

Design and Performance of a Balloon-borne Bolometric Cosmic Microwave Background Polarimeter

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Boomerang is a balloon borne millimeter-wave telescope and radiometer, used to study features in the Cosmic Microwave Background (CMB). The receiver is a bolometric instrument, with a focal plane cooled to 285mK. It is coupled to a 1.3m diameter telescope via a series of feeds and filters at 0.3 and 4 Kelvin. The focal plane array of eight horns feeds a total of 12 detectors in three bands, centered at 150, 250 and 350 GHz. The high frequency bands are made sensitive to a single linear polarization by the placement of a wire grid over each feedhorn; the lowest frequency channels use a new technology where both linear polarizations are preserved through the feed optics; the two orthogonal polarizations are absorbed by two separate detectors at the end of the optical chain.

In January 2003, Boomerang flew for 15 days over Antarctica, gathering information on the temperature and polarization anisotropies of the CMB. I will describe the receiver technology and testing, as well as discuss the methods by which these data will be used to characterize the CMB.