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Magnetized Clustered Star Formation in Orion

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Interferometric polarization observations have revealed that magnetic fields are crucial in the star formation process. However, their relative importance in different environments and their role in stellar multiplicity remain poorly understood. The B-field Orion Protostellar Survey (BOPS) recently observed 870 μm dust polarization observations of 61 young protostars in the Orion molecular cloud, probing scales from 400 to 2000 au. The observations reveal standard hourglass magnetic field morphologies in collapsing cores, highlighting the interplay between magnetic fields and gravity, while misaligned or twisted fields indicate the growing influence of rotation and turbulence. Our findings suggest that magnetic fields play a key role in regulating fragmentation within dense envelopes: strong magnetic fields suppress fragmentation by stabilizing against gravitational instabilities, whereas weaker fields allow the formation of binary or multiple star systems. We also find that the magnetic field affects disk formation through magnetic braking, that significant misalignment between the magnetic field and outflow axes tends to reduce magnetic braking, leading to the formation of larger disks.

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