Abstract Submitted
for the DAMOP07 Meeting of
The American Physical Society

Phase diagrams of the Bose-Fermi-Hubbard-Model: Analytical and numerical studies ALEXANDER MERING, MICHAEL FLEISCHHAUER, Technical University of Kaiserslautern — We present calculations for the Bose-Fermi-Hubbard model both in the limit of vanishing fermionic hopping (infinitly large mass) and large fermionic hopping (vanishing mass). In the first case, a detailed study of the fermionic ground state which minimizes the energy for the bosons allows a straight forward prediction of the phase diagram in terms of the pure Bose-Hubbard model. The resulting incompressible phases can be classified and Bose glass like phases are predicted. In the second case, the fermions act as a reservoir to the bosons and an effective hamiltonian can be derived. This hamiltonian corresponds to an extended Bose-Hubbard model with long range oscillatory density- density interactions that depend on the fermionic filling and lead e.g. to the formation of density waves. In both cases, analytic results are given and compared to numerical calculations obtained using DMRG and exact diagonalization methods.

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Date submitted: 02 Feb 2007 Electronic form version 1.4