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Quasiparticles and vortices in superconducting microwave resonators[1] IBRAHIM NSANZINEZA, B.L.T. PLOURDE, Syracuse University — Nonequilibrium quasiparticles and trapped magnetic flux vortices can significantly impact the performance of superconducting microwave resonant circuits and qubits at millikelvin temperatures. Quasiparticles result in excess loss, reducing resonator quality factors and qubit lifetimes. Vortices trapped near regions of large microwave currents also contribute excess loss. However, vortices located in current-free areas can actually trap quasiparticles and lead to a reduction in the quasiparticle loss. We will discuss experiments involving the controlled trapping of vortices for reducing quasiparticle densities as well as the use of normal metal quasiparticle traps in superconducting resonators. In our measurements, quasiparticles are generated either by stray pair-breaking radiation or by direct tunnel-junction injection.

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