Abstract Submitted
for the DAMOP13 Meeting of
The American Physical Society

Quantum Phases of Soft-Core Dipolar Bosons in Optical Lattices

DANIEL GRIMMER, BARBARA CAPOGROSSO-SANSONE, University of Oklahoma, Norman, USA, SEBNEM G. SOYLER, Max Planck Institute for the Physics of Complex Systems, Dresden, Germany — We perform quantum Monte Carlo simulations of a system of soft-core ultracold bosonic atoms with dipolar interactions, confined in a two dimensional optical lattice. We consider long range isotropic repulsive interactions which refers to dipoles are alligned perpendicular to the plane. We calculate the ground state phase diagram for a parameter range that exhibits various solids, superfluid and supersolid phases. We also present finite temperature results and discuss the experimental feasibility of such phases.

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Date submitted: 23 Jan 2013 Electronic form version 1.4