

Abstract Submitted
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Low-photon number studies of inductively-coupled superconducting resonators¹ MOE KHALIL, Laboratory for Physical Sciences and University of Maryland, Department of Physics, HANHEE PAIK, Laboratory for Physical Sciences, FRED WELLSTOOD, University of Maryland, Department of Physics, KEVIN OSBORN, Laboratory for Physical Sciences — Quality factors near one million have been observed in on-chip superconducting resonators for many years, but new studies on resonators reveal much lower quality factors at low-photon numbers, perhaps due to the presence of anomalous two-level system defects. We have designed and fabricated four new aluminum thin-film resonator types near 6 GHz. They include a lumped-element resonator, a slot-line resonator, and two hybrids, both of which contain a slot line and either an inductor or a capacitor. The resonator types have a consistent line width and are fabricated on a sapphire substrate to facilitate the study of surface defects, such as two-level systems. We plan to compare their quality factors in an effort to better understand the loss mechanism associated with the surface. All the resonator types have inductive coupling to a coplanar waveguide with geometrical symmetry that can be used to construct useful Josephson junction resonators.

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