

Abstract Submitted
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Quantum gates between superconducting and atomic qubits

MARK SAFFMAN, University of Wisconsin, FRANK WILHELM, IQC, University of Waterloo, Canada, ROBERT MCDERMOTT, University of Wisconsin — We propose methods for performing entangling gate operations between superconducting phase qubits and neutral atom hyperfine qubits. The gate is mediated by mapping the superconducting qubit onto a microwave excitation of a coplanar waveguide resonator (CPW). The large transition dipole moments of atomic Rydberg states at microwave frequencies enable bidirectional entanglement between a single atom and a single CPW photon. Specific gate protocols and fidelity calculations are presented for experimentally realistic geometries.

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