# X-ray detector development in APS/ASD

- ASD Electrical Systems Group working with detector pool staff and other ASD groups.
- Goal is to develop detector electronics and beamline instrumentation, and provide support on into the future.

#### Several different detector systems

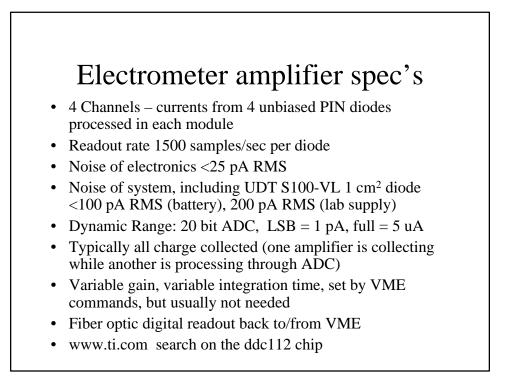
- PIN Diode detector into electrometer amplifiers for beam position, beam intensity monitoring -mature design, delivering to sectors
- Avalanche photodiode detectors for time resolved x-ray studies, counting/integrating electronics – "my" part of work really just beginning.
- Other detectors

### Beam position monitoring

Detector is a quad array of PIN diodes which detect x-rays backscattered from a thin foil. [Ref Alkire et.al. J. Sync Radiation (2000) 7 p.61]

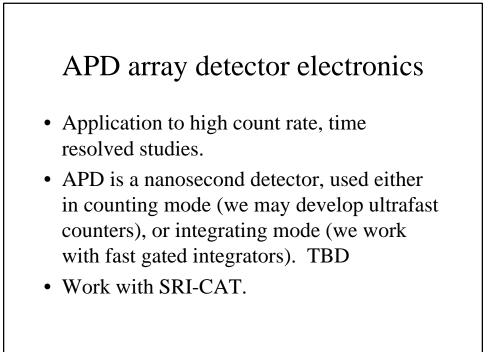
First application of electronics at ComCAT (Wasserman,D'Amico) for fast EXAFS – they use 3 quad arrays, plus a monitor of mono. keV

We can design varied mechanical diode holders, to match specific sector needs e.g. KF40,KF50



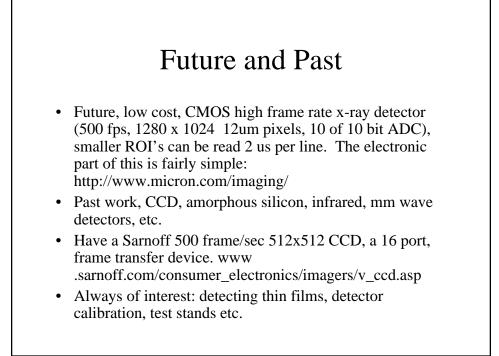
## VME data acquisition

- Setup data from VME system sent to electrometer card via fiber, to monitor 4 PIN diodes.
- Data from each electrometer card returns via fiber to a VME card. This card can accept signals from 4 electrometer cards at a time (e.g. 16 PIN's).
- Second VME card does signal averaging, puts data onto VME bus (A16/24, D16 registers).
- Cost of system \$2K-\$3K. I have about 10 systems built up, am working to install at beamlines.
- Other data formats can be discussed.
- Software work done by others, can discuss.



### General electronics for beamlines

- Various sectors ask for specialized hardware development. We have a set of things we can do quickly, and we also work with ASD,AOD Controls groups. Examples include:
- Custom digital "glue" logic designs using FPGA cards. Applied to timing modules that divide down bunch clock to pulse synchronized lasers etc.
- Circuits to pass data around a hutch along a daisy chained 2-wire link –string all the station monitoring together.
- Various amplifiers
- Miscellaneous simple circuit boards.



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