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Probing the Speed Limits of Transmon Dispersive Readout THEO WALTER, PHILIPP KURPIERS, MINTU MONDAL, MAREK PECHAL, ANDREAS WALLRAFF, S. GASPARINETTI, ETH Zurich — In circuit QED, faster and more accurate measurement of a qubit's state is necessary to achieve better feedback control, to accomplish more complex quantum algorithms and simulations, and to cross the threshold for fault tolerant quantum computing. In this talk, we discuss our experimental progress to minimize the time needed to readout the state of a dispersively coupled transmon qubit with high fidelity. We outline a signal-to-noise ratio model, illuminate the constraints and find optimal parameters for maximizing measurement speed, while maintaining high readout fidelity. Utilizing a Purcell Filter increases the generality of our results as it becomes possible to reach these speeds with a broader set of system parameters.

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