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Ultra-Small Superconducting RF Metamaterials CIHAN KURTER, STEVEN M. ANLAGE, Center for Nanophysics and Advanced Materials, Department of Physics, University of Maryland — We propose an ultra-compact design for RF metamaterials implemented with Nb thin films. Those miniaturized devices are fashioned in the form of planar spirals operating at frequencies below 100 MHz, where existing normal-metal metamaterials are quite lossy. The transmission data have shown robust resonance peaks below the superconducting transition temperature (Tc) of Nb which are sensitively tunable with temperature and RF power, and no resonant features above Tc. We discuss the advantages and intrinsic aspects of using superconductors in constructing RF metamaterials such as adding kinetic/Josephson inductance and nonlinearity into their resonance modes.

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