Strongly interacting lattice bosons in disorder potential: a strong coupling approach[1] CHIEN-HUNG LIN, RAJDEEP SENSARMA, Condensed Matter Theory Center, Department of Physics, University of Maryland, College Park, Maryland 20742, USA, KRISHNENDU SENGUPTA, Theoretical Physics Department, Indian Association for the Cultivation of Science, Kolkata-700032, India, SANKAR DAS SARMA, Condensed Matter Theory Center, Department of Physics, University of Maryland, College Park, Maryland 20742, USA —

We use a strong coupling canonical transformation to study the phase diagram of strongly interacting bosons in an optical lattice in the presence of one-body disorder potential. Our strong coupling approach treats the disorder potential non-perturbatively and can be applied to moderately high disorder potentials as long as the on site repulsion energy scale for the bosons (U) is larger than the scale of the disorder potential (V). Within the strong coupling approach, we systematically derive the low energy effective Hamiltonian, and, using variational Gutzwiller type wavefunctions, study the phase diagram of the disordered Hubbard model, identifying the Mott insulator, superfluid and Bose glass phases.

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