

Abstract Submitted  
for the DAMOP16 Meeting of  
The American Physical Society

**Probing Fermi-Hubbard physics with local spin excitations** W. MORONG, W. XU, B. DEMARCO, University of Illinois — The Fermi-Hubbard model is a minimal model for a strongly correlated material. Despite decades of studies, there are many outstanding questions relating to transport properties of this model, which ultracold Fermi gases in optical lattices are well suited to address. We propose a new approach to transport measurements in this system that utilizes tightly focused Raman beams to create a spatially localized spin imbalance. Monitoring the reequilibration of this imbalance in real time and real space will make it possible to directly measure spin diffusion and relaxation rates, providing a flexible tool to study transport in a variety of phases. This will open up a new avenue of investigation into strongly correlated ultracold gases that complements existing measurement techniques in momentum space. We describe our proposal for this method and current progress towards its implementation. We acknowledge funding from NSF grant PHY 15-05468 and ARO grant W911NF-12-1-0462.

William Morong  
University of Illinois

Date submitted: 29 Jan 2016

Electronic form version 1.4