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Microfabrication of Arrays of Superconducting Transition Edge Sensors for CMB Measurements CHRYSTIAN POSADA, JUNJIA DING, AMY BENDER, TRUPTI KHAIRE, Argonne National Laboratory, SERGI LENDINEZ, Universitat de Barcelona, SAMUEL CIOCYS, University of California, Berkeley, GENSHENG WANG, VOLODYMYR YEFREMENKO, Argonne National Laboratory, STEVE PADIN, JOHN CARLSTROM, University of Chicago, CLARENCE CHANG, VALENTINE NOVOSAD, Argonne National Laboratory, SPT3G COLLABORATION¹ — The cosmic microwave background (CMB) provides a unique window for exploring fundamental physics. Increasing the sensitivity of CMB experiments requires fabricating focal planes with orders of magnitude more detectors than current instruments. This work presents the procedures used at Argonne National Laboratory for the fabrication of large arrays of dual-polarized multichroic detectors for CMB measurements. The detectors are composed of a broad-band sinuous antenna coupled to a Nb microstrip transmission line. In-line filters define the spectral response, allowing for individual measurement of three band-passes (95 GHz, 150GHz and 220 GHz). A Ti /Au termination resistor is used to couple the mm-wave signal to Ti/Au transition edge sensor (TES) bolometers. There are six bolometers per pixel, for a total of 16,140 detectors in the CMB receiver being fabricated. The monolithic microfabrication of the detector arrays will be presented and discussed in detail.

¹The SPT3G collaboration is developing the third-generation camera for CMB measurements with the South Pole Telescope. Additional information can be found in the following link: <https://pole.uchicago.edu/spt/>

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