Superconducting Pathways Through Kilopixel Backshort-Under-Grid Arrays

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We have demonstrated in the laboratory multiple fully functional, kilopixel, bolometer arrays for the upgrade of the High Resolution Wideband Camera (HAWC+) for the Stratospheric Infrared Observatory (SOFIA) Each kilopixel array consists of three individual components assembled into a single working unit: 1) a filled, transition-edge-sensor (TES) bolometer array, 2) an infrared, absorbing backshort grid, and 3) an integrated, two-dimensional Superconducting Quantum Interference Device (SQUID) multiplexer readout. The detector array is a filled, square grid of suspended, one--micron thick silicon bolometers with superconducting sensors. The Backshort-Under-Grid (BUG) is a separately fabricated component serving as a backshort to each pixel in the array. The backshorts are positioned in the cavities created behind each detector by the back-etched well. Kilopixel TES arrays are directly indium-bump-bonded to a 32x40

SQUID multiplexer circuit. In order to provide a fully superconducting pathway from the TES to the SQUID, numerous superconductor-to-superconductor interfaces must be made. We will focus on the fabrication techniques needed to create the superconducting path from the TES, out of the detector membrane, through the wafer, and down to the SQUID readout.