Abstract Submitted
for the DAMOP07 Meeting of
The American Physical Society

**Enabling Chip-Based Atom Interferometry II: Working with Atom-Atom Interactions and Phase Fluctuations in Dense, Elongated Gases** C.A. CHRISTENSEN, G.-B. JO, J.-H. CHOI, T.A. PASQUINI, Y.R. LEE, W. KETTERLE, D.E. PRITCHARD, MIT — BECs on atom chips tend to be dense and quite elongated. This leads to high mean-field interaction energy and phase fluctuations along the long dimension of the condensate. Interactions were expected to "heal" density imbalance and perturb coherent phase evolution, preventing reliable interferometry, while phase fluctuations across the sample may reduce signal-to-noise and imaging contrast. However, our experiments show that interactions promote long coherence time by number squeezing and enable in-situ phase readout by mapping the relative phase of separated BECs to the temperature of the system after merging. We also characterize phase fluctuations in our experiment, showing that they do not prevent reliable phase readout, but that they reveal an interesting regime of quasi 1-D degenerate gases.

Caleb Christensen
MIT

Date submitted: 06 Feb 2007 Electronic form version 1.4