

Abstract Submitted  
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**Bose-Hubbard model on a checkerboard superlattice**<sup>1</sup> MENDERES ISKIN, Koç University — We study the ground-state phases of the Bose-Hubbard model on a checkerboard superlattice in two dimensions, including the superfluid phase and the Mott and charge-density-wave insulators. First, we discuss the single-particle Hofstadter problem, and show that the presence of a checkerboard superlattice gives rise to a magnetic flux-independent energy gap in the excitation spectrum. Then, we consider the many-particle problem, and derive an analytical mean-field expression for the superfluid-Mott and superfluid-charge-density-wave insulator phase transition boundaries. Finally, since the phase diagram of the Bose-Hubbard model on a checkerboard superlattice is in many ways similar to that of the extended Bose-Hubbard model, we comment on the effects of magnetic field on the latter model, and derive an analytical mean-field expression for the superfluid-insulator phase transition boundaries as well.

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