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Observation of the Leggett-Rice effect in a unitary Fermi gas SCOTT BEATTIE, STEFAN TROTZKY, CHRIS LUCIUK, ALMA BARDON, University of Toronto, EDWARD TAYLOR, McMaster University, SHIZHONG ZHANG, University of Hong Kong, JOSEPH THYWISSEN, University of Toronto — Currents can reveal essential qualities of a system that are not evident from equilibrium measurements. In a trapped cloud, spin currents are natural to study because they can exist without net mass transport. Spin diffusivity, like conductivity, is a measure of the scattering rate. Precession of spin current, also called the Leggett-Rice effect [1], is a measure of the coherent interactions between excitations. In a degenerate Fermi gas of potassium tuned to a Feshbach resonance, we measure the dynamics of a superposition of two hyperfine states. Using a spin-echo sequence, we probe both the phase and amplitude of magnetization dynamics due to transverse spin currents. Transport coefficients are measured as a function of temperature and of scattering length, at and near unitarity.

A. J. Leggett and M. Rice, *PRL* 20, 586 (1968); A. J. Leggett, *J. Phys. C* 3, 448 (1970).

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