Abstract Submitted
for the DAMOP07 Meeting of
The American Physical Society

Use of custom potentials to facilitate access to quantum Hall states in rotating Bose gases ALEXIS MORRIS, DAVID FEDER, University of Calgary — Through the use of exact diagonalization, we have numerically investigated the properties of zero-temperature, harmonically trapped, rotating ultracold Bose gases. For small number of alkali atoms, we consider the case of tight confinement along the axial direction such that the atoms are essentially two-dimensional. As the rotation rate is increased, the interacting Bose gas undergoes a series of transitions from one quantum Hall state to another akin to what is seen in a two-dimensional electron gas subjected to a strong perpendicular magnetic field. Unlike the electronic case, experimental verification of the existence of quantum Hall states in rotating Bose gases has not yet been achieved. To remedy this, we have investigated the possibility of adding custom built potentials to the existing trapping potential such that experimental access to specific quantum Hall states is facilitated. We find that the creation of certain quantum Hall states in rotating Bose gases should be feasible using current experimental capabilities. (Research supported by NSERC, iCORE and CFI)

Alexis Morris
University of Calgary

Date submitted: 05 Feb 2007 Electronic form version 1.4