

Abstract Submitted  
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**Progress Towards Quantum Simulation Using Micro-fabricated Ion Traps**<sup>1</sup> K. WRIGHT, JQI, University of Maryland Dept. of Physics, C. CAO, Dept. of Physics, Pennsylvania State University, G. JI, T. BRENNAN, C. MONROE, JQI, University of Maryland Dept. of Physics — We report our current experimental progress towards using surface electrode traps for quantum simulation. Current progress is being made using a micro-fabricated Satellite trap from GTRI. This trap features two long storage arms which can be used to hold ions in reserve to mitigate the need to load ions via a heated oven in the event of ion loss. This should allow trapping of long ion chains with a substantial decrease in the time needed to recover an ion chain of a given length. The trap has 96 electrodes for fine control of the DC potential needed to create large anharmonic trapping wells. It also features two crossing linear regions for the ordering of mixed ion chains by selective shuttling between the arms of intersecting linear regions of the trap. This should allow us to trap multiple species and explore the advantages of having sympathetic coolant ions. Interspersing these ions through a chain of ions undergoing coherent operations potentially could increase the chain lifetime as well as mitigate certain heating effects. We hope to use these features as the next step in increasing the size of current quantum simulations being done at UMD, which are aimed at exploring quantum phenomena in spin systems.

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