

Abstract Submitted
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Control of Trapped Ions on a Chip Trap for Quantum Information KATHERINE COLLINS, The Joint Quantum Institute, University of Maryland Department of Physics, and National Institute of Standards and Technology, KENNETH WRIGHT, CHRISTOPHER RICKERD, CHRISTOPHER MONROE, The Joint Quantum Institute, University of Maryland Department of Physics and National Institute of Standards and Technology — Macroscopic traps have been the standard ion trap for some time; however, these traps are fabricated by hand, making them difficult to reproduce and therefore not scalable. Micro-fabricated surface traps, such as the “Ball Grid Array” (BGA) trap designed by Georgia Tech Research Institute (GTRI) and micro-fabricated by Honeywell International, are the new generation of ion traps. These surface traps are produced in CMOS foundry and are highly reproducible and scalable. Our group traps $^{171}\text{Yb}^+$ ions using the 48-electrode BGA trap that improves the control of the ions. We discuss the ability to shuttle ions to different areas on the trap as well as optical control, coherent operations, measurement of heating rate of the ions in the trap, and the possible quantum information application of boson sampling^{1,2}.

¹S. Aaronson, S. and A. Arkhipov, Proc. 43rd Annual ACM Symposium on Theory of Computing, 333 (2011).

²C. Shen, Z. Zhang, and L.-M. Duan, Phys. Rev. Lett. 112, 050504 (2014)

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