Contribution ID: **340** Type: **Poster**

Simons Observatory Microwave Multiplexing Readout System Overview

Thursday, 25 July 2019 18:45 (15 minutes)

The Simons Observatory (SO) is a polarized CMB experiment on the Cerro Toco Plateau with large overlap with other optical and infrared surveys (DESI, LSST, HSC). Polarized measurements of the CMB provide a wealth of cosmological and astrophysical information. SO aims to improve existing CMB polarization measurements at a large range of angular scales by building 3 small aperture telescopes (SATs) optimized for large scales and 1 large aperture telescope (LAT) optimized for small scales, with a larger number of total detectors than stage 3 experiments to increase mapping speed distributed in 6 frequency bands to aid in polarized foreground subtraction. Some primary science targets on large scales (low-ℓ) are constraints on the primordial tensor to scalar ratio, r, as well as reionization while on small scales (high-ℓ) we can study large scale structure, dark energy, galaxy evolution, neutrino mass, and relativistic species through the Sunyaev-Zel'dovich effect and weak gravitational lensing. To enable the readout of $\mathcal{O}$(10,000) detectors in the SATs and the $\mathcal{O}$(10,000) detectors in the LAT of the SO we will employ the microwave SQUID multiplexing (μ-mux) framework. The microwave multiplexer has never been deployed on the scale we will need for the SO, with a multiplexing factor of $\mathcal{O}$(1,000) and SO will serve as an important test case for future large detector count experiments such as CMB-S4. Here we present an overview of the system level design that we have developed to achieve the high multiplexing factor readout in SO readout electronics and cold TES coupled resonators. This includes design considerations such as cryogenic RF component selection, system linearity, noise, and thermal power dissipation.

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

Y

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

Y

Primary authors: Mr SILVA-FEAVER, Maximiliano (University of California, San Diego Department of Physics); Dr SATHYANARAYANA RAO, Mayuri (Lawrence Berkeley National Laboratory)

Presenter: Mr SILVA-FEAVER, Maximiliano (University of California, San Diego Department of Physics)

Session Classification: Poster session

Track Classification: Detector readout, signal processing, and related technologies