Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Local density fluctuation approach to Fermionic lattice models ZHENGQIAN CHENG, CHRIS MARIANETTI, Columbia University — We formulate an effective action as a function of selected Hubbard operators which reproduces the local density fluctuations of a given lattice model. The relevant Hubbard operators emerge via mapping the lattice Hamiltonian to a composite system with auxiliary holes and gauge bosons which mediate the inter-cell hopping. After a mean field approximation of the gauge bosons, we get an effective local model which reproduces the expectation value of the relevant Hubbard operators. We apply our method to the one band Hubbard model in one and infinite dimensions, demonstrating good agreement between our computed static observables and the exact solutions. While our approach does not address frequency dependent observables, it has a negligible computational cost as compared to dynamical mean field theory and could be highly applicable in the context of real materials.

Zhengqian Cheng
Columbia University

Date submitted: 13 Nov 2014 Electronic form version 1.4