Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

Geometric study of optical billiards with cold atoms[1] DONG SHENG, LUIS OROZCO, Joint Quantum Institute, Department of Physics and NIST, University of Maryland — We present experimental work exploring the qualitative and quantitative geometric properties of optical billiards with cold atoms. We load ^{87}Rb atoms from a magneto-optical trap to a dynamic blue detuned dipole trap that confines the atoms to a plane. We first search for the signature associated with a topological transition from one globally connected region to two locally separated connected regions in a sand clock shape trap. We perform a similar study on a trap with the shape of a rhombus plus a line barrier in the middle. The collective motion of the atoms is the signature of an intermediate topological transition. We also quantify the degree of geometric symmetry breaking of a regular polygon by comparing the dynamics of cold atoms inside dipole traps with shapes of equilateral triangle, square and regular hexagon. Our results are compared with theoretical simulations that we also extend to three dimensions.

[1]Work supported by NSF.

Dong Sheng
Joint Quantum Institute, Department of Physics and NIST,
University of Maryland

Date submitted: 22 Jan 2010 Electronic form version 1.4