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Warm Electronics for Time Division Multiplexed (TDM) SQUID readout of CMB-S4

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We present the new warm electronics for Time Division Multiplexed (TDM) readout of the CMB-S4 microwave background telescopes. The system consists of "Row Address"and "Column Readout"boards which can be grouped together in modular fashion for readout of each detector wafer. Each Row Address board is capable of addressing 32 signals used for flux-activated switches. Each Column Readout board provides bias, feedback and readout for 8 columns of Superconducting Quantum Interference Device (SQUID) amplifiers operating at 100 mK and 4 K temperature stages. It also provides bias for the 100-mK Transition Edge Sensors (TES) being amplified by each SQUID. Firmware on the module implements a servo loop to bias the SQUIDS at the optimum operating point. A timing distribution and communications loop between all boards in a group allows one board to coordinate timing between all boards in the group, and multiplexing readout data to the back-end DAQ system. The first prototypes have been developed and are fully functional and have been connected to a cryogenic readout chain at SLAC for testing and analysis.

Early Career

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