angle of the strongest magnetic fields. However, there is degeneracy in synthetic polarization measurements when the strength of magnetic energy is weak compared to the turbulence energy. Comparing the LOS magnetic field information allows us to break the degeneracy in the synthetic polarization measurements showing that, if the ratio of the magnetic to turbulent energy (Alfven Mach number, Ma) is known, then the inclination angle of the magnetic field is available from observation.

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Date submitted: 06 Nov 2021 Electronic form version 1.4