Abstract Submitted
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Remote entanglement of $^{138}Ba^{+}$ ions in separate traps using photons[1] GEORGE TOH, ALLISON CARTER, KSENIA SOSNOVA, JAMESON O'REILLY, DREW RISINGER, SOPHIA SCARANO, LEEZA MOLDAVCHUK, CHRISTOPHER MONROE, JQI, University of Maryland — Trapped atomic ions are one of the leading platforms for quantum computing systems and quantum networks. Here we combine these application areas by using multiple ion trap modules connected via photonic links. We report progress on one building block of a trapped ion quantum network, the remote entanglement of ions in two separate vacuum chambers. Single photons at 493 nm are to be collected from a $^{138}Ba^{+}$ ion in each node using high numerical aperture (NA=0.6) optics, and a Bell state measurement heralds the entanglement of the two remote qubits. We can demonstrate entanglement by measuring the correlations of the ion states in multiple bases. We will present preliminary results for entanglement generation rate and fidelity and also speculate how this system will scale to larger modules and also with more qubits per module.

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