

InterCAT Technical Working Group Meeting

February 18, 1999

Agenda Review and TWG Activity Summary & January Minutes: (Paul Zschack)

The meeting agenda and action items from the previous meeting were reviewed. Ongoing TWG activities include various subgroups, listed below with leader contact information.

| <u>Subgroup</u> | <u>Subgroup Leader</u> | <u>E-mail</u> |
|------------------------|------------------------------------|------------------------|
| Top-off | John Quintana | jpq@nwu.edu |
| Accelerator Parameters | Jon Tischler | tischlerjz@ornl.gov |
| Detector | Tom Irving | irving@biocat1.iit.edu |
| Beamline Diagnostics | (currently seeking a group leader) | |

Parties interested in participating should contact the group leaders for further information; persons interested in leading the Beamline Diagnostics Subgroup should contact Paul Zschack.

Facility Reports

APS Facility Update/News: (Steve Davey)

Davey briefly reviewed current facility information as follows:

- Indicated that he will send out information to all CATs about the use of dry shippers (action item from previous meeting).
- Reported that nine CATs expressed interest in the Oxford cryo cooling service offer. The use of Mohan's group for service will be pursued.
- Thanked CATs for providing input for beamline directory.
- Reminded the group that Yeldez Amer is still not available for assistance with Tecknit. Contact either Steve Davey or Bob Ferry with any questions.
- Informed the group that Tecknit Shielding is under new management. The company president visited the APS to emphasize the company's push for improved management (e.g., handle drawings more effectively).

Liquid Nitrogen Distribution Update: (Bob Ferry)

Ferry reviewed progress on the LN2 system since the last meeting. Bidding opened on 1/25/99. Eight vendors were sent requests for proposals; four vendors have dropped out of the running. Four bids were received from major vendors and put through the technical review/selection process. A low bid has been unofficially identified. All CATs have been asked to complete an LN2-use survey. Ferry will be collecting the surveys and continuing to work through the project schedule. The project is still on track for a 3/1/99 award date. Ferry is looking at the September-October time frame for completion. By June, all CATs must know how/where their LN2 access will be set up.

The only safety issue remaining on the project is to establish a system(s) that will prevent the large storage dewar from potentially emptying into an enclosure and/or detect large LN₂ leaks. Ferry briefly discussed the logistics of system installation.

CAT Reports

Real-time computed microtomography: (Ian McNulty)

McNulty reviewed the collaboration between SRI-CAT (specifically sector 2), the Mathematics and Computer Science Division of ANL, CARS-CAT, and USC. The collaboration, established one-and-a half years ago, focuses on real-time x-ray microtomography. The goal of the program is to develop new capabilities for the reconstruction of high-resolution tomographic data using quasi-real-time analysis, as well as visual and interactive steering capability (e.g., to reduce the transport process and three-dimensional reconstruction time of 1 - 5 GB tomography data sets to less than one minute). McNulty briefly reviewed the DOE Grand Challenge program and the role microtomographic structure problems play in the program.

McNulty discussed the Computer Microtomography Workbench software tool and reviewed the data loop. The control panel is linked directly to the beamline and runs the data collection. The fast reconstruction of data collected from the experiment allows rapid adjustment to maximize the success of the experiment. McNulty reviewed ANL ATM network architecture and the format of links and the local area network, as well as project data acquisition advancements in hardware, software, and interfaces.

The key applications of real-time computed microtomography include the investigation of dynamic processes (e.g., fluid flow in porous materials), signal averaging, and other high-data-volume projects. On beamline 2-BM, the first real-time experiments were conducted in October 1998, as part of the 1998 High-Performance Computing (HPC) Conference. For the experiment, phase contrast measurements were made on micro-machined PMMA spur gears. Using phone and WWW links between the APS and Florida, CCD camera images were sent to the conference after data manipulation was completed at the APS. The effort won the HPC Challenge award and received the best-of-show award. The group hopes to repeat the live experiments for an upcoming conference early this summer.

McNulty believes that 50 to 100-nm resolution can be achieved while still maintaining the data-collection rate. Work is continuing on 2-ID-B and -D. McNulty discussed various technical aspects of the beamlines and their capabilities, reviewing the advantages they offer to the project.

In-vacuum beam intensity monitor: (Jon Tischler)

Tischler reported on an in-vacuum beam intensity monitor that was designed as a diagnostic tool on monochromators and works in ultra-high vacuum conditions. The monitor, placed near the monochromator, measures the center of the beam, not just the edges. It is placed before all slits and is not sensitive to beam position. It can be left in place in the beamline.

The device is a thin graphite foil through which beam is passed. High-voltage electrodes pull electrons out of the foil and the output is measured using a Keithley. The response is 2×10^{-9} A at 10 keV, 95 mA. The device has been tested up to 30 keV. Pyrolytic graphite is used for

electrons is of this order. A gold film would provide the largest signal and would work well at higher energies. Tischler showed schematics of how the device is set up.

BESSRC-CAT Activity Update: (Mark Beno)

The Basic Energy Sciences Synchrotron Radiation Center (BESSRC) CAT comprises two sectors (11 and 12) on the experiment hall floor. Beno reviewed staff and responsibilities from BESSRC, the ANL Chemistry Division, and the Northern Illinois University physics department.

Beamline 12-ID consists of a double-crystal monochromator and three hutches (which can be used one at a time). Beno reviewed the primary research programs on-going in each station. Most of the beamline's evolution can be attributed to the small-angle scattering (SAXS) programs. Beno discussed the physical parameters of the monochromator (original design by Mohan Ramanathan), the many changes the system has undergone over time, and the advantages gained from the design modifications. The bending-magnet beamline in sector 12 is now in windowless operation. A bendable mirror is used to focus beam into the B hutch. The three stripes on the mirror (platinum, palladium, and silicon) are used to adjust cut offs. Beno discussed the mirror tank at 12-BM. For inelastic scattering work, the beam has been focused down to 100 microns and was stable. Future plans include installing a pink-beam mirror in the FOE. Beno discussed other technical aspects of the station layout, as well as diagnostics used in the beamline. An in-vacuum quadrant diode is being used to determine beam position and to look for motion in the second crystal. The pinholes in the device are used when doing SAXS. Beno compared the monochromators on the bending-magnet line and the undulator, highlighting the distinctions between the two.

The 11-ID beamline is now being assembled. Beno expects it will be tested in the April to June time range. There will be three separate beamline capable of simultaneous operation (three shutters, three monochromators). The source will be an elliptical multipole wiggler. Beno concluded his presentation by briefly discussing the research program planned for the sector.

News and Other Business

The next CAT update will highlight CMC-CAT.

Next Meeting

The meeting will be held March 18, 1999, in conference room A1100.

Action Item

1. Send out information to all CATs about the use of dry shippers (S. Davey)