



SPT-3G: The Next Generation Receiver for the South Pole Telescope

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The South Pole Telescope (SPT) is a millimeter-wavelength telescope dedicated to observations of the Cosmic Microwave Background (CMB). The next generation receiver, known as SPT-3G, is scheduled for deployment in early 2016. Currently, the primary limit on the sensitivity of millimeter-wavelength transition-edge sensor (TES) bolometer cameras is the number of detectors. The SPT-3G focal plane will have 16,260 TES bolometers, an order of magnitude increase from the current receiver. The detectors are grouped into 2,710 polarization-sensitive multichroic pixels. Each pixel couples power from a broadband dual-polarization antenna into microstrip transmission lines. In-line filters separate the power again into three frequency bands (90, 150, 220 GHz) and then deposits it onto six TES bolometers. The SPT-3G receiver combines advances in both TES detector development and the associated readout electronics. I will present an overview of the superconducting channelizer architecture of the SPT-3G pixel and the latest laboratory performance. I will also present the integration of these new detectors with an upgraded digital frequency domain multiplexing readout system capable of multiplexing 64 channels per module.

SPT-3G will open a new regime of sensitivity in high-resolution mapping of the CMB. I will highlight some of the scientific achievements expected after four years of observation. These include mapping the B-mode polarization signature from gravitational lensing of the CMB, precisely constraining the sum of neutrino masses. SPT-3G will also detect thousands of new galaxy clusters, probing the expansion history of the universe and improving constraints on the evolution of dark energy.