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**Development of an Inductively Coupled Thermometer for a Cryogenic Half-Wave Plate** ALEXANDER MADUROWICZ, University of California, Berkeley, AKITO KUSAKA, Lawerence Berkeley National Laboratory — The current state of Cosmic Microwave Background (CMB) research has focused much attention on the measurement of polarization. In an effort to modulate the CMB polarization while also minimizing photon noise due to thermal emission, we are developing a sapphire half-wave plate (HWP) cooled to 50 K rotating at 2 Hz on a superconducting magnetic levitating bearing. In order to measure the temperature of the rotor without making physical contact, we designed an inductively coupled cryogenic thermometer. The complex impedance of the circuit has a resonant peak when driven around 1 MHz. The width of this resonance is dependent on the value of the resistor, which varies with temperature and functions as a thermometer once calibrated. In this talk, we will present results from stationary measurements of this impedance and discuss the temperature accuracy of this thermometer, as well as a preliminary circuit design to measure this impedance during the HWP rotation.

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