Universal 2-local Hamiltonian Quantum Computing

Daniel Nagaj

(Submitted on 2 Feb 2010)

We present a Hamiltonian quantum computation scheme universal for quantum computation (BQP). Our Hamiltonian is a sum of a polynomial number (in the number of gates L in the quantur circuit) of time-independent, constant-norm, 2-local qubit-qubit interaction terms. Furthermore, each qubit in the system interacts only with a constant number of other qubits. The computer runs in three steps - starts in a simple initial product-state, evolves it for time of order L^2 (up to logarithmic factors) and wraps up with a two-qubit measurement. Our model differs from the previous universal 2-local Hamiltonian constructions in that it does not use perturbation gadgets, does not need large energy penalties in the Hamiltonian and does not need to run slowly to ensure adiabatic evolution.

Subjects: **Quantum Physics (quant-ph)**
Cite as: **arXiv:1002.0420v1 [quant-ph]**

Submission history

From: Daniel Nagaj [view email]
[v1] Tue, 2 Feb 2010 08:44:13 GMT (298kb)

Which authors of this paper are endorsers?