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A Novel Toroidal Split-Ring Resonator RF Measurements of Electromagnetic Material Properties JAKE BOBOWSKI, AARON CLEMENTS, University of British Columbia - Okanagan campus — We describe a novel toroidal split-ring resonator (SRR) design that allows one to make accurate and precise measurements of the electromagnetic (EM) properties of various materials. The toroidal geometry avoids large radiation losses associated with conventional cylindrical SRR designs which allows one to design a compact rf resonator that maintains high quality factors without requiring additional EM shielding. The toroidal SRR has been used to measure the real and imaginary components of the complex permittivity of methyl alcohol at 175 MHz. We have also used this apparatus to measure the temperature dependence of both the dielectric constant of liquid nitrogen from 63 to 77 K and the resistivity of copper from 77 to 300 K. Finally, we describe a low-frequency (1 GHz) electron spin resonance (ESR) experiment based on the toroidal SRR and other future applications.

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