

SCUBA-2 FOCAL PLANE ARRAYS

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We describe the SCUBA-2 focal plane arrays, their construction, performance and the focal plane environment. SCUBA-2 is a submm camera designed to be operated on the James Clerk Maxwell Telescope in Hawaii. The camera will have two focal planes operating simultaneously imaging the sky at 850 and 450 microns. Each focal plane will consist of 4 sub-arrays of a total pixel count of 5120 per focal plane and 10,240 for the whole camera. A subarray is 32 columns by 40 rows. A sub-array is made of two parts, a multiplexer and a detector hybridised together by indium bump bonding (0.25 million bonds) to provide electrical, thermal and mechanical support. The multiplexer uses time division implemented with one active SQUID switch per pixel. In addition there are dummy SQUID switches to help control crosstalk. The detector array consists of pixels 1mm sq. deep etched into a silicon wafer which is an odd number of wavelengths (in silicon) thick. The front surface of the pixel is ion implanted to give 400 ohm per sq. and the back of the pixel is completely covered with the detector metalization to form a back short. To achieve thermal isolation a pixel is suspended on a 0.5 micron thick silicon nitride membrane which is 10 microns wide. The detectors are transition edge bolometers with NEP's of $6 * 10^{-17}$ watts/sqrt(Hz). Each pixel has a heater used to provide thermal power to help bias the pixels into the transition region. In operation, the heater power will be adjusted to compensate for the varying sky loading and hence keep the detector responsivity and array flat field constant.

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