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Generating Greenberger-Horne-Zeilinger States in Remote Trapped Ions[1] HARRIS RUTBECK-GOLDMAN, United States Air Force Research Laboratory, PAIGE HAAS, Technergetics, LLC., DAVID HUCUL, United States Air Force Research Laboratory, ZACHARY SMITH, Griffiss Institute, MICHAEL MACALIK, Booz Allen Hamilton, JUSTIN PHILLIPS, Northeastern University, JAMES WILLIAMS, United States Air Force Research Laboratory, CARSON WOODFORD, Griffiss Institute, BOYAN TABAKOV, KATHY-ANNE BRICKMAN-SODERBERG, United States Air Force Research Laboratory
— Quantum networks promise ultra-secure lines of communications that are both tamper proof and tamper evident. Remote entanglement, the required first-step towards a quantum network, has been demonstrated in a number of systems. Here we describe a protocol to extend two-qubit remote entanglement to generate a Greenberger-Horne-Zeilinger (GHZ) state comprising three remote trapped-ion qubits. Two-particle remote entanglement combined with local operations and communication of classical bits can generate large-scale, network-sized, multi-particle entanglement for distributing quantum information. Quantum communication channels are desirable as they may enable secure links that could reveal the presence of eavesdroppers and protect critical information.

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