



Design and Deployment of a Multichroic Polarimeter Array on the Atacama Cosmology Telescope

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We present the design and a preliminary look at the performance with respect to beams and pass-bands of a horn coupled multichroic polarimeter array and the enabling broadband optical system covering the 90 and 150 GHz Cosmic Microwave Background (CMB) bands recently deployed on the Atacama Cosmology Telescope (ACT). The constituent pixels are feed-coupled multichroic polarimeters fabricated at NIST. We describe the design of the pixel components including broad-band feed horns and superconducting circuit elements. The detectors realize more than an octave bandwidth and split the incoming signal into two orthogonal linear polarizations each with two frequency bands. The array consists of 255 pixels with a total of 1020 polarization sensitive bolometric detectors fed by a 140 mm diameter silicon platelet monolithic feed horn array. This array is coupled to the ACT telescope via a set of three silicon lenses incorporating a novel broad-band metamaterial anti-reflection coating. This receiver represents the first multichroic detector array for a CMB experiment and paves the way for the extensive use of multichroic detectors and broadband optical systems in the next generation of CMB experiments.