DAMOP08-2008-020094

Abstract for an Invited Paper
for the DAMOP08 Meeting of
the American Physical Society

Phases and phase transitions in a dipolar ferromagnetic spinor gas

DAN STAMPER-KURN, University of California, Berkeley and Lawrence Berkeley National Laboratory

In the regime of quantum degeneracy, a gas of spin-1 rubidium atoms is predicted to become simultaneously superfluid and magnetically ordered. We have studied such a gas using dispersive imaging to measure the complete vector magnetization in situ. I will present three main findings from our work. First, we have studied the dynamics of a gas that is suddenly quenched across a symmetry-breaking phase transition, characterizing the spectrum of dynamic instabilities and quantifying the symmetry-breaking seed that is predicted to arise due to quantum spin fluctuations. Second, we have ascertained that magnetic dipole interactions are an important influence on this spin-1 gas. Third, we have explored the equilibrium phase diagram for this gas, finding that a robust inhomogeneous but spatially structured spin texture arises in steady state below the apparent Bose-Einstein condensation transition temperature.