Abstract Submitted
for the DAMOP09 Meeting of
The American Physical Society

An Experimental Scheme for Observing Dynamical Monodromy with Ultra-Cold Atoms M.K. IVORY, J.B. DELOS, S. AUBIN, College of William and Mary — We propose an experimental scheme based on trapped ultra-cold atoms for observing the recently predicted phenomenon of dynamical monodromy. It occurs when an ensemble of trajectories forming a loop of initial conditions evolves continuously in time into a topologically different loop with the same total energy and angular momentum as the original ensemble. Unlike classical particles, using ultra-cold atoms allows one to quantum mechanically freeze out internal properties of the particles. Atom-atom interactions can be suppressed using K39 and a Feshbach resonance. The atoms can be contained using an optical dipole trap formed from blue- and red-detuned lasers creating a donut-shaped potential. The energy of the center peak can be changed by increasing or decreasing the power of the blue-detuned laser. The angular momentum of the particle can be controlled by a rotating magnetic field. By controlling these external potentials, one can manipulate the energy and angular momentum of the atoms to generate the closed path in energy-angular momentum space that is necessary for producing dynamical monodromy.

Megan Ivory
College of William and Mary

Date submitted: 27 Jan 2009

Electronic form version 1.4