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Universal Spin Transport in Strongly Interacting Fermi Gases[1]

ARIEL SOMMER, MARK KU, MARTIN W. ZWIERLEIN, Department of Physics, MIT-Harvard Center for Ultracold Atoms, and Research Laboratory of Electronics, MIT, Cambridge, Massachusetts 02139, USA — We present measurements of the spin transport properties of strongly-interacting two-component Fermi gases (arXiv:1101.0780v1). Spin transport is generated by spatially separating the two spin components in an external potential, and allowing the system to relax to equilibrium. We find that spin drag is greatest when interactions are resonant, while spin diffusivity is minimized on resonance. Varying the temperature on resonance shows that the spin diffusivity approaches a universal minimum set by Planck's constant and the atomic mass. From the spin transport measurements we determine the spin susceptibility of the unitary Fermi gas as a function of temperature. In highly polarized Fermi gases with resonant interactions, we observe maximal spin drag at finite temperatures, with a reduction at low temperatures due to Pauli blocking. Finally, we observe strong spin drag in superfluid Fermi gases with small spin polarization.

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