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Superfluid-Mott insulator transition in spin-orbit coupled Bose-Hubbard Model[1] MENDERES ISKIN, AHMET T.B. BOLUKBASI, Koc University — We consider a square optical lattice in two dimensions and study the effects of both the strength and symmetry of spin-orbit coupling (SOC) and Zeeman field on the ground-state, i.e., Mott insulator (MI) and superfluid (SF), phases and phase diagram, i.e., MI-SF phase transition boundary, of the two-component Bose-Hubbard model. In particular, based on a variational Gutzwiller ansatz, our numerical calculations show that the spin-orbit coupled SF phase is a nonuniform (twisted) one with its phase (but not the magnitude) of the order parameter modulating from site to site. Fully analytical insights into the numerical results are also given.

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