FLUCTUATING LOCAL FIELD APPROACH TO STRONG CORRELATIONS

Rubtsov A.

Russian Quantum Center, Moscow, Russia
ar@rqc.ru

A quantitative description of developed collective fluctuations in correlated media remains one of the main challenges for the theoretical and computational physics. The essentially nonlocal nature of the collective modes makes the mean-field schemes inappropriate. The advanced diagrammetic schemes such as Dual boson approach built on top of the Dynamical mean field theory require an enormous numerical effort, and even their accuracy can be questioned. In our talk, we will report a new approach targeting the problem of strong collective fluctuations. Unlike the mean-field paradigm, where the effective field obeys a constant value to determined in a self-consistent way, we perform an integration over the value of the effective field. The mean field solution corresponds to the saddle point in this integration, whereas a grid-integration over all values of the effective field allows to handle the fluctuations. The method is benchmarked for small Ising and Heisenberg classical clusters, as well as for the half-filled Hubbard one, and shows a superior accuracy against the mean-field approach.