Preferential Misalignment Between Magnetic Fields and Rotation Axes in High-Mass Protostellar Disks

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In high-mass star formation, protostellar disks are crucial for channeling material onto young stellar objects, preventing stellar feedback from prematurely halting mass growth. However, the exact role of magnetic fields in this accretion process remains debated. Theory predicts that magnetic braking can inhibit disk formation by transporting angular momentum outward. Numerical simulations suggest that the magnetic braking efficiency can be reduced by a misalignment between the magnetic field and the disk's angular momentum. To address this, we used ALMA observations of 30 high-mass star-forming regions to compare disk kinematics on ~100 AU scales with magnetic field properties on core scales at ~2000 AU. We measured the magnetic field orientations for 31 disk candidates, identified using high-resolution molecular line emission. For each rotation-like disk, the rotation axis was inferred to be perpendicular to the observed velocity gradient. We find that the rotation axes of these disk candidates are preferentially misaligned with respect to the local magnetic field direction. We will correlate this alignment/misalignment with the disk properties to infer the influence of the magnetic field on disk formation, and ultimately, the formation of high-mass stars.