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Stoner Instability in a Strongly Repulsive Fermi Gas[1] WUJIE HUANG, CHRISTIAN SANNER, EDWARD SU, AVIV KESHET, JONATHON GILLEN, WOLFGANG KETTERLE, Center for Ultracold Atoms, Research Laboratory of Electronics, and Department of Physics, Massachusetts Institute of Technology — We study the existence of itinerant ferromagtism using a ultracold Fermi gas with short range repulsion in a harmonic trap. A degenerate Fermi gas is rapidly quenched into the regime of strong effective repulsion near a Feshbach resonance. The spin fluctuations are monitored using speckle imaging and, contrary to several theoretical predictions, the samples remain in the paramagnetic phase for arbitrarily large scattering length. We also observe a rapid decay into bound pairs over times on the order of $10\hbar/E_F$ in a wide range of interaction strengths, which is intrinsic by the nature of Feshbach resonance and preventing the study of equilibrium phases of strongly repulsive fermions. Our work suggests that a Fermi gas with strong short-range repulsive interactions does not undergo a ferromagnetic phase transition.

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Wujie Huang
Center for Ultracold Atoms, Research Laboratory of Electronics, and
Department of Physics, Massachusetts Institute of Technology

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