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Parallel Loss Channels in Superconducting Epitaxial Aluminum Resonators CHRISTOPHER RICHARDSON, NATHAN SIWAK, LEI HE, Laboratory for Physical Sciences — Superconducting epitaxial aluminum (epi-Al) on silicon and sapphire has demonstrated low-loss performance that is desirable for linear circuit elements in quantum computing. Most often, it is process artifacts that limit the performance of devices fabricated from epi-Al. Two common artifacts are photoresist residue that is impossible to observe with optical microscopy and line edge defects on the aluminum sidewalls. Superconducting quarter-wave resonators exhibit both saturable power dependence akin to conventional two-level-systems, and power independent loss that strongly impacts yield and is fabrication process dependent. Correlations between detailed electron microscopy, and resonator quality factor measurements with values above and below 10ˆ6 will be discussed.

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