

Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

Spin diffusion of ultracold ^{87}Rb in inhomogeneous spin-dependent potentials JEFFREY MCGUIRK, DORNA NIROOMAND, SEAN GRAHAM, Simon Fraser University — We study the effect of an inhomogeneous differential potential on the relaxation dynamics of spin structures in ultracold ^{87}Rb near degeneracy. In a homogeneous differential potential, the diffusion of spin inhomogeneities has been shown to exhibit instabilities that interconvert longitudinal and transverse spin. These instabilities couple transverse and longitudinal spin dynamics and lead to large-scale coherent spin fluctuations. However, the addition of a spatially inhomogeneous spin-dependent potential is predicted to suppress this instability and decouple the spin dynamics. We present progress towards observing this phenomenon by measuring the diffusion of a longitudinal domain wall in the presence of an optically-created inhomogeneous differential potential. We observe trapping of a transverse spin wave within the domain wall and a separation of timescales for transverse and longitudinal spin relaxation, indicative of anisotropic spin diffusion. We also study the role of coherence in these dynamics.

Jeffrey McGuirk
Simon Fraser University

Date submitted: 27 Jan 2017

Electronic form version 1.4