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Input Impedance of the Microstrip SQUID Amplifier DARIN KINION, Lawrence Livermore National Laboratory, JOHN CLARKE, Physics Department, University of California Berkeley and Materials Sciences Division, Lawrence Berkeley National Laboratory — We present measurements of the complex scattering parameters of microstrip SQUID amplifiers (MSA) cooled to 4.2 K. The input of the MSA is a microstrip transmission line in the shape of a square spiral coil surrounding the hole in the SQUID washer that serves as the ground plane. The input impedance is found by measuring the reverse scattering parameter (S11) and is described well by a low-loss transmission line model. We map the low-loss transmission line model into an equivalent parallel RLC circuit in which a resistance R, inductance L, and capacitance C are calculated from the resonant frequency, characteristic impedance and attenuation factor. Using this equivalent RLC circuit, we model the MSA and input network with a lumped circuit model that accurately predicts the observed gain given by the forward scattering parameter (S21). We will summarize results for different coil geometries and terminations as well as SQUID bias conditions. A portion of this work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory in part under Contract W-7405-Eng-48 and in part under Contract DE-AC52-07NA27344 and by Lawrence Berkeley National Laboratory under Contract No. DE-AC02-05CH11231.

Darin Kinion
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