Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

Fractional Quantum Hall Physics with Rotating Bose Gases
LOUIS JACOME, JIANSHI ZHAO, NATHAN GEMELKE, The Pennsylvania State University — Fractional quantum Hall (FQH) physics familiar in two-dimensional electron systems has also been predicted to appear in a gas of interacting bosons that are confined to a rapidly rotating trap. Previous experiments in an optical lattice with rotating lattice sites observed strong correlations in large ensembles of few-body clusters consistent with a bosonic analog of fractional hall states, but the large dispersion in particle number prevented unambiguous interrogation of specific states' properties. We describe a new generation of experiments with a single-site-resolved optical microscope and Rubidium-87 atoms, which allows for occupancy resolved measurements. Details of the apparatus, including the high numerical-aperture (NA=0.8) microscope, extension to new atomic isotopes with Feshbach-tuned interactions, and new techniques to probe FQH ground state properties will be discussed. Further extensions using impurity atoms as probes may allow for observation of the analog of fractionalized charge and possibly even fractionalized exchange statistics.

Louis Jacome
The Pennsylvania State University

Date submitted: 31 Jan 2014 Electronic form version 1.4