MAR16-2015-008127

Abstract for an Invited Paper
for the MAR16 Meeting of
the American Physical Society

Mott physics and spin fluctuations: A unified framework

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I will present the "TRILEX" formalism for strongly correlated electron systems and its application to the Hubbard model. TRILEX is designed to unify Dynamical Mean Field Theory (DMFT) and spin fluctuation approaches close to the Mott transition in a minimal way. It is based on a local approximation of the dynamical three-leg interaction vertex and solved using a self-consistent local quantum impurity model. It allows to address simultaneously the Mott physics à la DMFT and the effect of long range antiferromagnetic fluctuations. While its computational cost is comparable to a single site Extended-DMFT computation, the self-energy is momentum-dependent. Moreover TRILEX is the starting point of a systematic and controlled method based on clusters. I will discuss the application of TRILEX to the Hubbard model on a two-dimensional square lattice. As interactions are increased towards the Mott insulating state, the local vertex acquires a strong frequency dependence, driving the system to a Mott transition, while at low enough temperatures the momentum dependence of the self-energy is enhanced due to large spin fluctuations. Upon doping, a Fermi arc is found in the one-particle spectral function, which is one signature of the pseudogap state.