

The Formation of Magnetized Molecular Clouds: New Results and Experimental Possibilities.

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Abstract

Molecular Clouds are the birthplace of stars yet fundamental questions as to their origin remain unresolved. Do clouds form from colliding flows, or do they condense out of the background ISM? Are their observed velocity line-widths due to a turbulent cascade of initial and/or externally driven kinetic energy, or is it the result of gravitational collapse? Here we compare the results of various simulations of cloud formation with observed cloud properties to constrain mechanisms related to formation and turbulence.

Using 3-D AMR multi-physics calculations via the code AstroBEAR we carry forward a series of simulations which allow us to compare and contrast two mechanisms for the generation of turbulence: colliding large scale flows which both form the clouds and seed their turbulent motions and internal driving of turbulent motions via interacting stellar outflows. As the study of cloud formation and turbulence is of great interest to the astrophysical community we also introduce possible HED laboratory experiments. In particular we focus on colliding magnetized flows and interacting jets as mechanisms for exploring turbulence in experiments.