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Reducing defects in Josephson phase qubits – interdigitated capacitors and microbridges NADAV KATZ, M. ANSMANN, R. BIALCZAK, E. LUCERO, UC Santa Barbara, R. MCDERMOTT, University of Wisconsin, M. NEELEY, A. D. O'CONNELL, M. STEFFEN, E. WEIG, A. CLELAND, J. MARTINIS, UC Santa Barbara — Josephson phase qubits have recently demonstrated increased coherence times, setting them as a serious option for scalable quantum computing. This has been made possible by identifying dielectric two-level defect states in the Josephson junction and in any additional capacitance in the circuit as a major source of decoherence. We show that by fabricating an external, high quality interdigitated capacitor the lifetime of the qubit is increased to at least half a microsecond. Further reduction in decoherence is expected by completely removing the dielectric of the tunnel junction and replacing it with a superconducting microbridge. Some preliminary results for MBE grown Rhenium microbridge qubits will be presented.

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