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**Two-qubit tomography with joint dispersive read-out in circuit QED** S. FILIPP, P. MAURER, P. J. LEEK, ETH QUANTUM DEVICE TEAM, ETH Zurich, A. BLAIS, Universite de Sherbrooke, A. WALLRAFF, ETH Zurich — Quantum state tomography is an important tool in quantum information science for complete characterization of multi-qubit states and their correlations. We demonstrate that for two superconducting qubits coupled to a common resonator mode a reconstruction of the full density matrix can be achieved by measuring the transmission through the resonator – without the need for single-shot measurement of individual qubits. Since the resonator transmission depends non-linearly on the dispersive cavity pull of different qubit states, information about qubit-qubit correlations is intrinsically present in the averaged measurement signal. It is shown that this simultaneous two-qubit read-out can be used for quantum state tomography of both separable and entangled states.

- Prefer Oral Session  
 Prefer Poster Session

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