

APS-U Forum Update

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APS-U Forum

February 26, 2015

News

- Meeting scheduled for March 5th in Germantown to present the Science Case and latest plans for the APS Upgrade
- The Science Case planning process is launched
- Full funding for APS-U was received: \$20M in FY15
- APS-U in President's Budget Request for \$20M in FY16



Meeting with DOE – March 5, 2015

- Meeting scheduled for March 5, 2015 in Germantown to finalize information needed to move the project forward.
- Putting the finishing touches on the “Stump Speech” and Project details.
 - Complete “Stump Speech” (a.k.a. Mission Need) Presentation
 - A set of 12 whitepapers answering 49 Tough Questions
 - Project details: revised cost estimate, KPPs for discussion, ...
- Goal for the March meeting is to move forward with:
 - CD-0 revision to incorporate new scope, cost and schedule
 - planning a CD-1 review, scoping out late summer time frame



Science Case Development

- Launched the Science Planning process leading to a “First Experiments”-type document
- The Science Planning process is co-chaired by Stephen Streiffer and Paul Evans (U. Wisconsin)
- Working groups are forming, starting with WG leadership (confirmed):
 - **Biology and Life Sciences:** Gayle Woloschak (NW), Bob Fischetti (ANL)
 - **Condensed Matter Physics:** Oleg Shpyrko (UCSD), John Freeland (ANL)
 - **Advanced Materials / Mesoscale Engineering:** Bob Suter (CMU), Dillon Fong (ANL), Peter Chupas (ANL)
 - **Chemistry and Catalysis:** A. Wilkinson (Ga. Tech), David Tiede (ANL), Karena Chapman (ANL)
 - **Soft Matter:** Bob Leheny (Johns Hopkins), Alec Sandy (ANL)
 - **Environmental Science and Geo Science:** John Parise (SBU), A. Lanzirotti (UC)
- The planning process is on a schedule leading to a series of focused workshops (in April/May) culminating in a “First Experiments”-type document (in June)



Highlights (from monthly report to DOE)

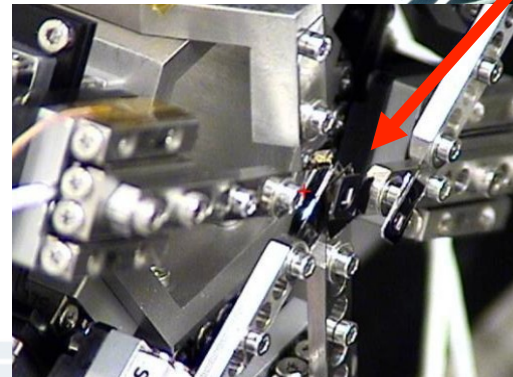
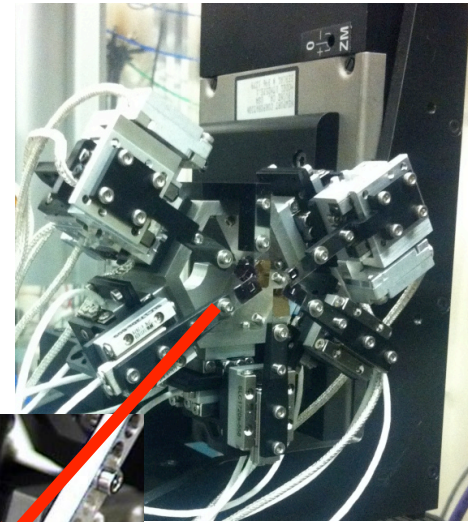
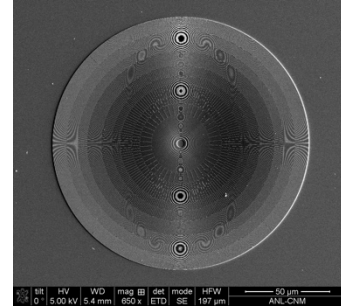


A lot of great technical work is being accomplished to move the Upgrade forward



Diffractive optics for hard x-ray energies key to achieve highest spatial resolution across applications

- High, direct spatial resolution required to access diverse contrast mechanisms: XRF, XRD, nanospectroscopy, ...
 - Lensless imaging can complement, but not replace
 - Require both high resolution as well as high efficiency
- **ZP** developments likely to reach below 20 nm, down to **5 nm** (Interlaced stacking); enable full spectroscopy, reasonable *in situ*
 - Exciting developments all over the board, largely combinable for maximum effect
- Various approaches towards ‘stacking’ increase optics efficiency tremendously. We have demonstrated **28.2% efficiency at 27 keV** (compared to 1.8% of a single ZP) using intermediate field stacking of 6 ZPs (cf. Patent pending: ANL-IN-13-092 Gleber *et al* Optics Express 22(23), 2014)
- Revolutionary possibilities when leveraging MBA-type storage ring.



APS Upgrade Progress - Brief Updates

- M1 Magnet Pre Prototype Production
 - Coils and core completed. Final assembly starting
- Power Supply Stability
 - With a modification to the temperature control of the system, both the TDK-Lambda Genesys and Danfysik 9100 power supplies maintained 1ppm stability at 200 A.
- Prototype Plinth Procurement
 - Steel frames are complete, in both Quad Doublet and Demo Multiplet Module forms. Several mixes of concrete will be used to generate stability information for these supports.
- Other Interactions with other Labs
 - BNL NSLS-II BPM arrived at APS for testing
 - Visit to MAX IV for installation / vibration information (March)
 - Visit to NSLS-II for controls / feedback / diagnostics (February)
 - Visit of LNLS to APS for engineering systems discussion (March)
 - Visit to CERN (May) for vacuum system design development



M1 Coils and Core at Fermilab.



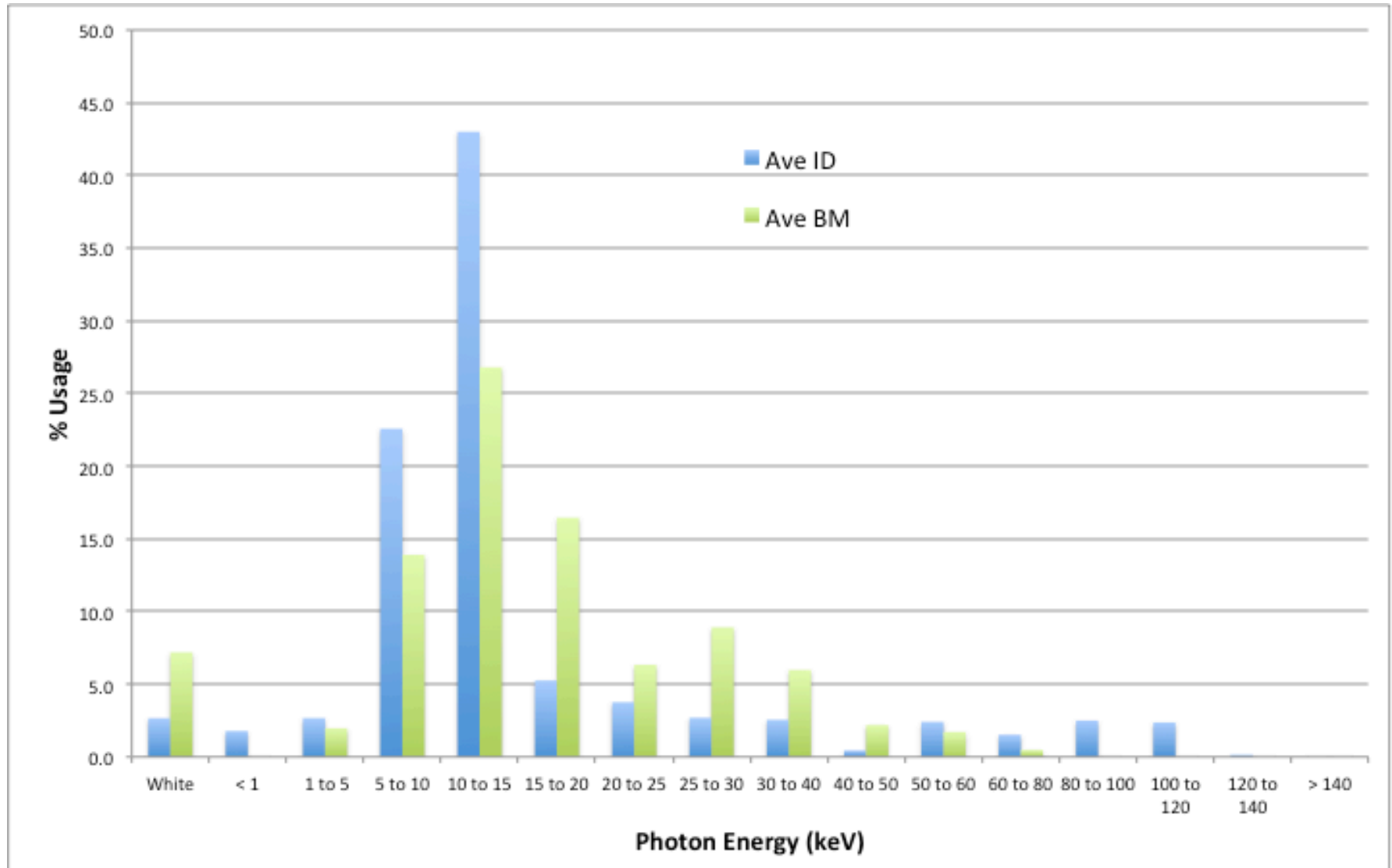
Steel frames for the Plinth R&D at Corsetii Steel. Concrete pouring will take place next week at Dukane Precast.

Next Steps

- Complete deliverables for CD-1
 - Finalize CDR, incorporating MAC suggestions
 - Update BoEs and cost estimate; deep dive on costs in key areas
 - Bottom up contingency analysis
 - Finalize project documentation:
 - Risk management plan, PHAR, QAP
 - Further develop the beamline, optics and detectors scope
- Validate readiness:
 - Forming Project Management Advisory Committee and Experimental Systems Advisory Committee
 - Aim for reviews in May/June
 - Director's Review 6-8 weeks before a CD-1 review



Photon Energy Usage Survey

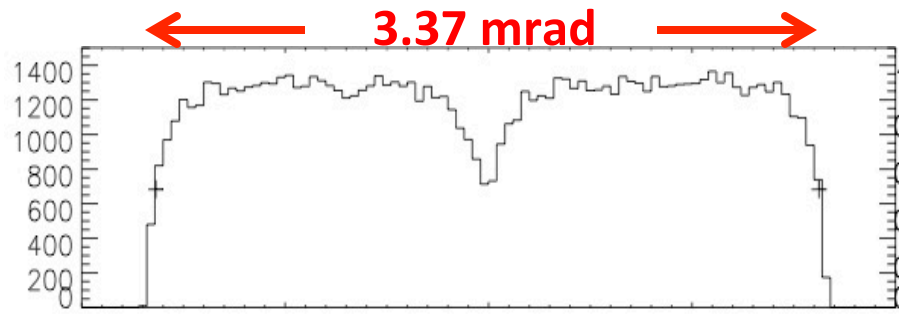


Errata

- Corrected slide from last meeting



3-Pole Wiggler – Flux Distribution @ 20 keV - Correction



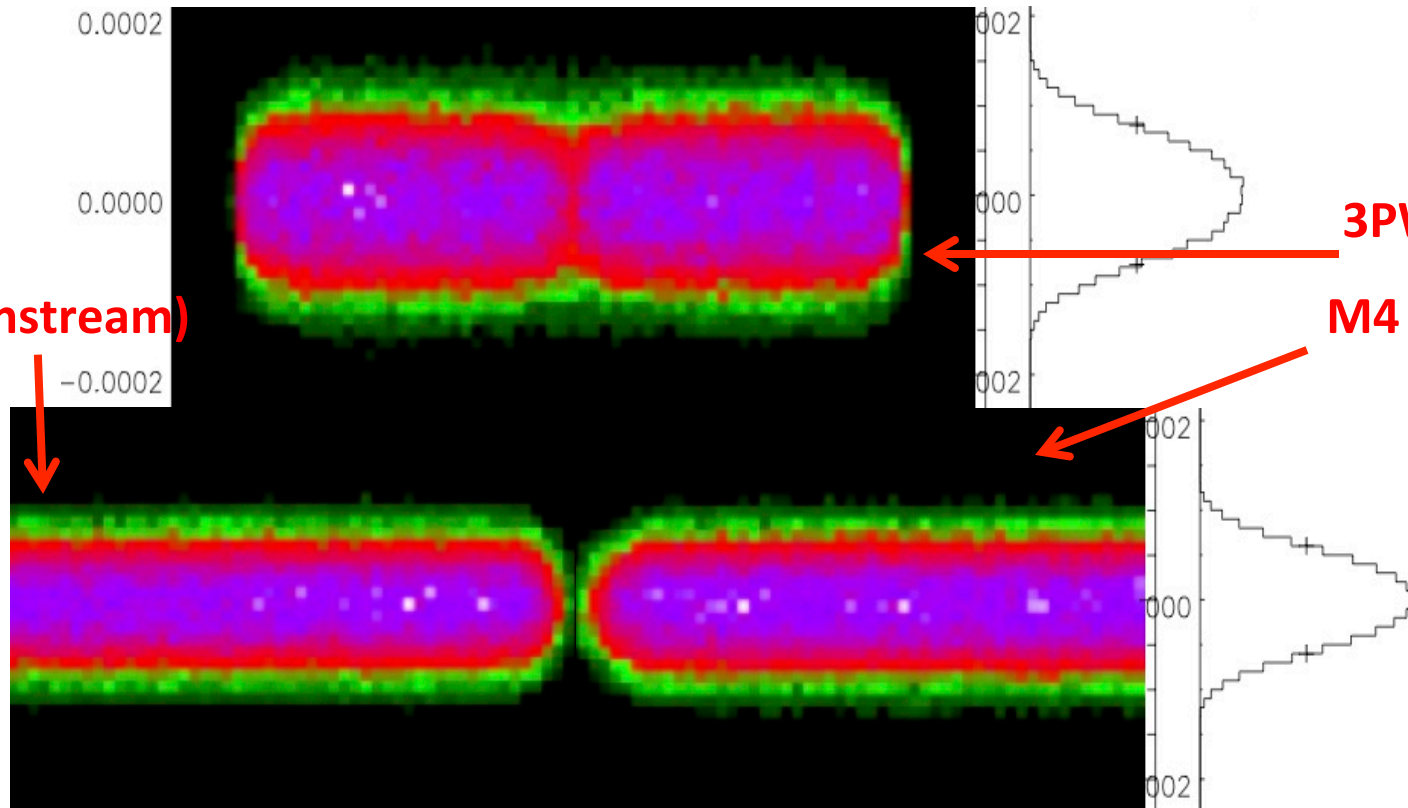
Beam divergence as viewed at source point for each source
100% coupling 47.4 pm-rad emittance

M3
(downstream)

3PW – 1.19T

M4 (upstream)

0.2 mrad



Upcoming Events and Workshops

- Upcoming Events, Conferences, and Workshops

- APS SAC Meeting March 18-19, 2015
- Twenty Years of the APS, March 26, 2015
- IPAC 2015, May 3-8, 2015
- SRI, New York, July 6-10, 2015 (abstracts due 3/1)
- Denver X-ray conference, Aug. 3-7, 2015

- Forum

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|------------|------------|--------------------------|
| – March 12 | E1100/1200 | Michael Borland |
| – March 26 | | cancelled |
| – April 9 | | cancelled |
| – April 23 | A1100 | TBD (Fornek ?) |
| – May 14 | | cancelled (User Meeting) |
| – May 28 | A1100 | TBD |



Questions?

