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The flow-driven picture of molecular cloud formation: A parameter study of the effects of shear on hydrodynamic instabilities and star formation CHRISTINA HAIG, FABIAN HEITSCH, University of North Carolina, Chapel Hill, JONATHAN CARROLL, University of Rochester — In recent years a flow-driven picture of molecular cloud formation has been presented to explain the narrow age spread of stellar clusters in the solar neighborhood. In this scenario clouds of molecular hydrogen form in the shock boundary between two supersonic streams of atomic hydrogen on scales of tens of parsecs, due to thermal, gravitational, and non-linear thin shell instabilities. These instabilities lead to simultaneous local collapse across the length of the cloud, forming dense cores and stars within a few shock-crossing times. In recent simulations of head-on collisions, observable parameters such as age spread and star formation efficiency have been indirectly measured and found to be relatively accurate. In an effort to extend the robustness of these investigations, our work includes the effects of shear; a reasonable expectation in the interstellar medium. In our work we find that shear flows can inhibit global and local collapse, but still permit the formation of dense cores due to breakup of the shock boundary. Final stellar angular momentum distribution and star formation rates are compared, as well as post-processing of data to form CII maps. These simulations are done in AstroBEAR, a magnetohydrodynamic code with adaptive mesh refinement and self-gravity.

Christina Haig
University of North Carolina, Chapel Hill

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