

Abstract Submitted
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Barrier defect analysis using Josephson junction resonators¹

M.J.A. STOUTIMORE, BAHMAN SARABI, MOE KHALIL, University of Maryland and Laboratory for Physical Sciences, C.J. LOBB, University of Maryland, K.D. OSBORN, Laboratory for Physical Sciences — We have designed Josephson junction (JJ) resonators by adding an Al/AIO_x/Al Josephson junction in parallel with a coplanar sapphire capacitor and an inductor so that the total loss will be dominated by the junction barrier. JJ resonators couple to individual defects in the junction barrier, causing splittings in the spectroscopy of the resonator when it is excited near single-photon energies, similar to phase and other qubits. Measurements are performed in a dilution refrigerator at 30mK with a drive frequency of approximately 7GHz. By applying a dc flux bias, we can tune the resonance frequency by as much as 1GHz. Analysis of the frequency of splittings as a function of junction area and barrier growth process provides a method for determining the source of the defects. We will use these devices to study amorphous aluminum oxide barriers and will report our progress towards studying novel barrier dielectrics.

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