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Atom-Ring Cavity System for Multimode Quantum Technology
KEVIN COX, US Army Research Lab, DAVID MEYER, US Army Research Lab, University of Maryland at College Park, FREDRIK FATEMI, PAUL KUNZ, US Army Research Lab — Entanglement is the most "quantum" part of quantum mechanics, and the primary resource for quantum technologies with no classical analog. But before realizing the full promise of entanglement, improved and simplified devices for distributing entanglement must be invented. I will present new results for generating both remote and internal entanglement using rubidium atoms coupled to a parabolic ring cavity. We achieve strong coupling, with collective cooperativity C>20, even with a simple and inexpensive ex-vacuo cavity, by using parabolic mirrors in an asymmetric geometry. Angular multiplexing allows creation of multiple distinct excitations in a single ensemble, opening paths toward multi-mode cavity QED, multi-qubit quantum network nodes, and high speed multiplexed quantum repeating.

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