



The Cosmology Large Angular Scale Surveyor (CLASS) Focal Plane Development

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The Cosmology Large Angular Scale Surveyor (CLASS) will measure the polarization of the Cosmic Microwave Background to search for and characterize the polarized signature of inflation. CLASS will operate from the Atacama Desert and observe ~70% of the sky. A variable-delay polarization modulator (VPM) modulates the polarization at ~8 Hz to suppress the $1/f$ noise of the atmosphere and enable the measurement of the large angular scale polarization modes. The measurement of the inflationary signal across angular scales in which features from both recombination and reionization are expected allows a test of the predicted shape of the polarized angular power spectra in addition to a measurement of the energy scale of inflation.

CLASS is an array of telescopes covering frequencies of 40, 90, 150, and 220 GHz. These frequencies straddle the foreground minimum and thus allow the extraction of foregrounds from the primordial signal. Each focal plane contains feed horn-coupled transition-edge sensors that simultaneously detect two orthogonal linear polarizations. The use of single-crystal silicon as the dielectric for the on-chip transmission lines enables both high efficiency and uniformity in fabrication. Integrated band definition has been implemented that both controls the bandpass of the single mode transmission on the chip and prevents stray light from coupling to the detectors.