

Abstract Submitted  
for the MAR16 Meeting of  
The American Physical Society

**Strengthening Supersolids with Disorder in the Extended Bose-Hubbard Model** FEI LIN, Washington and Lee University, THOMAS MAIER, Oak Ridge National Lab, VITO SCAROLA, Virginia Tech — The extended Bose-Hubbard model captures the essential properties of a wide variety of physical systems including ultracold atoms and molecules in optical lattices, Josephson junction arrays, and narrow band superconductors. It exhibits a rich phase diagram including a supersolid phase where a lattice solid coexists with a superfluid. We use quantum Monte Carlo to map out the phase diagram of the extended Bose-Hubbard model on the simple cubic lattice where the supersolid is expected. We find that the supersolid is very delicate because unexpected phase separated states compete with the supersolid. We add disorder to the extended Bose-Hubbard model and find that the supersolid phase is enhanced by disorder as phase separation is suppressed. Our results establish optimal regimes for observing supersolids and therefore have important implications for their observation.

Fei Lin  
Washington and Lee University

Date submitted: 04 Nov 2015

Electronic form version 1.4