

Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

Probing the Superfluid to Mott Insulator Transition at the Single Atom Level ERIC TAI, WASEEM BAKR, RUICHAO MA, JONATHAN SIMON, AMY PENG, JONATHON GILLEN, SIMON FOELLING, LODE POLLET, PHILIPP PREISS, MARKUS GREINER, Harvard University — The Quantum Gas Microscope enables high fidelity detection of single atoms in a Hubbard-regime optical lattice, bringing ultracold atom research to a new, microscopic level. We investigate the Bose-Hubbard model using space- and time-resolved characterization of the number statistics across the superfluid - Mott insulator quantum phase transition. Site-resolved probing of fluctuations provides us with a sensitive local thermometer, allows us to identify microscopic heterostructures of low entropy Mott domains, and enables us to measure local quantum dynamics, revealing surprisingly fast transition timescales. Recently realized 99% fidelity insulator regions will serve as an excellent starting point for studies of quantum magnetism.

Waseem Bakr
Harvard University

Date submitted: 04 Feb 2011

Electronic form version 1.4