

Abstract Submitted  
for the MAR10 Meeting of  
The American Physical Society

**Universal Spin Transport in a Strongly Interacting Fermi Gas<sup>1</sup>**

ARIEL SOMMER, ANDRE SCHIROTZEK, MARK KU, MARTIN ZWIERLEIN,  
Massachusetts Institute of Technology — We study the collision and subsequent diffusion of the two spin components of a strongly interacting Fermi gas. The spin components are initially fully separated via a Stern-Gerlach gradient pulse. By quickly turning on an external magnetic field in the vicinity of a Feshbach resonance we control the interaction between the two spin states in the subsequent collision. From our measurements, we find the spin diffusion coefficient as a function of the interaction strength between the two components. It attains a minimum at the Feshbach resonance on the order of  $\hbar/m$ , where  $\hbar$  is Planck's constant and  $m$  is the atomic mass. At positive scattering length, atoms in the two spin states form molecules as they mix. We observe the formation of molecules and the evolution of the atomic and molecular populations using spatially resolved RF spectroscopy. Our experiment may shed light on the question of whether stable, ferromagnetic spin domains can exist in repulsively interacting Fermi mixtures.

<sup>1</sup>AFOSR-MURI, DARPA-OLE, Alfred P. Sloan Foundation, NSF

Ariel Sommer  
Massachusetts Institute of Technology

Date submitted: 20 Jan 2010

Electronic form version 1.4