

Abstract Submitted
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Robust microfabricated surface ion traps with arbitrary lateral geometries D.L. MOEHRING, T. BARRICK, F. BENITO, M.G. BLAIN, M. DESOUR, A.R. ELLIS, K.M. FORTIER, R.A. HALTLI, C. HIGHSTRETE, S.A. KEMME, J. STERK, D. STICK, B.P. TABAKOV, C.P. TIGGES, Sandia National Laboratories — We will present the status of Sandias efforts to engineer surface ion traps, specifically detailing our ability to reliably fabricate arbitrary surface geometries. These achievements include the precision placement of backside holes for loading from a neutral atom source, multi-level metalization which supports vertical interconnects and low electrical power loss in the substrate, and low profile wirebonds for surface laser access [1, 2]. We have combined these capabilities to produce a successful and robust Y-junction trap which takes advantage of numerical simulations to tailor the RF pseudopotential field in the junction with precisely shaped electrodes [3]. We will also present ongoing work at fabricating structures for quantum simulations in collaborations with NIST and MPQ. In addition we will describe traps with an integrated high finesse optical cavity, junction traps capable of reordering strings of ions with multiple species, and ring shaped traps that we are fabricating for the IARPA sponsored MUSIQ program. [1] D. Stick, et al., arXiv:1008.0990v2 [physics.ins-det] (2010). [2] D. T. C. Allcock, et al., arXiv:1105.4864v1 [quant-ph] (2011). [3] D. L. Moehring, et al., arXiv:1105.1834v1 [quant-ph], accepted for publication (2011).

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