

Abstract Submitted  
for the MAR10 Meeting of  
The American Physical Society

**Dielectric Loss Studies of New Materials for Quantum Information Circuits**<sup>1</sup> DAVID WISBEY, FABIO DA SILVA, JEFFERY S. KLINE, MICHAEL VISSERS, National Institute of Standards and Technology, SUDARSHAN KARKI, ANTHONY CARUSO, University of Missouri-Kansas City, JIANSONG GAO, DAVID P. PAPPAS, National Institute of Standards and Technology — Boron carbide was deposited on a niobium thin film multiplexed coplanar waveguide resonators and the unsaturated internal quality factor was measured. At high power the internal quality factor was 120,000 but at low power, in the single photon regime (unsaturated), it dropped to below 10,000 indicating the presence of two level systems in the boron carbide. Also the internal quality factor of crystalline rhenium multiplexed coplanar waveguides, with a 2 nm crystalline aluminum oxide capping layer, was measured and had an unsaturated internal quality factor of 85,000. The best overall resonator, considering internal unsaturated quality factor and ease of processing, was found to be a high quality niobium thin film grown on a highly ordered sapphire substrate with the highest unsaturated quality factor of 160,000.

<sup>1</sup>This research was funded by the Intelligence Community and IARPA

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Date submitted: 09 Feb 2010

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