InterCAT Technical Working Group Meeting
January 18, 2001

Agenda Review and TWG Activity Summary: (Mark Beno)
Mark called the meeting to order and reviewed the agenda.

APS Update

HVAC for Experiment Stations: (Marv Kirshenbaum, APS)
Marv provided an update on the air conditioning system in the experiment hall using slides from a 1993 CAT workshop presentation. Marv stated that the goals of the system were to provide system flexibility, reliability, and a low-noise environment. The design concept, which was intended to meet the needs of a generic beamline, includes a "base building" layout. Marv described in detail the parameters of the air handling units, ductwork, and temperature control system (which now keeps the experiment hall at a constant 72º F). He noted that the system can be used to bring air and temperature control capabilities into the hutches and discussed the costs and mechanical considerations for doing so. Readings from such modifications can be transferred to EPICS for tracking. It was noted that no humidification is provided in the experiment hall floor, but it is provided in the LOMs. Marv also reviewed other utilities (chilled and hot water, exhaust systems, etc.).

When the APS was designed, the architect hired an acoustic sound consultant who did computer modeling of the projected noise levels in the hall. Last summer the APS did a series of measurements of sound levels all around the ring. The data are currently being evaluated. Marv discussed the various sources of noise, noting that the major source is the mechanical equipment mezzanine. High-sound-reduction material has been purchased to test as a solution to this noise source.

CAT Reports

Performance of the ChemMatCARS Diamond Monochromators: (Tim Graber, ChemMatCARS)
Tim introduced the ChemMatCARS group and provided a brief overview of the sector 15 layout (including the FOE for 15-ID in some detail). He then described the crystal orientation and motion in the Kohzu monochromator, noting that there are kinematic mounts on each crystal. He gave the Kohzu HLD-3 specifications and discussed the parameters of crystal stage motion. Tim talked about the requirements for windowless operation and told the group that ChemMatCARS initially had a difficult time pumping down the monochromator. He reviewed the mounting of the water-cooled diamonds (Sumitomo Electric, U.S.A. type IIA synthetic) and presented data on their power loading parameters and a series of rocking curve data for the diamond (111) crystals.

Using Feedback with EPICS: (Mark Rivers, GSECARS)
Since dedicated feedback controllers are costly, Mark wrote software for a new EPICS record for performing feedback: enhanced proportional integral derivative (EPID). Mark gave a discrete form of the PID equation and the three main terms, P = proportional term, I = integral term, and D = derivative term. He described several enhancements over the standard EPICS PID record, including the following:

- It separates device support from the record; it uses soft record device support (which uses EPICS database units)
- EPID can be used with other device support; the ability to add fields can simplify database construction
- PID is computed as an absolute number rather than differential
- Limits are placed on the magnitude of the I term
- CVL field has been renamed INP
- Changed time units from minutes to seconds
- Imposes "sanity checks" on I term (not done in EPICS)

Mark discussed the two kinds of device support for the EPID record, the slow feedback “soft” device support and fast feedback hardware. He also gave a quick guide to selecting optimal values for KP, KI, and KD.

Mark concluded his talk by giving examples of GSECARS applications using this system (e.g., furnace temperature control, monochromator second crystal feedback on both BM and ID line, and temperature stabilization via laser power control in the laser-heated diamond anvil cell).

Beam Instability: (Bob Fischetti, Bio-CAT)
Bob reported on evaluations of the stability of a Si(111) cryo crystal of the so-called hockey puck design. He showed the results of stability testing measurements done on a $KMnO_4$ edge vs. time over seven hours. He also showed the group a picture of the cryo manifold and described the design elements, including a Compton shielding modification involving gold-plated tungsten. Bob discussed thermal effects on the second crystal (which is not cryo cooled) noting the need to minimize the amount of scatter on the crystal. Bio-Cat has used electronic feedback (designed by Jeremy Kropf) when doing rapid scans. When using small beams, there can be big effects from the storage ring; Bob showed rf BPM vs. x-ray BPM results. He then described a successful technique for improving beam stability using feedback and angular correction.

Next Meeting
The meeting will be held Thursday, February 15, 2001, in Building 401, room B4100.