MAR11-2010-001433

Abstract for an Invited Paper
for the MAR11 Meeting of
the American Physical Society

LeRoy Apker Award Talk: Parallel State Transfer and Efficient Quantum Routing on Quantum Networks[1]

CHRISTOPHER CHUDZICKI, MIT

We study the routing of quantum information in parallel on multi-dimensional networks of tunable qubits and oscillators. These theoretical models are inspired by recent experiments in superconducting circuits using Josephson junctions and resonators. We show that *perfect parallel state transfer* is possible for certain networks of harmonic oscillator modes. We further extend our model to analyze the distribution of entanglement between every pair of nodes in the network, and find that the routing efficiency of hypercube networks is both optimal and robust in the presence of dissipation and finite bandwidth.

[1]This research was supervised by Frederick W. Strauch; it was supported by Williams College and Research Corporation. A paper preprint based on this work is available online: (arXiv: 1008.1806).