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Low-Power Dispersive Measurements of High-Coherence Flux Qubits DAVID HOVER, A.P. SEARS, T. GUDMUNDSEN, A.J. KERMAN, P.B. WELANDER[1], J.L. YODER, MIT Lincoln Laboratory, A. KAMAL, S. GUSTAVSSON, X.Y. JIN, Research Laboratory of Electronics, Massachusetts Institute of Technology, J. BIRENBAUM, J. CLARKE, Department of Physics, University of California, Berkeley, W.D. OLIVER, MIT Lincoln Laboratory; Research Laboratory of Electronics, Massachusetts Institute of Technology — We report on progress towards nondestructive dispersive measurements of a high-coherence flux qubit. A capacitively shunted flux qubit that incorporates high-Q MBE aluminum will have longer relaxation and dephasing times when compared to a conventional flux qubit, while also maintaining the large anharmonicity necessary for complex gate operations. We numerically investigate the expected measurement fidelity of the improved qubit and present measurements that explore the boundary between destructive and nondestructive dispersive readout. This research was funded in part by the Office of the Director of National Intelligence (ODNI), Intelligence Advanced Research Projects Activity (IARPA); and by the Assistant Secretary of Defense for Research & Engineering under Air Force Contract number FA8721-05-C-0002. All statements of fact, opinion or conclusions contained herein are those of the authors and should not be construed as representing the official views or policies of IARPA, the ODNI, or the U.S. Government

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