

## **Large-Area CCD Detector Systems**

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To build a large area CCD-based X-ray detector it is necessary to go to a modular array design. There is additional complexity with the array design but there are also inherent advantages in that it is possible to standardize the required modules and then build different sized arrays based on the standard module. This is the strategy we have followed at ADSC. All of the 50 or so commercial array detectors we have built to date have been based on only 2 standard module designs. The modular design also allows the CCD readout to be done in parallel (all CCD's reading out at the same time into separate framebuffer PC's) and this greatly improves overall detector readout speed. Our current large area CCD detector is the Quantum 315, a 3 by 3 module array detector, which has 315mm by 315mm total active area and 6K by 6K of 51 micron pixels in full resolution readout. Because of the very parallel method of readout the readout time for full resolution images is just over one second (about 1100ms).

In this talk and in the associated poster we will try to speculate where CCD-based X-ray detectors should go from here. More performance is certainly possible (still bigger area, still faster readout, still more sensitivity) but costs will rise steeply to accomplish this additional performance. The question posed at the end of the talk will be: "What further improvements in performance of CCD-based detectors will make commercial sense in the years remaining before the arrival of the commercial pixel array detectors."