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Surface and Interface Defects in Linear and Nonlinear Superconducting Resonators STEVEN WEBER, KATER MURCH, UC Berkeley, ALLISON DOVE, University of Illinois Urbana-Champaign, GUSTAF OLSON, gustafolson@gmail.com, ZACK YOSCOVITS, University of Illinois Urbana-Champaign, R. VIJAY, ELI LEVENSON-FALK, UC Berkeley, JAMES ECKSTEIN, University of Illinois Urbana-Champaign, IRFAN SIDDIQI, UC Berkeley — We report on progress to identify and mitigate noise mechanisms in both linear superconducting resonators and devices embedded with Josephson junctions. Defects, either microscopic fluctuators or remnant residue layers associated with nanofabrication, can exist on metal surfaces, at the metal-dielectric interface, within the dielectric, or within the Josephson junctions themselves. We have investigated the quality factor and phase noise of lumped element and distributed element resonators at low temperature and photon number- the operating regime of superconducting qubits. In particular, we compare the performance of poly-crystalline and epitaxial films, silicon and sapphire substrates, and weak link and tunnel type Josephson junctions.

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