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Microwave multiplexing on the Keck Array

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We present an on-sky demonstration of a microwave-multiplexing readout system in one of the receivers of the Keck Array, a polarimetry experiment observing the cosmic microwave background (CMB) at the South Pole. During the austral summer of 2018-2019, we replaced the time-domain multiplexing (TDM) system with microwave-multiplexing components including superconducting microwave resonators at the sub-Kelvin focal plane, coaxial-cable plumbing and amplification between room temperature and the cold stages, and a SLAC Microresonator Radio Frequency (SMuRF) system for the warm electronics. In a 1-GHz bandwidth centered on 5.5 GHz, a single coaxial cable reads out 528 channels. The readout system is coupled to transition-edge sensors (TESs), which are in turn coupled to 150-GHz slot-dipole phased-array antennas. The detectors and antennas are of the same design as those in the other four Keck receivers. Observations began in April 2019, and we report here on an initial characterization of the system performance.

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

Y

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

N

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