Abstract Submitted
for the PSF12 Meeting of
The American Physical Society

**Equations of state of strongly interacting two-dimensional Bose gases**[1] LI-CHUNG HA, The University of Chicago, CHEN-LUNG HUNG, California Institute of Technology, ULRICH EISMANN, SHIH-KUANG TUNG, CHENG CHIN, The University of Chicago — We study strongly interacting two-dimensional Bose gases based on *in situ* density profiles of the sample in the superfluid and critical fluctuation regimes. We achieve strong interaction between atoms by using a magnetically tuned Feshbach resonance and by confining the atoms into an optical lattice. In the superfluid phase, the measured compressibilities deviate from the mean-field prediction when the interaction is strong, and are in better agreement with the renormalization calculation. Near the critical point of the Berezinskii-Kosterlitz-Thouless transition, we find that the equations of state scale universally with respect to the interaction strength within the strength range we probe. We extract the critical chemical potentials, critical densities as well as the renormalized interaction strengths and compare the results to the mean-field and renormalization calculations.

[1]This work is supported by NSF Award PHY-1206095, ARO Grant W911NF0710576 with funds from the DARPA OLE Program, and the Packard foundation.

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Date submitted: 05 Oct 2012 Electronic form version 1.4