

Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Inhomogeneous Hubbard Models: from Weak to Strong Coupling

WEI-FENG TSAI, Department of Physics, University of California, Los Angeles, S. A. KIVELSON, Department of Physics, University of California, Los Angeles and Department of Physics, Stanford University — We systematically study the ground-state phase diagram of two inhomogeneous Hubbard models – the dimerized and checkerboard models – in the limit in which the coupling between clusters, t' , is small. Using t' as a small parameter, we can solve the problem for any strength of the Hubbard U , and so can trace the evolution of the ground state from the small U (band structure) to the large U (strongly correlated) limit. On both lattices, we have found that there are Fermi liquid phases with only modestly renormalizations of the effective mass as a function of U , and with residual repulsive interactions between the quasiparticles whose strength, likewise, varies smoothly as U changes. In addition, there are also robust superconducting phases, especially on the checkerboard lattice, of various symmetries, despite the presence of only repulsive interactions in the microscopic model.

Wei-Feng Tsai
Department of Physics, University of California, Los Angeles

Date submitted: 01 Dec 2004

Electronic form version 1.4