



Weekly Seminar

When Gutzwiller meets DMRG

周毅

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Time: 3:00pm, June 2, 2021 (Wednesday)

时间: 2021年6月2日 (周三) 下午3:00

Venue: Room W563, Physics building, Peking University

地点: 北京大学物理楼, 西563会议室

Abstract

We propose to boost the performance of the density matrix renormalization group (DMRG) in two dimensions by using Gutzwiller projected states as the initialization ansatz. When the Gutzwiller projected state is properly chosen, the notorious “local minimum” issue in DMRG can be circumvented and the precision of DMRG can be improved by orders of magnitude without extra computational cost. Moreover, this method allows to quantify the closeness of the initial Gutzwiller projected state and the final converged state after DMRG sweeps, thereby sheds light on whether the Gutzwiller ansatz captures the essential entanglement features of the actual ground state for a given Hamiltonian. The Kitaev honeycomb model has been exploited to demonstrate and benchmark this new method. By this combination of DMRG and Gutzwiller projected wave functions, a nematic quantum spin liquid state with an emergent parton Fermi surface has been unveiled in the triangular-lattice SU(4) spin-orbital model.

About the speaker

周毅, 1998年本科毕业于清华大学物理系, 2004年1月博士毕业于清华大学高等研究院。2004至2009年于马克斯-普朗克-复杂物理系统研究所(德累斯顿)、香港科技大学、香港大学和香港中文大学做博士后研究。2009年7月至2019年2月在浙江大学任特聘研究员和教授。2019年3月至今任中国科学院物理研究所研究员。从事凝聚态物理理论的研究, 主要研究电子关联和拓扑系统, 在量子自旋液体、拓扑物态、非常规超导电性等方面取得有影响的成果。在Reviews of Modern Physics、Science、Nature Physics、Physical Review Letters、Science Bulletin等期刊上发表论文65篇。