Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

Spinor Dynamics Of A Freely Expanding F=1 Bose-Einstein Condensate ZACHARY GLASSMAN, DONALD FAHEY, Joint Quantum Institute, National Institute of Standards and Technology and the University of Maryland, ARNE SCHWETTMANN, University of Oklahoma, JONATHAN WRUBEL, Creighton University, PAUL LETT, Joint Quantum Institute, National Institute of Standards and Technology and the University of Maryland — Spin-exchange collisions drive coherent population oscillations between m_F ground states in an optically trapped $F = 1$ Bose-Einstein condensate that depend on the density and quadratic Zeeman shift. Due to the slow expansion of the condensate, spinor dynamics persist after release from the trap when time-of-flight detection is used, and the changing density during free expansion must be factored into the analysis, particularly if the effective magnetic field is changed during this time. The recent adoption of microwave dressings in spinor BEC experiments has improved the control over the quadratic Zeeman shift, q, and allowed for negative shifts and fast switching times for quench experiments. By switching the parameter q at a variable time during the free expansion of a sodium $F = 1$ Bose-Einstein condensate, the effects of a changing density and magnetic field on the spinor evolution were investigated. Our measurements agree well with a mean-field simulation under the single-mode approximation, and both experimental and simulation data are presented.

Donald Fahey
Joint Quantum Institute, NIST and the University of Maryland

Date submitted: 06 Feb 2017 Electronic form version 1.4