QUANTUM MONTE CARLO APPROACHES FOR CORRELATED SYSTEMS

Over the past several decades, computational approaches to studying strongly interacting systems have become increasingly varied and sophisticated. This book provides a comprehensive introduction to state-of-the-art quantum Monte Carlo techniques relevant for applications in correlated systems. Starting with an overview of variational wave functions, it features a detailed presentation of stochastic samplings including Markov chains and Langevin dynamics, which are developed into a discussion of Monte Carlo methods. The variational technique is also described, from foundations to a detailed description of its algorithms. Other topics discussed include optimization techniques, real-time dynamics, and projection methods, including Green's function, reptation, and auxiliary-field Monte Carlo, from basic definitions to advanced algorithms for efficient codes, and concluding with recent developments on the continuum space. This book provides an extensive reference for students and researchers working in condensed matter theory or those interested in advanced numerical methods for electronic simulation.

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