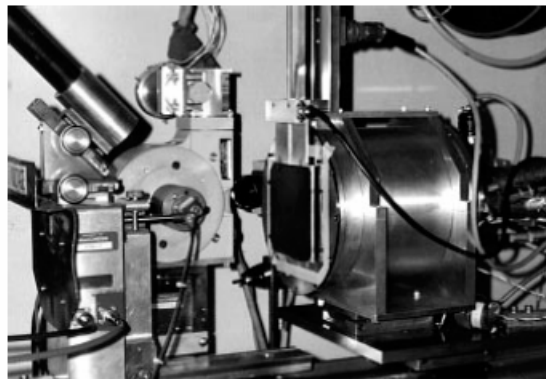


CCD detectors at CHESS

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MacCHESS has recently purchased a 2K CCD detector to complement the 1K detector which has been on loan from Sol Gruner's lab at Princeton University since December 1993. The new detector, assembled collaboratively by Sol Gruner and John Lowrance (Princeton Scientific Instruments), was delivered in December 1994. After initial testing to characterize the detector, the instrument has been in regular use for macromolecular crystallography, primarily on the A1 station. This spring, a new era in the collection of macromolecular diffraction data was evident at CHESS as both detectors were in service on stations A1 and F1. The convenience and efficiency provided by these detectors opens up new opportunities for rapid data collection without a great labor demand.

The 2K detector can operate in either its regular mode where data is recorded independently from each of the 2 million pixels (40 μm on edge) or in a binned mode where four pixels are electronically tied into individual wells of 80 μm on edge thereby effectively operating as a 1K CCD detector. The active area in either case is 82 x 82 mm^2 . For most cases the detector is operated in the binned mode in order to produce smaller data frames which are subsequently easier to transfer and handle. In cases where distinct spot separation becomes marginal, the 2K mode is advantageous. Compared to the 1K detector, this detector has a faster readout time, 5 seconds versus 20 seconds, and a larger active area, 82 x 82 mm^2 versus 50 x 50 mm^2 . Both



The MacCHESS 2K CCD detector.

detectors produce high quality data; the 2K allows the collection of 200 orders of diffraction across the face while the 1K captures 150 orders.

Providing sophisticated detectors to the general user community required the preparation of extensive documentation as well as the dedication of the MacCHESS operations staff. Much of the training and documentation is becoming available on-line as CHESS and MacCHESS continue to take advantage of modern network tools.

Another step in "user-proofing" the CCD's has been to outfit them with a MacCHESS-designed protection mechanism to prevent accidental exposure of the detector to the direct synchrotron beam. This mechanism consists of an x-ray blocking shutter with a thin x-ray sensitive detector covering the face of the CCD detector. Anytime the station door

is opened the shutter moves into place. When the door is subsequently closed and an exposure is attempted, a brief opening of the oscillation camera shutter flashes the x-rays. If no appreciable counts are seen by our safety detector the CCD shutter raises and exposures commence. The 2K CCD is shown above mounted at the A1 beamline with the safety shutter covering the active area.

MacCHESS is presently acquiring the prototype 1K CCD detector of Area Detector Systems Corporation. In the Fall, we plan to have this detector available to users. This detector will incorporate a fiber optic bundle having a greater taper ratio which will provide an active area of 82 x 82 mm^2 , the same as that of our 2K detector. Furthermore, it will operate under an entirely new software interface specifically aimed at assisting the macromolecular crystallographer.