Day 3(Poster E)

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Title:Continuous-time quantum search at low temperature in the symmetric subspace

Abstract:
Quantum search is useful as a test problem with a quadratic speed up over classical random guessing. In a continuous-time setting it can be mapped to the symmetric subspace and solved analytically. In the large size limit it corresponds to a two-state single avoided crossing model. We study this limit in the presence of a low temperature bath, to determine the role played by cooling in finding the solution with a quantum advantage. In the large size limit, for a model in which each qubit is coupled to its own bath at the same temperature, we show that, for low enough temperature, this corresponds to a single two-state system coupled to a single bath. This enables us to determine the effect of finite temperature on the search success in this setting. There is an optimal, low but non-zero, temperature for a given problem size for which the computation is enhanced, rather than degraded. This is similar to thermal entanglement effects [e.g. PRA 64 042302 2001].