CM/AMO Seminar

Dr. Paul Lett

NIST, Gaithersburg, MD
Adjunct Professor, University of Maryland

"Phase space dynamics and quantum phase transitions in a spinor Bose-Einstein condensate"

Time: Thursday, March 26, 2PM
Location: 4404 Randall

Abstract: An atomic Bose-Einstein condensate (BEC) is a state where all of the 100,000 atoms have a single collective wavefunction for their external (spatial) degrees of freedom. A spinor condensate is a BEC for which there is, in addition, a vector that describes the internal states of the atoms. It is a fascinating collective quantum system that can be poked and prodded to reveal both something of its inner workings and the remarkable sensitivity of the experimental techniques. The interesting interactions in the system are collisions between the atoms and the magnetic field interactions characterized by the quadratic Zeeman effect. Such a system can be described with a simple two-dimensional phase space that we can manipulate to some degree by changing the magnetic field present. The system (its spin populations and phases) is found to evolve in time, due to an unknown dissipative mechanism. In recent experiments we have been able to track and observe this evolution, uncovering interesting properties of the interactions and hopefully leading us toward an understanding of the dissipation mechanism. A number of quantum (zero-temperature) phase transitions of the ground state have been observed.