

on multimode cavity QED by the David Schuster and Jens Koch groups. It would be great if the talks were in the same session and in the order prescribed in the titles.

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Multimode cavity QED 4: Quantum state tomography SRIVATSAN CHAKRAM, NELSON LEUNG, RAVI NAIK, YAO LU, NATHAN EARNEST, Physics Department and James Franck Institute, University of Chicago, PETER GROSZKOWSKI, JENS KOCH, Northwestern University, DAVID SCHUSTER, Physics Department and James Franck Institute, University of Chicago — One of the challenges of large scale quantum information processing is the ability to perform quantum state tomography of massively entangled states. We implement multiplexed tomography of quantum states of multimode cavity arrays comprising several photonic qubits. Quantum state tomography is performed via sequential parametric transitions [1] with a single, flux-tunable transmon qubit, in conjunction with multimode photonic gates and transmon readout. We describe schemes to prepare and characterize W states of several modes of the multimode cavity, and our progress towards extending such schemes to multiphoton entangled states. The ability to create and measure arbitrary quantum states, in conjunction with the large coherence time of microwave cavities, makes multimode cavity QED a promising architecture for scalable quantum computation and bosonic quantum simulation. [1] J. D. Strand et al, Physical Review B 87.22 (2013)

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