

Application of diagrammatic Monte-Carlo to Hubbard model

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ABSTRACT: The study of quantum Many-Body systems is one of the largest fields within modern physics research and despite the basic theory of quantum mechanics being laid out decades ago there remains an inability to accurately predict the properties of many different materials. This stems from the fundamental difficulty of solving the large number of simultaneous Schroedinger equations that describe a many-body interacting system. Much of the study in the field of correlated electrons is done on the Hubbard Model, which is the simplest non-trivial example of a correlated electron system and has generated significant recent interest due to the ability to simulate it using cold atoms in optical lattices. One family of methods that has been successfully applied in performing calculations in the Hubbard model are the Diagrammatic Monte Carlo techniques which perform the integrals of the diagrammatic perturbation expansion using a Metropolis like algorithm to stochastically sample the integration space. In this talk I will introduce the Hubbard model and the Diagrammatic Monte Carlo method and demonstrate its application as a method for performing controlled calculations in the Hubbard model.

ALL ARE WELCOME!