

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Decoherence Suppression in Multi-qubit Quantum Gates with Trapped Ions by Control of the Driving Field PAK HONG LEUNG, Georgia Inst of Tech — The loss of coherence during the implementation of multi-qubit gates has posed a major challenge to fault-tolerant quantum computation. For example, residual entanglement between the internal and motional states of trapped ions at the end of quantum gates is a key contributor to fidelity loss. It is therefore crucial to minimize the phase space displacement due to state-dependent forces upon completion of the gate. We will show that in theory we can suppress the effect of the displacement operator for relevant modes by using an oscillatory laser detuning pattern. This method may be combined with previous efforts on amplitude and phase modulation, leading to more complex parallel gate operations on an ion chain that are robust against heating of motional modes.

Pak Hong Leung
Georgia Inst of Tech

Date submitted: 09 Nov 2016

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