

Optimization of Transition Edge Sensor Arrays for Cosmic Microwave Background Observations with the South Pole Telescope

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Abstract—In this paper, we describe the optimization of transition-edge-sensor (TES) detector arrays for the third-generation camera for the South Pole Telescope (SPT-3G). The camera, which contains ~16,000 detectors, will make high angular-resolution maps of the temperature and polarization of the cosmic microwave background. Our key results are: (i) scatter in the transition temperature of Ti/Au TESs is reduced by fabricating the TESs on a thin Ti(5 nm)/Au(5 nm) buffer layer; and (ii) the thermal conductivity of the legs that support our detector islands is dominated by the SiO_x dielectric in the microstrip transmission lines that run along the legs.

Keywords (Index Terms)—Bolometers, cosmic microwave, sensor, transition edge, South Pole, telescope.

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