Large, Individually-addressable, Multispecies Quantum Information Processor: Performance

MARKO CETINA, MICHAEL GOLDMAN, LAIRD EGAN, ANDREW RISINGER, KEVIN LANDSMAN, CHRISTOPHER MONROE, Joint Quantum Institute, University of Maryland Department of Physics, College Park 20742 — Under the IARPA LogiQ program, in a collaboration between universities and industrial partners, we have constructed a complex ion-based quantum processor with the goal of realizing a logical quantum bit. I will report on the performance of our first-generation integrated system, including fidelities of single-qubit and two-qubit gates, crosstalk, operation with long ion chains, syndrome readout and multi-species operation.

1This work is supported by the ARO with funding from the IARPA LogiQ program, the NSF Practical Fully-Connected Quantum Computer program, the DOE program on Quantum Computing in Chemical and Material Sciences, the AFOSR MURI on Quantum Measurement and Verification, and the AFOSR MURI on Interactive Quantum Computation and Communication Protocols.