1079-37-243 **Zhenwei Cao** and **Alexander Elgart*** (aelgart@vt.edu), McBryde Hall, Department of Mathematics, Virginia Tech, Blacksburg, VA 24061. *On the efficiency of Hamiltonian-based quantum computation for low-rank matrices.*

Quantum computing is believed to possess more computational power than classical computing on certain computational tasks. Farhi and his collaborators had proposed the adiabatic quantum computing (AQC) as a constructive model for implementing a quantum computer. It was later realized that from a computational complexity point of view AQC is equivalent to all other models for universal quantum computation

We will present an extension of AQC algorithm for the unstructured search to the case when the number of marked items is unknown but is relatively small. The algorithm maintains the optimal Grover speedup and includes a small counting subroutine.

Our results include in particular upper and lower bounds on the amount of time needed to perform a general Hamiltonian-based quantum search, a lower bound on the evolution time needed to perform a search that is valid in the presence of control error and a generic upper bound on the minimum eigenvalue gap for evolutions. (Received January 16, 2012)