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Superfluid, Supersolid, and Phase Separation in Strongly Correlated Square Lattice Bosons LIANG REN, ZIQIANG WANG, Department of Physics, Boston College — The Bose-Hubbard model and its mapping onto the quantum spin-1/2 XXZ model have played an important role in the understanding of the possible phases of strongly correlated lattice bosons. We present here a different mapping to the quantum spin-1/2 model in the hard-core limit and a mean field solution that accounts for both the direct and the exchange correlations on equal footing. We discuss the possible phase structure as a function of boson density, involving superfluid, supersolid, Neel solid, and phase separation, and make comparisons to the available quantum Monte Carlo simulations.

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