

Abstract Submitted
for the DAMOP13 Meeting of
The American Physical Society

Robust quantum control of $^{171}\text{Yb}^+$ qubits in a surface-trap with integrated microwave elements J. TRUE MERRILL, CHRISTOPHER M. SHAPPERT, KENTON R. BROWN, CURTIS VOLIN, HARLEY HAYDEN, C.-S. PAI, ALEXA W. HARTER, Georgia Tech Research Institute, Atlanta, GA 30332, USA — We present a microfabricated surface-electrode ion trap with a pair of on-chip microwave waveguides for coherent operations on hyperfine $^{171}\text{Yb}^+$ qubits. Our design uses common silicon-on-aluminum microfabrication techniques compatible with integration in other surface-trap designs. We demonstrate sub-microsecond π -times, microwave polarization control, and coherence lifetimes exceeding $T_2 > 0.1$ s. We also demonstrate coherent transport of qubits over a 1.8 mm distance. Further, we utilize compensating composite pulses which reduce sensitivity to field variations to produce extremely uniform gates over a 0.9 mm qubit manipulation region.

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Date submitted: 30 Jan 2013

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