Title:	Finite Temperature Robustness of Quantum Many-Body Scars
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Abstract:	Recent advancements in the coherent manipulation and control of cold atoms have opened up new avenues for studying the non-equilibrium dynamics of closed quantum many-body systems. As a result, many studies are underway to understand how an arbitrary initial quantum state converges to thermal equilibrium while undergoing unitary dynamics. Interestingly, some systems defy this paradigm by failing to converge to thermal equilib- rium despite undergoing Hamiltonian evolution. Such systems are broadly classified into two categories: 1) strong ergodicity-breaking systems and 2) weak ergodicity-breaking sys- tems. All the eigenstates fail to thermalize in systems that show strong ergodicity breaking, while only a very small fraction of the eigenstates fail to thermalize in systems exhibiting weak ergodicity breaking. One such form of weak ergodicity breaking is Quantum Many- Body Scars, which is the topic of focus of this thesis. Quantum Many-Body Scars are a special set of eigenstates that are equidistant in en- ergy, reside in the middle of the spectrum, and carry anomalously low entanglement en- tropy. When the initial state has a high overlap with these special states, the system fails to thermalize. Quantum Many-Body Scars sensitively depend on the choice of the initial state, and by deviating from the special initial states that show athermal behavior, the sys- tem rapidly thermalizes. In this thesis, we study how robust Quantum-Many Body Scars are to the initial states, particularly the scarring behavior of finite temperature states. Insights on this finite-temperature robustness of many body scarring are important because of the finite-temperature effects on ground state preparation in experimental setups
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