QMC study of the 1D boson Hubbard model with a superlattice potential VALY ROUSSEAU, MARCOS RIGOL, University of California, Davis, FRÉDÉRIC HÉBERT, Institut Non Linéaire de Nice, DANIEL AROVAS, University of California, San Diego, GEORGE BATROUNI, Institut Non Linéaire de Nice, RICHARD SCALETTAR, University of California, Davis — We use QMC simulations to explore the phase diagram of the Bose-Hubbard model with an additional superlattice potential. We first analyse the hard-core limit where an exact analytic treatment is possible, and then use QMC to solve the soft-core case and find the insulator/superfluid phase diagram as a function of potential strength and filling. These results are relevant to the behavior of cold atoms in optical superlattices which are beginning to be achieved experimentally.

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