

Abstract Submitted
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Microfabricated Microwave-Integrated Surface Ion Trap MELISSA C REVELLE, M. G. BLAIN, R. A. HALTLI, A. E. HOLLOWELL, D. LOBSEY, C. D. NORDQUIST, J. REMBETSKI, P. RESNICK, PETER MAUNZ, Sandia Natl Labs — Microwave radiation is easier to control and stabilize than lasers and is a candidate for realizing high-fidelity qubit manipulations¹. However, strong near-field microwave radiation is necessary for creating the large gradient field required for multiple-ion gates². Taking advantage of Sandia's microfabrication techniques, we designed and manufactured a multi-layered surface ion trap with co-located microwave antennae and ion trap electrodes. The near-field integrated antennae can produce stronger fields and field gradients at the ion than are possible with far-field radiation. Using this trap, we measure a 300 ns carrier π -time and demonstrate qubit motional mode addressing. We present our results on the microwave field characterization along with single qubit operations.

¹D. P. L. Aude Craik. et al., Appl. Phys. B 114, 3 (2014).

²T. P. Harty, et al., PRL 117, 140501 (2016); U. Warring et al., PRL 110, 173002 (2013).

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