Abstract Submitted
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Probing microscopic structure and braid statistics in rotating Bose gases[1] JIANSHI ZHAO, LOUIS JACOME, NATHAN GEMELKE, The Pennsylvania State University — It has been predicted that interacting bosonic atoms confined in a rapidly rotating two dimensional harmonic trap exhibit ground states analogous to fractional quantum Hall (FQH) states, and exhibit non-Landau-Ginzburg order and long range entanglement. Some of these states are expected to have excitations which possess fractional statistics, although no convincing measurement has yet been made. We describe an experiment which seeks to realize FQH physics using cold Rb-87 atoms confined to an optical lattice with rotating lattice sites. In these experiments, FQH droplets can be imaged using two high-resolution quantum gas microscopes (N.A.=0.4, 0.8) which allow for occupancy resolved measurements, imaging in three dimensions, and expand on previous measurements by providing an unambiguous identification of states through microscopic time-of-flight. The latter permits identification of novel properties through counting statistics - using impurity atoms (in a minority spin state), pair correlation measurements can reveal an effectively fractionalized relative angular momentum, indicative of fractionalized braid statistics [1].

[1] Yuhe Zhang, G. J. Sreejith, N. D. Gemelke, and J. K. Jain, PRL 113, 160404 (2014)

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