

1-BM Status

opening to GUP in 2009-2 at 70% level
2-D detection, fixed wavelength
hiring of a staff member for beamline seems more likely

11-BM Status

- Mail-in software (automation for base requests, data collection, data merge, file retrieval, sample disposal & publication tracking) is now done. A paper on this is being written.
- Autocalibration, with optional scheduling, is now done
 - Metering of sample bases to shifts now possible
 - Variable temperature data collection implemented, but not in user interface
- Software is documented with an internal wiki
- Diffractometer tools written to ease analyzer alignment
 - Alignment of analyzers now automated
 - Mono and blue (sample) slits now automated
 - More ideas for further productivity gains (set gains, interpolate for bender positions, 2-D scans, set filters & beamstop for analyzer alignment)
- Beamline staffing: Jun Wang left in July 2008, replaced by Matt Suchomel in January 2009.
 - Publicity efforts suspended due to lack of staffing
- Usage:
 - Samples registered by cycle:
 - 2007-3: 191
 - 2008-1: 175
 - 2008-2: 111
 - 2008-3: 182
 - 2009-1: 39 (to date)
 - Productivity: 10 papers in print in 2008

11-BM is considerably undersubscribed (We could in theory manage ~100+ samples/week). Until recently we could not have handled the load; at present the extra time is allowing for commissioning studies/training.

11-BM Tasks in progress

- Commissioning of optics for variable-wavelength operation (see separate report from Matt)
- Revision of user instructions
- Switch to simpler sample mounts
- Publicity outreach started
 - MRS (MRS, fall '08)
 - TMS (BHT, winter '09)
 - ICDD (BHT, spring '09)
 - NASSC (MRS, summer '09)
 - ACA (BHT, summer '09)
 - DXC (MRS, summer '09)
- Diffractometer diagnostics
 - Beamstop height adjustment
 - Beam size camera (at detector plane)
 - PIN diode (at detector plane)

Short-term optics improvements:

- Positioning cameras for 2nd mirror
- New mini hutch beam position flag
- Paper documenting sample database and automation process

Areas for possible development on 11-BM

Short-term optics improvements:

- 1) Motorize mirror bend adjustments
- 2) Check alignment of 1st mono crystal?
- 3) Spare bender (~\$80K): current unit has twist & virtual leak.
 - Broken crystal would shut down beamline for 1-2 cycles(!)
 - Twist hampers wavelength changes
 - Outgassing leaves us reluctant to do any in-vacuum work.

Long-term optics improvements:

- 1) Need to redesign 1st mirror positioning system, for reproducible movement
- 2) Mechanism for survey of beamline components

Mail-In scope expansions:

- 1) Allow users to specify multiple temperatures for data collection
- 2) Specify data collection protocols
 - beam-sensitive samples
 - wider/narrower Q range
 - scan time

The problems here are how to set policy and how to meter use to match beamtime allocations. Also, we don't want users to use up all allowable time, just because they can, or collect unusable data where they are overly ambitious and scan too quickly. The required web interface may be quite difficult to write.

On-Site usage:

At present, there is no beamline data collection automation other than that for mail-in samples. An on-site user could not create a sequence of operations using the robot, cryostream and/or diffractometer. The existing MEDM interface to the beamline controls is not intended for users. It is quite complex and not easy to learn. It does not protect against accidental actions that could significantly damage the instrument. We wish to design a user interface to suit tasks that a user would want to do with the instrument and not allow access to other parameters. To do this, we need to understand the functionality to be supplied through on-site use.

Currently on-site usage is allowed on an informal basis for users who have samples not allowed for mail-in (radioactive materials) – these users do very little work on the instrument themselves.

Resonant Scattering:

At present a large (>3 KeV) energy shift requires ~ 2 shifts to obtain a clean peak shape and good intensities. We cannot access wavelengths below ~ 13 KeV. We have a bit of experience making small shifts for near-

edge & below-edge measurements, and believe that this could be pretty simple and perhaps even be automated for users.

Instrumenting the 2nd mirror could make resonant scattering support possible. A better quality 2nd crystal would also likely make RS experiments easier. Considerable development is also needed to allow users to make even minor energy changes. We will revisit this in 2009-2 after more commissioning work.

Sample Environments:

At present we can provide temperature control with the cryostream ($\sim \pm 200\text{C}$). Matt is investigating the actual sample T for various settings over the range.

Purchased mount for goniometer heads. Use requires realignment of xyz stage (1/2 day?)

Air sensitive samples: O₂/water permeation in Kapton is unknown. Mounting capillaries in kapton does work. We are open to other ideas.

XOR provided capital money for purchase of a 4-100K device for 11-ID-C and 11-BM. Yang Ren is looking into this, but in the short term has purchased a simple (\$15K) device without a sample spin option that looks potentially interesting for 11-BM.

What other temperatures/environments should be investigated and funds be requested? Advocacy is needed.

- 10 K Helijet
- Norby *in situ* cells
- 1000C+ optical furnace?

Need to experiment with stationary sample data collection options since data collection is too fast to use sample rocking

If it takes a shift to setup for cryo work and a shift to switch back, how should this be prioritized against routine mail-in?

On-site use requires a user interface

Proprietary Data Collection

Some (though not all) industrial users are very concerned about who could have access to their data. At present, any APS staff member and perhaps many users could obtain access to all 11-BM data files if they are sufficiently sophisticated.

The simple solution: unplug the beamline computer from the network for proprietary data collection cannot be used.

Possible solutions (all require significant IT/BCDA investment):

- configure all-in one beamline server to allow removal of beamline from network
- encrypt all communication from struck scaler
- limit access to struck PV's to specified IP addresses

Unclear which of the above would be acceptable to sensitive proprietary interests. N.B. Support of industrial users is likely to rise in APS priorities.

Remote Operation

Remote operation of 11-BM could be possible. It raises lots of concerns for security and hazards – the uses for this are unclear.

Area Detection

Use of area detection on 11-BM is in the original proposal. How important is this to the beamline program with this offered on 1-BM?

Routine longer wavelength operation

For proteins and perhaps some pharmaceuticals, data collection is preferred at 15KeV rather than 30KeV. Should this be supported for users? How?

User Requests:

Regional workshops (**Arturo Hernandez-Maldonado**, Univ. of Puerto Rico)

Variable temperature (80-500K) work, mail-in OK (Pat Woodward)