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【123】Quantum Phase Transitions with a Lee-Yang Method and Many-Body Algorithms

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Predicting the phase diagram of interacting quantum many-body systems is a central problem in quantum matter. Here, we show that a Lee-Yang method, combined with numerical quantum many-body methods such as matrix product states and neural network quantum states, can be used to investigate quantum phase transitions and predict the critical points of correlated spin and fermion models. Specifically, we implement our approach for quantum phase transitions in the transverse-field Ising model on different lattice geometries, as well as an interacting fermionic chain. As such, our results provide a starting point for determining the phase diagram of more complex quantum many-body systems.

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