Abstract Submitted
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Cross-species gates in a Ba/Yb ion trap for modular networked quantum computing[1] MARTIN LICHTMAN, ISMAIL INLEK, CLAY CROCKER, KSENIA SOSNOVA, CHRIS MONROE, Joint Quantum Institute and University of Maryland Department of Physics, College Park, Maryland 20742 — A modular network of many ion traps is a promising approach to building a scalable quantum computer. Generation of entanglement between remote atomic qubits has been demonstrated using interference of simultaneously emitted photons from one qubit in each trap. However, stray photons emitted during this process may corrupt information stored in nearby qubits. To avoid this problem we have implemented co-trapping of two different elements in the same ion trap. $^{171}Yb^{+}$ is used as a quantum memory and processor, while $^{138}Ba^{+}$ is used for communication. The 493 nm photons from Ba^{+} do not couple to the Yb^{+} system, and suffer less attenuation in fiber optics than wavelengths available from most commonly trapped ion species. In this talk we report demonstration of state mapping between the Yb^{+} and Ba^{+} internal qubits, and progress towards utilizing these techniques in entanglement of remote qubits.

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