

THE UNIVERSITY OF HONG KONG

DEPARTMENT OF PHYSICS

SEMINAR

Entanglement Negativity and Quantum Magic in Fermionic Many- Body Systems

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Abstract:

Quantum information provides powerful perspectives on correlated fermions, but useful diagnostics must also be computationally accessible. In this seminar, I will discuss two such probes. First, the Gaussian-preserving structure of fermionic partial transpose enables the evaluation of Rényi negativity within determinant quantum Monte Carlo, while twisted Rényi negativity offers a practical proxy for logarithmic negativity. Second, I will introduce two-point stabilizer Rényi entropy as a local measure of quantum magic that can be reconstructed from few-body correlators. Applications to interacting lattice fermions and the Laughlin state show how local magic captures critical behavior and characteristic topological structure. Together, these results demonstrate how computable quantum-information observables can reveal entanglement, criticality, and non-stabilizer resources in strongly correlated many-body systems.

Biography:



Xiao Yan Xu received his Ph.D. from IOP, CAS in 2017, and then worked as a postdoctoral researcher at the Hong Kong University of Science and Technology and UC San Diego. He joined SJTU in 2021. He is primarily engaged in theoretical and computational research on strongly correlated electron systems, including quantum spin liquids, non-Fermi liquids, sign problems, quantum criticality, quantum entanglement, and interdisciplinary research at the intersection of quantum many-body physics with machine learning, quantum information, and ultracold atomic physics.

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