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Characterization of TES Bolometers for the POLARBEAR-2B Receiver

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The Simons Array (SA) is a Cosmic Microwave Background (CMB) polarization experiment comprised of three identical telescopes located in the Atacama Desert of northern Chile. SA was designed to measure mid- to large-scale CMB anisotropies in order to constrain the tensor-to-scalar ratio ($\sigma(r = 0.1) = 6 \times 10^{-3}$) and the sum of the neutrino masses ($\sigma(\sum m_\nu) = 40$ meV). Each SA telescope contains a cryogenic receiver with 7,588 transition edge sensor (TES) bolometers cooled to 0.3 K and read out using digital frequency division (dfMux) 40x multiplexing. Here we report characterization of the TES wafers that will be fielded in the second SA receiver, POLARBEAR-2B, in the summer of 2019. These measurements were performed in the POLARBEAR-2B receiver in lab. In particular, we focus on the effects of parasitic impedance on TES performance. We have developed a model that describes an increase in the effective time constant and magnitude of responsivity due to parasitic impedance and we show good agreement between model and data.

Less than 5 years of experience since completion of Ph.D

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Student (Ph.D., M.Sc. or B.Sc.)

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