Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

A Boson Core Compressibility Measure for Optical Lattices[1]
YASAMIN KHORRAMZADEH, FEI LIN, V.W. SCAROLA, Virginia Tech — Trapping in experiments on cold atomic gases in optical lattices leads to in homogeneity and different phases within the trap. We model a global measure, the boson core compressibility, that can be used to access local properties of a single phase at the center of the trap using observations of double occupancy. We test this measure on the trapped Bose-Hubbard model using mean field theory and quantum Monte Carlo. We find that the boson core compressibility focuses on the core region of the system and eliminates edge effects. We use the core compressibility to identify the transition from Mott insulator to superfluid and show that it is essentially the same as local compressibility in the core region when the system has doubly occupied sites. We generalize the definition of core compressibility to study systems with large densities at the trap center.

[1]This work is supported by AFOSR (FA9550-11-1-0313) and DARPA-YFA (N66001-1-1-4122).

Yasamin Khorramzadeh
Virginia Tech

Date submitted: 11 Nov 2011 Electronic form version 1.4