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**Trapped ion-inspired entangling gate for superconducting qubits**[1]
SYDNEY SCHREPPLER, MARIE LU, Univ of California - Berkeley, LUKAS BUCHMANN, FELIX MOTZOI, Aarhus University, IRFAN SIDDIQI, Univ of California - Berkeley — Quantum simulators of analog and digital varieties rely on the ability to entangle constituent particles with high fidelity. The Mølmer-Sørensen gate underlies much of the success of trapped-ion qubits, allowing for two-qubit entanglement with fidelity greater than 99% and for simultaneous multi-qubit operations. For the ions, qubit-qubit entanglement is achieved via stimulated Raman transitions and through their interaction with a shared phonon mode. We describe the development of a Mølmer-Sørensen inspired gate for superconducting qubits, employing an analogous shared photon mode and a bichromatic driving field to engineer multi-qubit entanglement. This new functionality encourages development of hybrid analog-digital approaches to quantum simulations with superconducting qubit systems.

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