

Abstract Submitted
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Ultracold bosons in optical superlattices with disorder: tunnelling induced Mott insulators DOMINIK MUTH, ALEXANDER MERING, MICHAEL FLEISCHHAUER, Fachbereich Physik, Technische Universität Kaiserslautern — Using the infinite size time evolving block decimation (iTEBD) algorithm, which is capable to calculate the ground state for translationally invariant Hamiltonians directly in the thermodynamic limit, we determine the superfluid to Mott-insulator phase transition for a Bose-Hubbard model with superlattice. The results agree well with a DMRG approach and, for small hopping J , with the cell strong-coupling perturbative approach found in [1], showing the existence of loop-hole insulators, i.e. incompressible phases which vanish for $J=0$. Adding uniformly distributed disorder to the system, we show both analytically and numerically that the loop-hole domains detach from the $J=0$ axis, creating Mott insulating islands surrounded by a Bose-glass phase. [1] P. Buonsante, A. Vezzani - Phys. Rev. A 72, 013614 (2005)

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