

Numerical Approaches to Correlated Lattice Models

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ABSTRACT: Finding solutions to interacting quantum many-body systems is an important problem in modern condensed matter physics. While the rapidly developing field of ab initio methods provides reliable information for the electronic properties of many weakly correlated compounds, materials with strong electronic correlations pose a significant problem to our understanding.

In this talk I will present solutions to the single-band Hubbard model in two dimensions; an ideal example of a strongly correlated electron system. By comparing results from a variety of numerical techniques, we are able to carefully control extrapolation uncertainties and to provide an important set of benchmark reference data. Finally, I will explain how new techniques that compute two-particle properties allow us to extract physical insights, which cannot be understood from single-particle properties alone. These insights have allowed us to identify the origin of pseudogap physics and to find parameters that optimize the superconducting transition temperature in the 2D Hubbard model.

ALL ARE WELCOME!