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Quantum Networking with Trapped Ion Qubits at AFRL[1] 2D LT KAITLIN POOLE, BOYAN TABAKOV, LAURA WESSING, PAUL COOK, DANIELA BOGORIN, BENJAMIN BONENFANT, KATHY-ANNE BRICKMAN SODERBERG, Air Force Research Labs — Quantum networking exploits particular features of quantum mechanics to provide ultra-secure networks that are both tamper proof and tamper evident. Such networks can be implemented at distant memory nodes connected via photon-based interfaces. Trapped ions are nearly ideal quantum network nodes due to the precise control possible over both internal and external degrees of freedom, and for their superior performance as long-term quantum memories. Photon-based qubits are the natural choice to transfer information within the network due to the ability to transmit quantum information over long distances and the capability to process information "on-the-fly" between memory nodes. We present the quantum research being done at the Air Force Research Labs (AFRL) with a focus on trapped ion qubits, the short- and long-term goals of the lab, and some unique resources we have access to at AFRL. Distibution A. Approved for public release, Case Number 88ABW-2017-1939

[1]Office of the Secretary of Defense Applied Research for the Advancement of S and T Priorities Quantum Science and Engineering Program

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