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Realizing a Deterministic Teleportation Protocol in Superconducting Circuits LARS STEFFEN, MARKUS OPPLIGER, MATTHIAS BAUR, ARKADY FEDOROV, ANDREAS WALLRAFF, ETH Zurich — Teleportation of a quantum state may be used for distributing entanglement between distant qubits in quantum communication and for realizing universal and fault-tolerant quantum computation. Previously, we have demonstrated the implementation of a teleportation protocol, up to the single-shot measurement step, with superconducting qubits coupled to a microwave resonator [1]. Using full quantum state tomography and calculating the projection of the measured density matrix onto the basis states of two qubits has allowed us to reconstruct the teleported state with an average output state fidelity of 86%. In ongoing experiments we attempt to implement single shot read-out and feed-back to perform full deterministic quantum teleportation.
[1] M. Baur, A. Fedorov, L. Steffen, S. Filipp, M.P. da Silva, and A. Wallraff, Phys. Rev. Lett. **108**, 040502 (2012)

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