

Abstract Submitted
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Fluctuating Potentials In Micrometer Scale Atomic Ion Traps J. BRITTON, S. SEIDELIN, J. CHIAVERINI, R. REICHLER, J.J. BOLLINGER, D. LEIBFRIED, J.H. WESENBERG, R.B. BLAKESTAD, R.J. EPSTEIN, N. SHIGA, J.M. AMINI, K.R. BROWN, J.P. HOME, D.B. HUME, W.M. ITANO, J.D. JOST, C. LANGER, R. OZERI, D.J. WINELAND, NIST — Electromagnetic confinement of atomic ion qubits coupled with laser cooling has permitted observation of 10 minute coherence times [1, 2]. Recent work to miniaturize electromagnetic traps promises qubit densities attractive for large scale quantum computing [3]. However, motional heating resulting from poorly understood fluctuating trapping potentials is observed to increase as approximately dimensions⁻⁴ [4]. We discuss efforts to suppress this heating and present experimental results for several microtrap fabrication techniques [5, 6]. [1] P. T. H. Fisk et al., IEEE Trans. Instrum. Meas. 44, 113 (1995). [2] J. J. Bollinger et al., IEEE Trans. Instrum. Measurement 40, 126 (1991). [3] A. Steane, quant-ph/0412165. [4] L. Deslauriers et al., Phys. Rev. Lett. 97, 103007 (2006). [5] S. Seidelin et al., Phys. Rev. Lett. 96, 253003 (2006). [6] J. Britton et al., quant-ph/0605170.

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