

Contributed Talk

Development and Implementation of a Multichroic Array for ACTPol

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Multichroic polarization sensitive detectors provide a path to increase spectral coverage and instrument sensitivity for observations of the Cosmic Microwave Background (CMB) in the presence of complex foregrounds. We present the design of a horn-coupled multichroic-detector array encompassing the 90 and 150 GHz frequency bands and the ancillary technology needed to implement this array in the Atacama Cosmology Telescope Polarization (ACTPol) experiment. The horn-coupled multichroic-polarimeter sensor's bands are optimized to maximize the polarization signal to foreground ratio. The array will be fabricated at NIST and consist of 255 pixels with a total of 1020 polarization sensitive bolometric detectors fed by a 140 mm diameter silicon platelet monolithic feed horn array. We discuss the array design and optimization for ACTPol. The light entering the array must pass through a cryostat window and three silicon lenses that are antireflection coated to improve the optical efficiency. We present the design and measurements of our broadband metamaterial antireflection coatings for the lens and window. We conclude by reviewing the status of these technologies that we aim to deploy to Chile during the 2013/2014 austral summer season.