APS Update

Dennis Mills

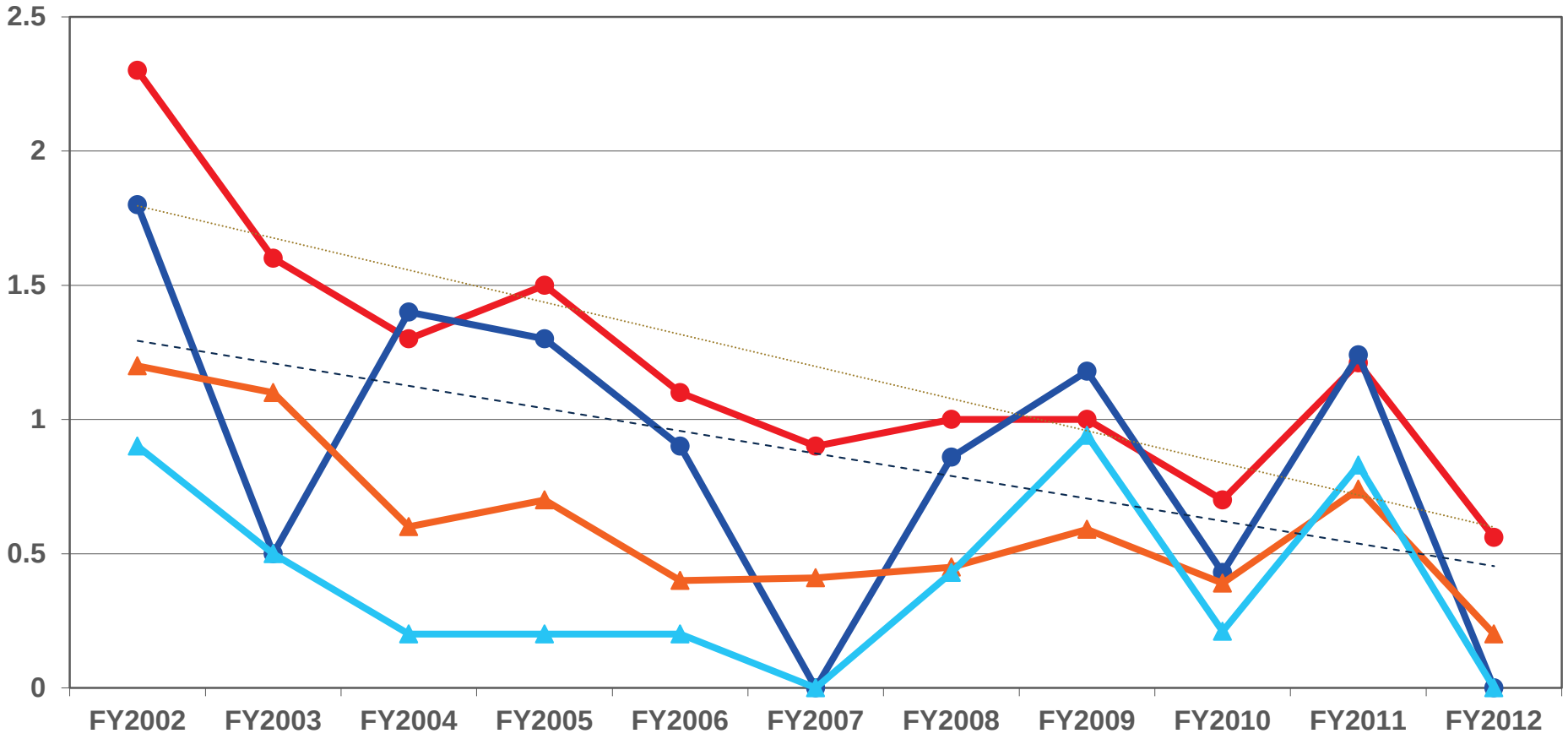
APS Monthly Operations Meeting

May 30, 2012

Agenda

- APS Update - Dennis Mills
- APS Upgrade Update - Jim Kerby
- APS Vibration Monitoring Plans - Rod Gerig

APS Still Doing Great on Injury Rates



TRC = Total OSHA Recordable Case Rate per 200,000 Hours Worked

DART = Days Away, Restricted Duty, or Job Transfer Case Rate per 200,000 Hours Worked

FY2002-4 APS Divs. FY2005-8 SUF (APS Divs.+ IPNS) FY2009-12 PSC (APS Divs. Only)

The Advanced Photon Source is an Office of Science User Facility operated for the U.S. Department of Energy Office of Science by Argonne National Laboratory

Upcoming Reviews

- DOE Mini-Review of APS-U: June 13
  - Preparation for CD-2 Review in December

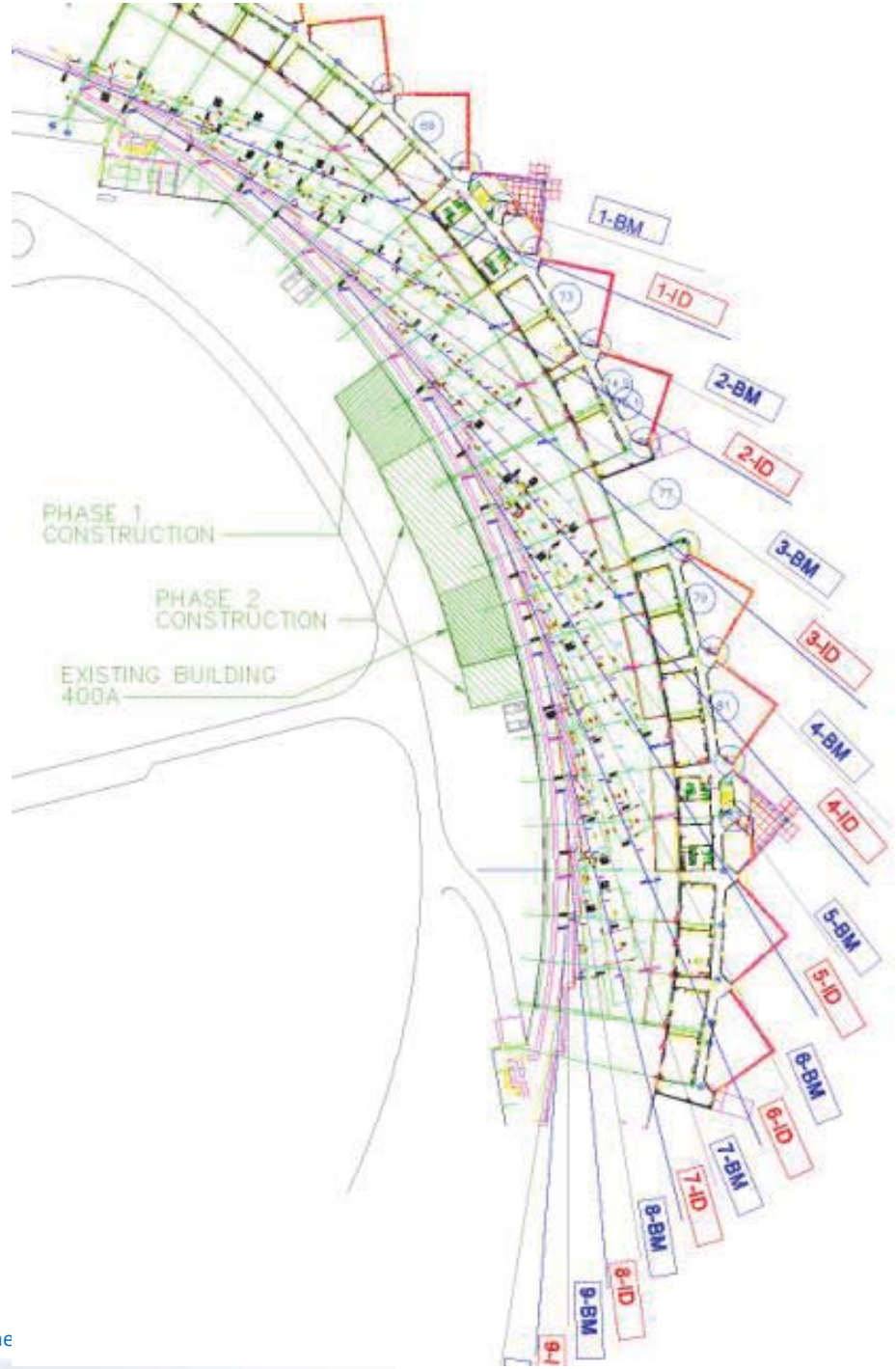
- University of Chicago: July 18-20
  - Will focus on strategy

- SAC: October 3-5
  - Will include program reviews of
    - HERIX and NRS at sectors 3 and 30
    - SAXS, Coherent SAXS, GISAXS at sectors 12 and 8 (also USAXS at 15?)

- CD-2 Review for APS-U: December 4-6

Building 400A Project

- Building 400A is being extended to house RF and cryo plant for the Short Pulse X-ray facility.
  - Phase 1: 3/18/12 – 7/8/12
    - All foundations and slab
    - All work below finish floor
    - Completion of North section of building (steelwork, roofing, paneling, life safety etc.)
    - All other site work (driveway, etc)
  - Phase 2: 7/9/12 – 9/30/12
    - Completion of the rest of the building
    - Could start immediately if funds available

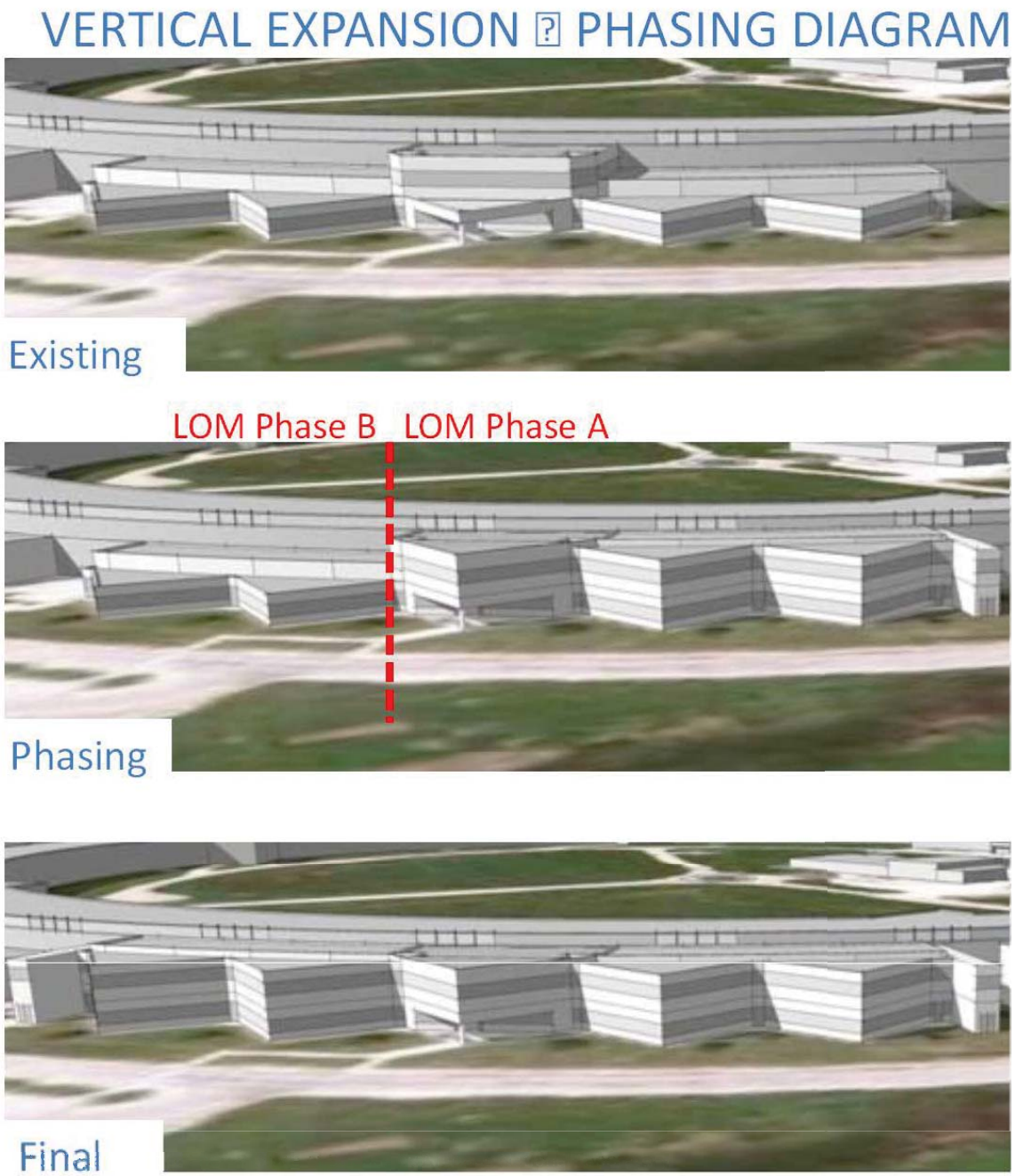


APCF Site Near 435 (Sectors 18-20)

- Start Construction: August, 2012
- LOM 435 Parking relocation: Fall, 2012
- Foundation/ Subgrade: Fall, 2012
- Steel Erection: Winter, 2012/2013
- Paving/ Final Site-work: Late Summer/ Fall, 2013
- We are installing initial vibration sensor network

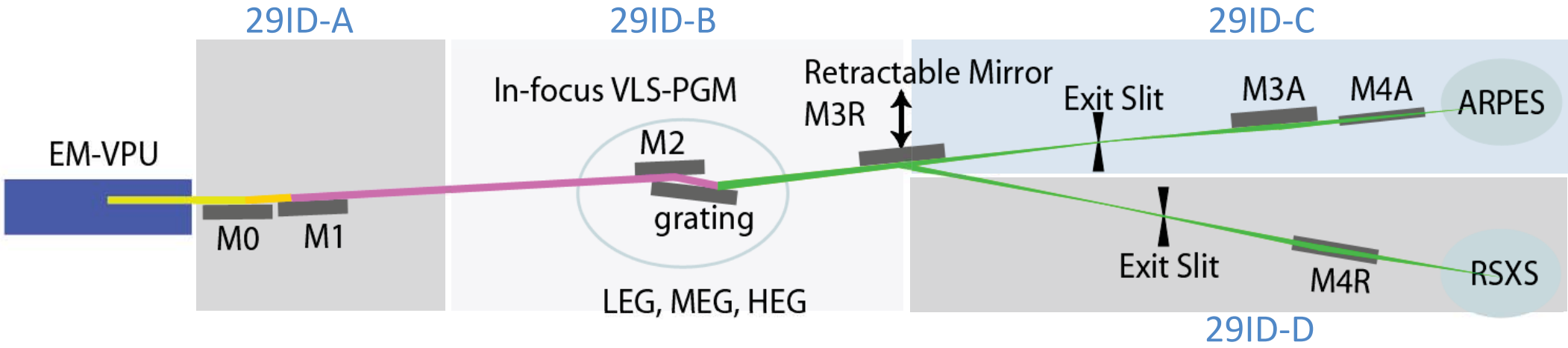
Early Planning for LOM Expansion

- Planning feasibility of adding second floor to office areas of LOMs to provide more user and beamline staff space starting in FY2013
- Working with A/E firm to develop more detailed designs and cost estimates
- Likely first LOM to be expanded would be 437 (unoccupied), construction in second part of FY2013



Sector 29ID: IEX

Intermediate-Energy X-rays a window into collective excitations in interacting electron systems



Grating	k_0 (line/mm)	$c = \frac{\cos\beta}{\cos\alpha}$	*Resolving Power (ΔE/E)*	*Flux (photon/sec)*	Energy range
HEG	2400	4.2	50,000	2×10^{10}	250 – 2,000 eV
MEG	1200	2.2	10,000 2,500	2×10^{11} 2×10^{9}	250 – 2,000 eV 2,000 – 3,000 eV
LEG	400	1.5	2,500	4×10^{12}	250 – 2,000 eV

IEX Status: Insertion Device

Electromagnetic Variable Polarizing Undulator (EMVPU) with quasiperiodicity (QP) capabilities for improved signal to noise

Magnetic Measurements:
Full characterization in all eight operational modes and switching between all modes.

- Linear Horizontal – with and without QP
- Linear Vertical – with and without QP
- Right Circular – with and without QP
- Left Circular – with and without QP

The device performs to specification

Installed in the storage ring on May 4, 2012

IEX EMVPU with QP	
ID period	125 mm
Number periods	38
Gap	10.5 mm
Energy Range	LP_H: 250 - 2500 eV
	LP_V, CP: 250 - 2500 eV

IEX Milestones

June/July 2012:	Commissioning of ID during machine studies Installation of M0/M1 (mirrors) Delivery of resonant soft x-ray scattering (RSXS) endstation
Aug 2012:	Expected first light and begin white/pink beam commissioning
Sept 2012:	Installation of grating monochromator assembly
FY 2013 (1Q-2Q):	Installation of branch line vacuum component Delivery of angle-resolved photoemission spectroscopy (ARPES) endstation
March 2013:	Delivery of monochromator components (mirror and first grating)
June 2013:	Begin mono beam commissioning

Optics and Detectors Test Beamline at 1-BM

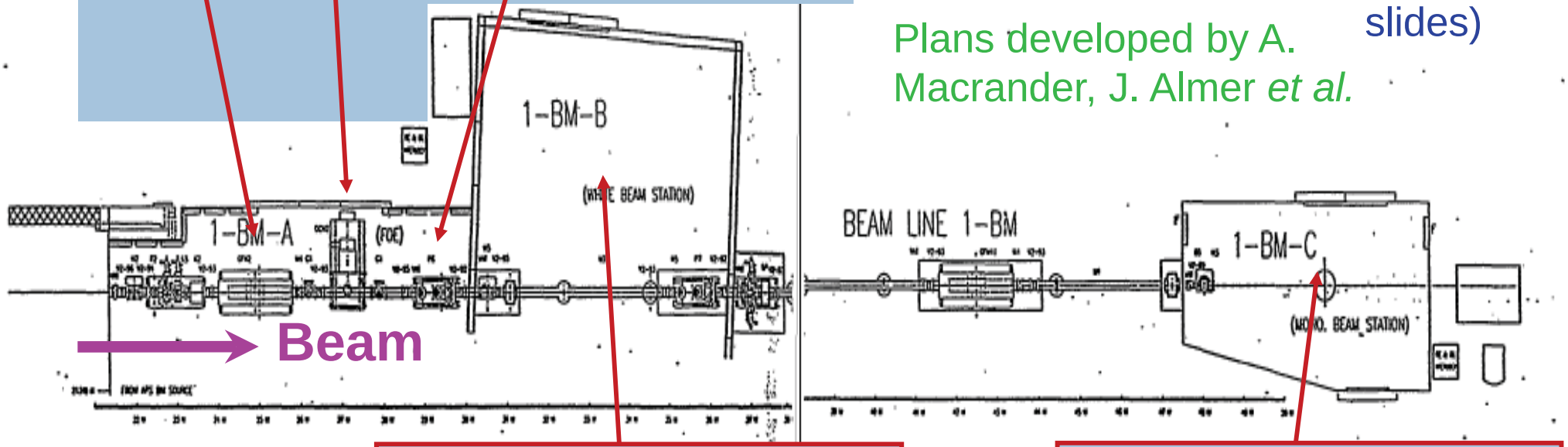
Collimating mirror: remove, and replace with 1) fast shutter and 2) future Laue-Laue double crystal monochromator for high energy diffraction hutch

PSL monochromator: replace second sagittal focusing crystal with flat crystal for test hutch

P6 shutter: remove riser blocks to transmit white beam

Powder diffraction: 17-BM (later slides)

Plans developed by A. Macrander, J. Almer *et al.*

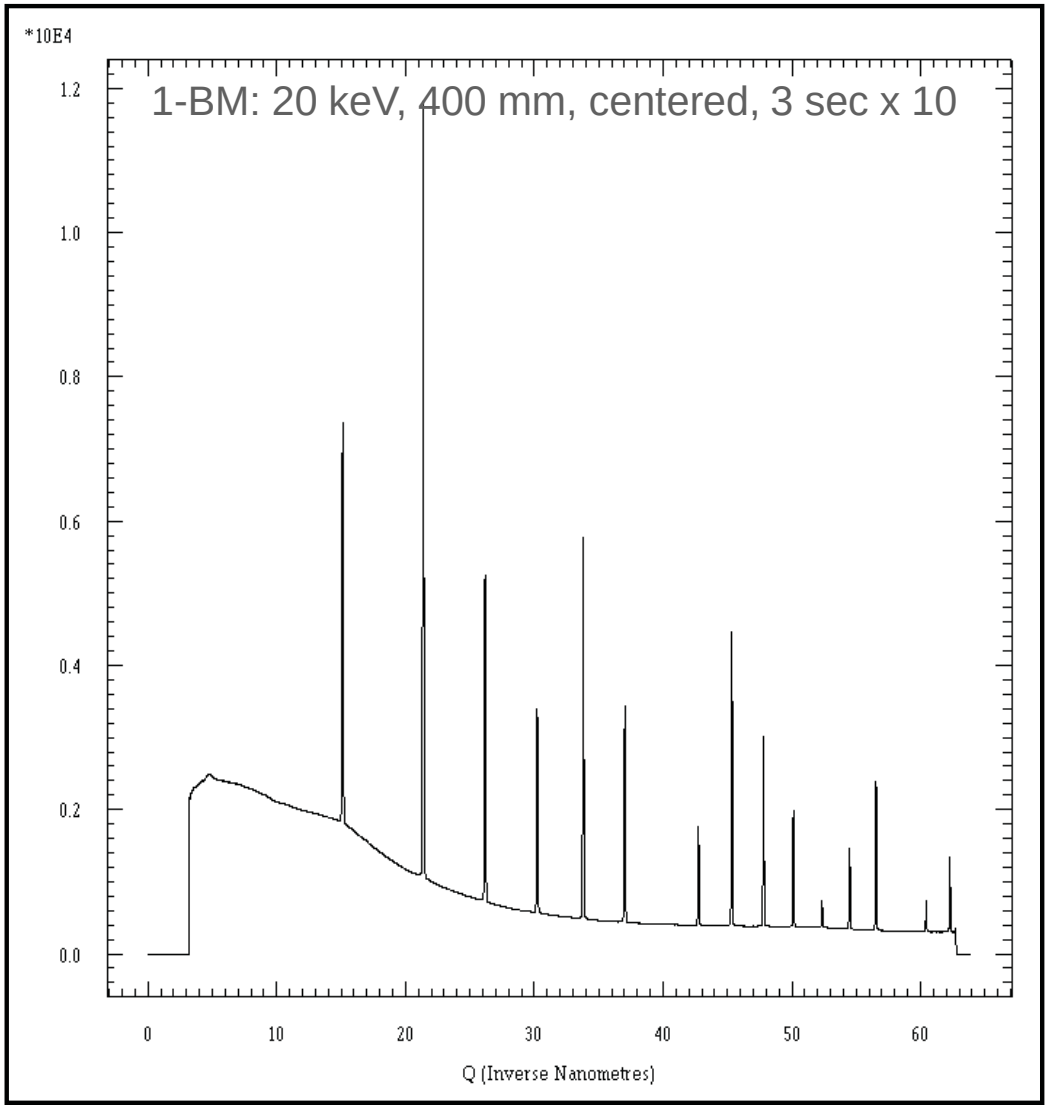


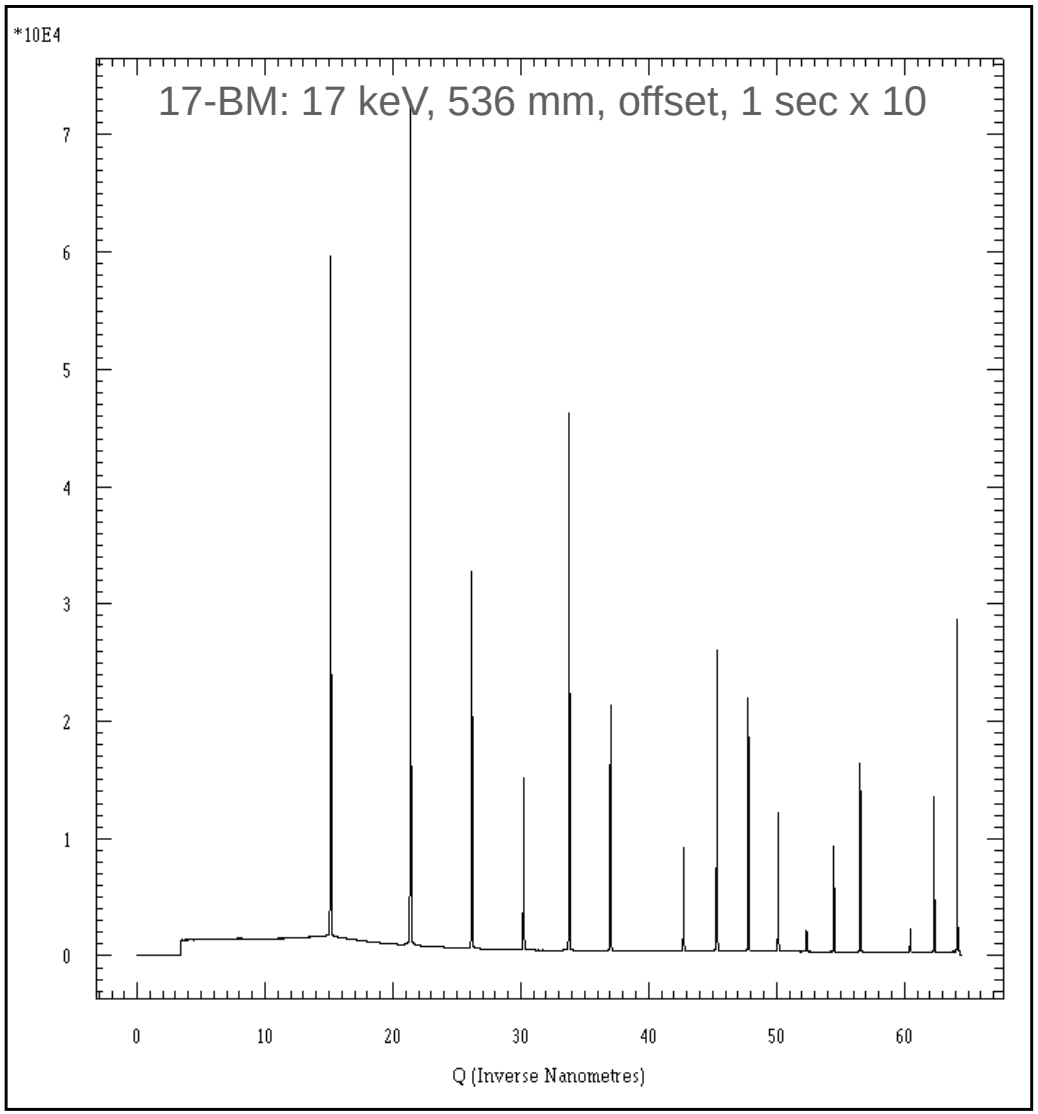
Optics and detector test hutch

High energy diffraction hutch

Figure from Srajer, Rodricks, Assoufid, and Mills, APS LS-35

Powder diffraction comparison: LaB_6 with 0.3 mm cap





17-BM has similar flux, improved peak/background. Tests by Greg Halder *et al.* April 2012

FY 2013 Key Focus Areas for Hard X-ray Science Initiative LDRD for FY13

- ***R&D in Support of the APS Upgrade Project***
  - The performance of deliverables within the scope of the APS Upgrade project will require R&D in key areas including production of short pulses, novel insertion devices, and advanced beamline instrumentation, including optics and high-speed/high-energy detectors.

- ***Science Enablers***
  - Fully exploiting the capabilities of the APS, including those provided by the Upgrade, will require their broad application into new areas of research. To maximize the value for ANL and the success of the upgraded APS, we will invest in efforts that will lead to innovative science programs taking full advantage of the upgraded APS.

- ***Future Hard X-ray Sources***
  - To maintain Argonne's leadership role in hard x-ray science, R&D must commence soon to develop the next generation of hard x-ray sources. These sources include high-repetition rate free electron lasers, free-electron laser oscillators, and/or ultimate storage rings

Process for Hard X-ray Science Initiative LDRD

- PSC will request 1-2 page pre-proposals to be reviewed by Hard X-ray Science Initiative Team, due to Denny by June 20.
- PIs will be informed which pre-proposals should be developed into full proposals.
- Full proposals will be evaluated and ranked by the Hard X-ray Science Initiative Team with advice from appropriate experts.
- The Hard X-ray Science Initiative LDRD package will be presented to ANL Lab Management with a request for funding.
- ANL Lab Management will come back with a funding level for this Initiative.
- The Hard X-ray Science Initiative Team will allocate funds to proposals.
- All the SI LDRD info can be found at: http://web.anl.gov/LDRD/FY2013_Strategic_Initiatives.html