

Abstract Submitted
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Non-equilibrium spin dynamics in an ultra-cold gas JEFFREY MCGUIRK, DORNA NIROOMAND, LYDIA ZAJICZEK, Simon Fraser University — We study spin dynamics in an out-of-equilibrium quantum gas. Using an optical technique, we imprint arbitrary one-dimensional spin structures in a trapped gas of Rb-87 atoms near quantum degeneracy. These spin structures can exhibit instabilities or lead to spin wave oscillations. The spin system has a highly nonlinear nature, and these spin waves can lead to collapse and revival of coherence. In particular, we measure spin currents in the ultra-cold gas, observe spatially localized collapse and revival of Ramsey fringe contrast, and show how the pattern of coherence depends on the strength of the spin-wave excitation. Lastly, we explore instabilities in the non-equilibrium spin system that can lead to spontaneous amplification of coherence.

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