Plans for a Second Generation 350 Micron Camera for the Caltech Submillimeter Observatory

C. Darren Dowell[1], S. Harvey Moseley, Jr.[2], & Thomas G. Phillips[1]

Abstract. Development of a new facility 350 μm camera ('SHARC II') for the 10 m Caltech Submillimeter Observatory (CSO) is underway. The camera will feature a 6×32 array of doped silicon Pop-Up Bolometers operating at 0.3 K (Moseley et al. 1999). Detector absorption resonances, filters, and anti-reflection coatings are optimized for 350 μm. The pixels will sub-sample the diffraction pattern of the CSO with a spacing of 5″ (0.7 λ/D). The expected point-source sensitivity of SHARC II in excellent weather is 0.5 Jy Hz$^{-1/2}$, an improvement of a factor of 2 over the existing SHARC (Wang et al. 1996; Benford et al. 1999).

1. Project Status, June 1999

Delivery of the SHARC II array from NASA-GSFC will follow development of pop-up bolometers for SPIRE/FIRST and is expected in 2000. To cool the detector array and optics of SHARC II, we have acquired a LN_2/L^4He Dewar and a compact, closed-cycle $^3He/^4He$ refrigerator (Figure 1). We are currently implementing the optics, selecting InterFET NJ132L JFET dies, constructing AC-biased readouts, and considering data acquisition options.

SHARC II Design Goals

Array format:	6×32, $(1\ \mathrm{mm})^2$ bolometers
Operating temperature:	0.32 K
Pixel size:	5″ (0.7 λ/D)
Resolution:	8″ FWHM
Field of view:	1.3 square arcminutes
Strehl ratio:	>90% over field
Bandpass:	350 μm $\pm$ 30 μm (HWHM)
Peak quantum efficiency:	40%
NEFD (best):	0.5 Jy s$^{1/2}$
First light:	2000

[1]California Institute of Technology, Mail Code 320-47, Pasadena, CA 91125. Email: cdd@submm.caltech.edu, phillips@submm.caltech.edu

[2]NASA Goddard Space Flight Center, Mail Stop 685.0, Greenbelt, MD 20771. Email: moseley@stars.gsfc.nasa.gov

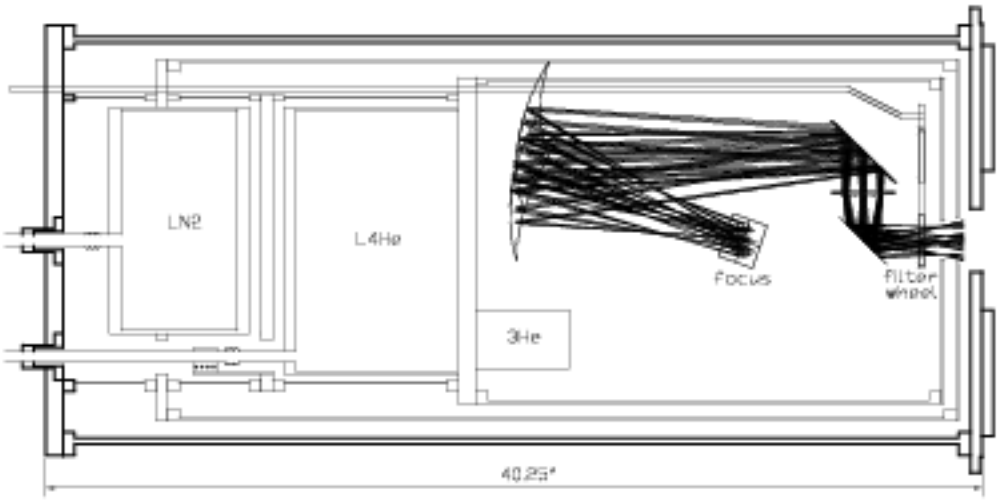

Figure 1. SHARC II cryostat and optics. We purchased the cryostat from Precision Cryogenic Systems, Inc., and the ^{3}He system from Chase Research/QMC Instruments, Ltd. The liquid helium and liquid nitrogen reservoirs (10.5 liters and 7.5 liters, respectively) are sized to last through two nights of observing without filling. In this view of the optics, the instrument is rotated so that the rays come out of the page as they form the final focus at the bolometer array.

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