复旦大学物理系物质科学报告

Physics Department Colloquium

Natural Orbitals Renormalization Group and Dynamical Mean Field Theory

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One of the most important and accurate approaches for studying interacting many-electron correlated systems is the quantum renormalization group (RG) procedure, upon which we propose a new concept in the framework of natural orbitals so that we can generalize the RG into general orbital space, namely natural orbitals renormalization group (NORG). We show that the NORG takes a polynomial ($\mathcal{O}(N_{bath}^3)$) rather than exponential computational cost in the number of electron bath sites and it can work on a quantum impurity model with any lattice topological structure. Actually, the effectiveness of the NORG is basically irrespective of a model's topological structure. Thus, the NORG is naturally appropriate for studying quantum cluster-impurity model. By using the NORG, we have recently solved the two-impurity Kondo problem, a long-standing problem in which there is the competition between the two opposite tendencies in the formation of a singlet ground state, driven respectively by the single-ion Kondo effect with conduction electrons to screen impurity spins and the RKKY interaction between the two impurities to directly form impurity spin singlet. Moreover, the NORG is a natural impurity solver to dynamical mean field theory, which I will also introduce in this talk.

Time：2:00pm, Tuesday, November 1, 2016
Location：Physics Building, Room 221B
(Cookies and coffee are served from 1:30 pm)