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Pre-flight Detector Characterization of BLAST-TNG

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The Next Generation Balloon-borne Large Aperture Submillimeter Telescope (BLAST-TNG) is a submillimeter imaging polarimeter which will map the polarized thermal emission from interstellar dust, revealing magnetic field structures in nearby giant molecular clouds, external galaxies and the diffuse interstellar medium in three bands centered at 250, 350 and 500 microns (spatial resolution of 30, 41 and 59"). Its camera contains over 2500 dual-polarization sensitive lumped element kinetic inductance detectors (LeKIDs) which are read out using FPGA-based readout electronics which will be the first of their kind to fly in a space-like environment.

BLAST-TNG was scheduled for a 28 day Antarctic flight during the 2018-2019 summer season, but has been delayed until the 2019-2020 season. We present results from pre-flight detector characterization, including estimates of in-flight sensitivity, the optical passband shapes and polarization efficiencies. We also discuss the planned strategy for the in-flight operation of the detector readout. Throughout the flight, changes in background loading and fridge base-temperature require that the readout software be able to periodically retune the frequency and amplitude of the probe tone for each LeKID detector. We describe how retuning is achieved by the BLAST-TNG flight software, and how this process can be optimized using next-generation tone-tracking LeKID readouts.

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

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