Day 3 (Poster E)

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Title:Comparing Quantum and Classical Algorithms for MAX 2-SAT

Abstract:
Continuous-time quantum computation is a method for solving computational problems that uses qubits which evolve according to a continuous-time Hamiltonian. Adiabatic quantum computing and continuous-time quantum walks are both forms of continuous-time quantum computing which have been found to be especially useful for solving optimization problems. We apply these methods of computation to an optimization problem known as the maximum-2-satisfiability problem (MAX 2-SAT). Although being NP-complete, modern classical algorithms for MAX 2-SAT have been refined to the extent that they are very effective in practice. We explore how the hardness of MAX 2-SAT instances differs for a classical algorithm and the two quantum algorithms. The results we obtain for quantum walks follow what was found previously for the problem of finding spin glass ground states, indicating that there is nothing special about the spin glass problem. We discuss a technique for producing a faster quantum algorithm using rapid quenches. Although the classical algorithm still performs better in this case, there is potential for further improvements that could be made to the quantum algorithms.