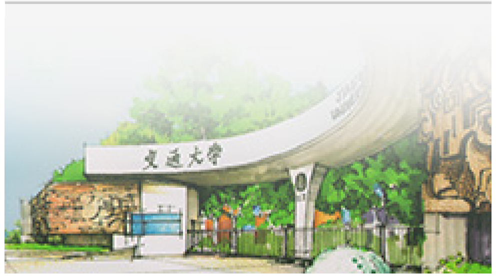

冷原子物理报告会

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报告题目: Precision Many-Body study of Two-dimensional interacting Fermi Gas: BKT transition, Contact and Pseudogap behavior

报告时间:2021年11月26日(星期五) 10:00—11:30

报告地点:仲英楼B249

报告人: Yuan-Yao He (何院耀), Flatiron Research Fellow

Center for Computational Quantum Physics, Flatiron Institute

报告摘要:

The Fermi gas with a zero-range attractive interaction is a model for strongly interacting fermions, and it’ s of interest in both condensed-matter and nuclear physics. The well-known characteristics of Fermi gas is the superfluidity ground state and the BCS-BEC crossover. In this talk, I will present our recent work [1] of applying state-of-art and large-scale Quantum Monte Carlo method [2] to the finite-temperature properties of two-dimensional (2D) Fermi Gas. Specifically, we systematically determine the phase diagram of the Berezinskii-Kosterlitz-Thouless (BKT) transitions, the evolutions of the pairing wavefunctions and the fermion and Cooper pair momentum distributions along with temperature and interaction strength. We also compute Tan’ s contact in the crossover regime as a function of temperature, which shows quite different behavior comparing to its three-dimensional correspondence. I will also present our most recent progress on the possible pseudogap behavior above the BKT transition temperature of this system. Our numerical results will serve as a valuable guide for future experiments, and provide comparison and benchmark for future analytical and computational studies. Thank you very much for your consideration.

报告人简介:

Yuan-Yao He got his PhD of Physics in Department of Physics, Renmin University of China in June 2018. In Sept. 2018, he moved to Center for Computational Quantum Physics (CCQ), Flatiron Institute (which is a division of Simons Foundation) in New York as a Flatiron Research Fellow. During his PhD, he focused on studying interacting topological insulators in lattice models using various quantum many-body numerical techniques, such as Exact Diagonalizations (ED) and Quantum Monte Carlo (QMC) methods. Since then, he mainly works on the developments and applications of finite-temperature QMC algorithms for correlated fermion systems, including the determinantal QMC method and the constrained-path QMC method which is used to control the sign problem. In methodology, he and his collaborators have dramatically reduced the computational cost of finite-temperature QMC methods by orders of magnitudes, which allows for theab initioQMC simulations of realistic systems, ranging from lattice models to fermi gases, Quantum chemistry and real materials. As the physical aspect, recently he mainly concentrates on the study of stripe density wave and pseudogap behavior in Hubbard-like lattice models and the finite-temperature properties of Fermi gas.

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