

Abstract Submitted
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Investigating two-level systems in the Josephson tunnel barrier¹

JOSHUA STRONG, NIST, FABIO ALTOMARE, RAYMOND SIMMONDS — The presence of two-level system defects within the Josephson tunnel barrier has been made apparent in the spectroscopy of superconducting phase quantum bits. Here, we present a different circuit— a tunable harmonic resonator based on the Josephson inductance— which is better suited to the study of these two-level systems. A typical circuit is tunable over a gigahertz range and behaves linearly at sufficiently low drive amplitudes. We use this circuit to investigate the properties of individual defects, extracting parameters such as strength of coupling to the resonator, etc. The sea of two-level systems also has a bulk effect, causing a degradation in the quality factor of the resonator. This means that the Josephson tunnel barrier has a non-zero loss tangent in the microwave regime.

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