

Simulating Astrophysical Magnetic Fields with Application to Star Formation

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ABSTRACT: Magnetic fields are ubiquitous throughout the Universe, and are the cause of and solution to many problems in theoretical astrophysics. I have developed enhancements to the numerical method Smoothed Particle Magnetohydrodynamics, which I have used to study the importance of magnetic fields on the formation of stars. In particular, these enhancements have resolved issues related to upholding the divergence-free constraint on the magnetic field and with capturing shocks in weak magnetic fields. Fixing these issues has enabled study of a wide range of physical phenomena, such as jets from forming stars, magnetised turbulence in molecular clouds, and magnetic instabilities in accretion discs. In this talk, I will discuss the numerical advancements that have been developed, demonstrating their effectiveness by way of their application to problems in star formation.

ALL ARE WELCOME!!!