Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

Dynamics of interacting fermions in spin-dependent potentials[1]
ANDREW KOLLER, JILA, NIST, and University of Colorado, Boulder, MICHAEL WALL, JILA and NIST, JOSH MUNDINGER, Swarthmore College, ANA MARIA REY, JILA, NIST, and University of Colorado, Boulder — Recent experiments with dilute trapped Fermi gases observed that weak interactions can drastically modify spin transport dynamics and give rise to robust collective effects including global demagnetization, macroscopic spin waves, spin segregation, and spin self-rephasing. We present a framework for analyzing the dynamics of weakly interacting fermionic gases following a spin-dependent change of the trapping potential. The dynamics are projected onto a set of lattice spin models defined on the single-particle mode space. Collective phenomena, including the global spreading of quantum correlations in real space, arise as a consequence of the long-ranged character of the spin model couplings. The spin model formulation provides a simple picture of the experimental observations and illuminates the interplay between spin, motion, Fermi statistics, and interactions. This technique opens a route for investigations of generic interacting spin-motion coupled systems in regimes that are not accessible with current numerical capabilities.

[1]Supported by JILA-NSF-PFC-1125844, NSF-PIF- 1211914, ARO, AFOSR, AFOSR-MURI, and NDSEG.

Andrew Koller
JILA, NIST, and University of Colorado, Boulder

Date submitted: 28 Jan 2016 Electronic form version 1.4