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Supersolidity from defect-condensation in the extended boson Hubbard model YU-CHUN CHEN, National Taiwan University, ROGER G. MELKO, University of Waterloo, STEFAN WESSEL, Universität Stuttgart, YING-JER KAO, National Taiwan University — We study the ground state phase diagram of the hard-core extended boson Hubbard model on the square lattice with both nearest- (nn) and next-nearest-neighbor (nnn) hopping and repulsion, using Gutzwiller mean field theory and quantum Monte Carlo simulations. We observe the formation of supersolid states with checkerboard, striped, and quarter-filled crystal structures, when the system is doped away from commensurate fillings. In the striped supersolid phase, a strong anisotropy in the superfluid density is obtained from the simulations; however, the transverse component remains finite, indicating a true two-dimensional superflow. We find that upon doping, the striped supersolid transitions directly into the supersolid with quarter-filled crystal structure, via a first-order stripe melting transition.

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