Abstract Submitted
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Ferromagnetic coherence in ultracold fermions L.J. LEBLANC, A.B. BARDON, M.H.T. EXTAVOUR, J. MCKEEVER, D. JERVIS, A. STUMMER, J.H. THYWISSEN, University of Toronto — The interactions between electrons in a metal give rise to itinerant ferromagnetism when the kinetic energy required to promote electrons from one spin state to the other is less than potential energy saved by putting electrons into the same, and thus non-interacting, state. An analogous phenomenon in a system of ultracold neutral fermions has been proposed [1], where the coherence of a superposition of two internal states is maintained against the effects of decoherence for strong repulsive interactions between the constituent states. Ultracold ^{40}K atoms near a Feshbach resonance can be used to study this state. To perform this experiment, atoms are cooled sympathetically by ^{87}Rb in a microchip trap, transferred to an optical dipole trap provided by a Nd:YAG laser at 1064 nm, and exposed to a magnetic field near (201 ± 6) G. We have demonstrated state manipulation of ^{40}K atoms with both radio- and microwaves and have seen the Feshbach resonance in collisional losses from the trap. We are working on a high stability magnetic field to allow for precise control of the interaction strength near the Feshbach resonance. [1] R.A. Duine and A.H. MacDonald, Phys. Rev. Lett. 95, 230403.

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