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Viscosity Measurements in an Ultracold, Strongly-Interacting, Fermi Gas CHENGLIN CAO, JESSIE PETRICKA, JAMES JOSEPH, ETHAN ELLIOT, BASON CLANCY, LE LUO, JOHN THOMAS, Duke University — Experiments and preliminary results measuring the viscosity in an ultracold Fermi gas are presented. An optically prepared, degenerate cloud of Fermionic ^{6}Li placed in an external magnetic field tuned to the location of a scattering (Feshbach) resonance produces a strongly interacting gas. Rotation and subsequent expansion follows a rigorous hydrodynamic form at zero temperature. Experiments at the lowest temperatures confirm this behavior. At higher temperatures perturbative models involving viscous forces can provide an estimate of the temperature dependent viscosity of our sample. The predicted and observed motion is a deviation from perfect hydrodynamic behavior involving slowed expansion along the narrow trap dimensions and accelerated expansion along the long dimension. Attributing the observations solely to our viscosity model shows nearly zero viscosity up to energies of E=Ef. Above this energy, the viscosity rises with a nearly $T^{3/2}$ scaling. We discuss our ongoing analysis and the consistency of our model within fluid mechanics and examine possible extensions necessary to explain observed shape changes within the cloud.

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