Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Phase diagram of bosons trapped in a two-dimensional quasi-periodic lattice CHAO ZHANG, Homer L. Dodge Department of Physics and Astronomy, The University of Oklahoma, Norman, Oklahoma, 73019, USA, ARGHAVAN SAFAVI-NAINI, JILA and Department of Physics, University of Colorado, 440 UCB, Boulder, CO 80309, USA, BARBARA CAPOGROSSO-SANSONE, Homer L. Dodge Department of Physics and Astronomy, The University of Oklahoma, Norman, Oklahoma, 73019, USA — We report on results of Quantum Monte Carlo simulations for bosons in a two dimensional quasi-periodic optical lattice. We study the ground state phase diagram at unity filling and confirm the existence of three phases: superfluid, Mott insulator, and Bose glass. At lower interaction strength, we find that sizable disorder strength is needed in order to destroy superfluidity in favor of the Bose glass. On the other hand, at large enough interaction, superfluidity is completely destroyed in favor of the Mott insulator (at lower disorder strength) or the Bose glass (at larger disorder strength). At intermediate interactions, the system undergoes an insulator to superfluid transition upon increasing the disorder, while a further increase of disorder strength drives the superfluid to Bose glass phase transition.

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Date submitted: 10 Nov 2014 Electronic form version 1.4