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**Office of  
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U.S. DEPARTMENT OF ENERGY

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## *APS Renewal and Beyond:*

## *What's Been Done So Far and a Path Forward*

*Dennis Mills*

*Renewal Workshop*

*October 20 and 21, 2008*

## *Development of a Medium Term (5 year) Plan*

- Based on a strong recommendation at the Close-out by the Review Committee for the 2007 DOE Facilities Review of the APS, management began to consider a “medium term” (5 year) renewal plan.

The APS Director must fully engage the APS staff, the user community, the Users’ Executive Committee, the Partner User Council and the Scientific Advisory Committee in developing a project plan for the next 5 years. The plan should include detailed budget and schedule information for technical upgrades and refurbishing of the storage ring and beamlines with milestones and performance measures. There should also be a corresponding scientific strategic plan.

from the DOE cover letter of the 2007 APS Review

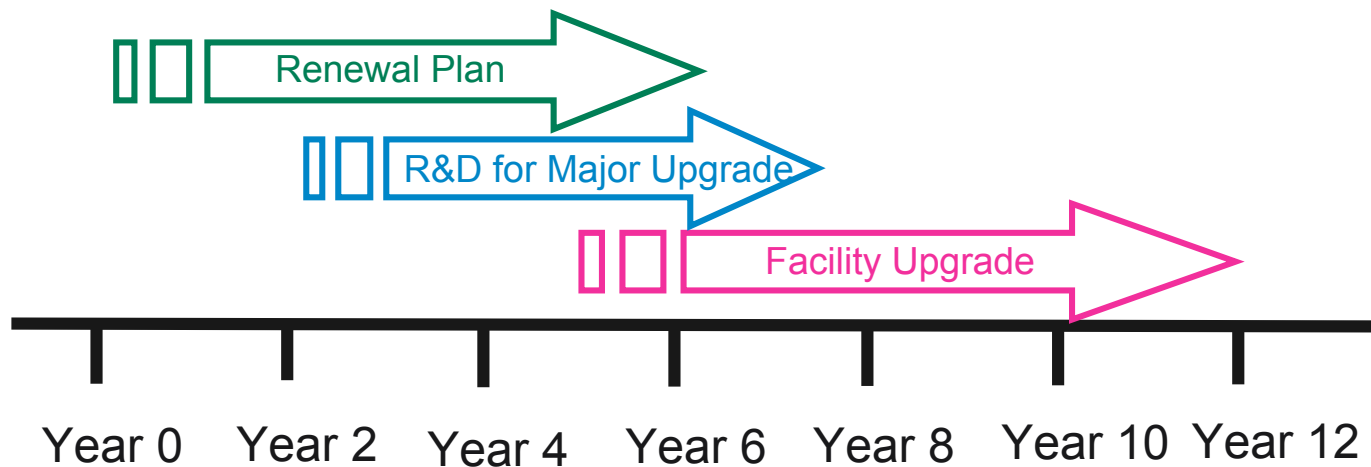
- After discussion with the APS Scientific Advisory Committee in January 2008, in February 2008 we had a call for beamline- and accelerator-related renewal proposals issued to our staff as well as CAT staff.

The Wednesday session of the SAC meeting focused on strategic planning, with presentations on both long-term and mid-term possibilities, discussion of ways to obtain user input .... Gibson presented a possible strategy for obtaining user input into the APS planning process and asked for SAC comment. ....After considerable discussion, the SAC members agreed that this strategy is sound.

from the minutes taken at the January 2008 SAC Meeting

## Argonne's Strategic Plan - How the Renewal Plan Fits In

- The APS 2020 Plan is an high-priority component of the ANL Business Plan, recently submitted to DOE, that (among other things) describes the Laboratory's major activities over the next 5-10 years.
- The APS 2020 Plan has several components:
  - APS Renewal Plan - a 5 year science-driven investment plan that will focus on beamlines, optics, detectors, and source improvements
  - R&D for Major Upgrade - a plan that focused on the R&D required for a major facility upgrade that will build on the Renewal Plan that will take SR sources to the next level
  - Facility Upgrade - a project that, once defined and approved by funding agencies, would keep the synchrotron radiation facilities at ANL at the state-of-the-art to 2020 and beyond.



# Call for Beamline- & Accelerator-Related Renewal Proposals

- In February 2008 we got things rolling by sending out an e-mail to:
  - CAT Directors,
  - XOR Group Leaders, and
  - Beamline Managers and/or Lead Scientists

requesting that they develop **beamline renewal proposals** for the medium term (next 5 years). Beamline Advisory Committees (BACs) for the XOR beamlines have already been or will be asked to help out here too.

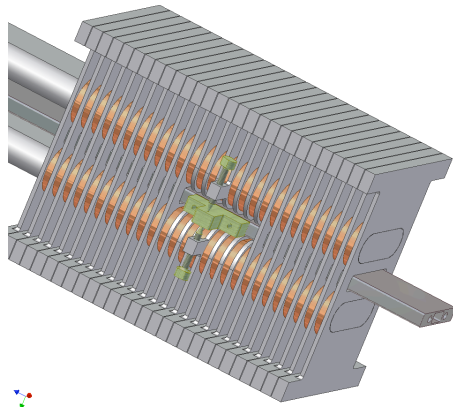
***42 Beamline-related Proposals were submitted!***

- At the same time, we requested **source renewal proposals** from the accelerator side that address obsolescence, reliability/spares, improved performance, and facility infrastructure.

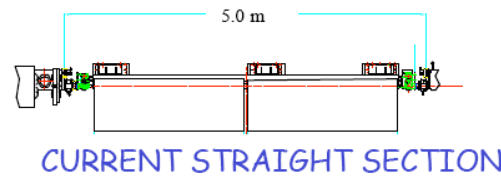
***69 Accelerator-related Proposals were submitted!***

# Example of a Beamline Renewal Proposal from XOR Staff

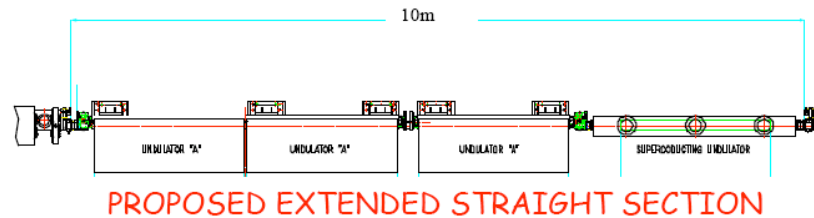
- A dedicated high-energy x-ray beamline for the study of mechanical properties
  - High-energy x-ray scattering techniques can be applied in a variety of ways to study the mechanical properties of materials
  - This proposal will allow us to **explore time scales and spatial resolutions that are currently not possible at the APS - or anywhere else.**
  - Need long straight-section and IDs optimized for 45- 120 keV range
  - Area detectors



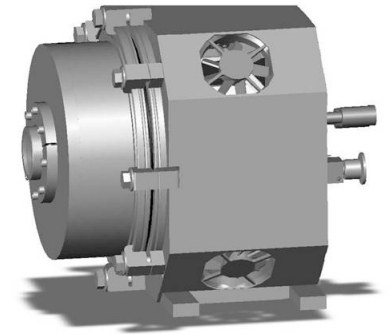
Conceptual design for the  $Nb_3Sn$  1.5-cm-period SCU and cryo-system.



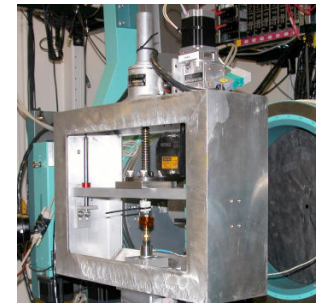
CURRENT STRAIGHT SECTION



PROPOSED EXTENDED STRAIGHT SECTION



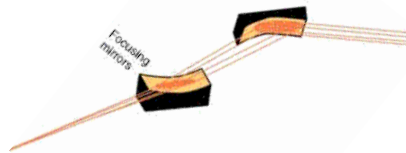
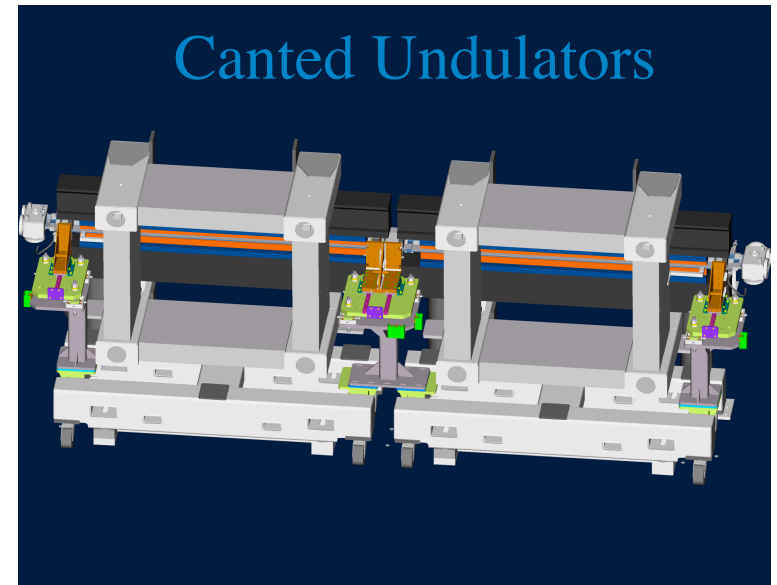
Fast CCD collaboration with LBNL



Current Sector 1 deformation rig

## Example Renewal Proposal from HP CAT staff

- 10 years experience have revealed clear directions for the future
- At the same time the existing facilities are aging and face steep competition from new facilities in Europe and Asia
- Request:
  - Canted IDs
  - Optimized submicron beam
  - Instrumentation for TR, inelastic, and high resolution diffraction



- This proposed upgrade will:
  - Permit advancement to the next generation of HP synchrotron science
  - Optimize the current (mainstream) techniques and develop new ones
  - Help to mitigate the beamtime shortages

## *Discussions at the May 2008 Users Meeting*

- APS proposed assembling, for each science discipline, a ***working group of inside and outside users*** (Science Teams) that would work to develop the case for their respective discipline.
- Science Teams
  - Develop the science case, select, consolidate and optimize the proposal, call for new proposals (if necessary) and outline how the renewal and possible eventual upgrade will position APS to enable revolutionary new science of importance in this area
- Technique Coordinators
  - Help identify which techniques are important to each scientific discipline and develop a list of (both current and future) instruments that are required to enable the various disciplines
- Create a Renewal Steering Committee, made up of APS staff and User Representatives to organize and shepherd the process along.
- Murray met with DOE to discuss the approach and get their advice and buy-in. DOE requested a White Paper on the APS Renewal by the end of calendar year 2008.

## Building the Science Case

- One of the mandates was to build a strong **science case** for the renewal plan.
  
  - 10 (originally 8) Sciences areas/disciplines were identified by the Renewal Steering Committee
    - Chemical Science and Engineering
    - Condensed Matter and Materials Physics
    - Engineering Applications/Applied Science
    - Fundamental Interactions in Chemical, Atomic and Molecular Physics
    - Geological, Environmental, and Planetary Sciences
    - Life Sciences (excluding MX)
    - Macromolecular Crystallography (MX)
    - Materials Science and Technology
    - Polymers, Soft Materials
    - Surfaces, Interfaces, and Thin Films
- |                             |
|-----------------------------|
| J. Miller, ANL              |
| S. Bader, ANL               |
| G. Ice, ORNL                |
| S. Rice, U of Chicago       |
| N. Sturchio, UIC            |
| L. Makowski, ANL            |
| T. Kossiakoff, U of Chicago |
| P. Evans, U of Wisconsin    |
| K. Shull, Northwestern      |
| P. Fentor, ANL              |
- 
- A total of 56 scientists served on the Science Teams representing 28 different institutions that covered universities, industry, DOE facilities, and other government laboratories.

*Thanks to all of you as well!*



## Renewal Workshop

- That pretty much brings us to where we are today, namely discussing the draft science cases.
- On Tuesday evening, Murray and a subset of the Steering Committee will meet with the APS SAC to get their comments, advice, and input.

- With all this in hand, the immediate goal of the Steering Committee is to **develop a *White Paper describing the scientific case*** that will drive the plan for renewal of the beamlines and source at the APS for the next 5+ years.



## *Proposed Structure for the APS Renewal White Paper*

- The body of the White Paper should be 8-12 pages and contain:
  - Scientific Vision for a Renewed APS
    - *With the help of the SAC, identify a limited number of important problems and provide example solutions that a renewed APS could provide.*
  - APS in the National and International Context
    - *Stress the unique capabilities of the APS*
    - *Need to renew to remain competitive internationally*
  - Explanation of the process for developing the plan
  - Cost and Schedule
  - Beyond the renewal - the possibility of a major accelerator upgrade
- Appendix
  - Scientific Cases (Executive Summary and list of Team Members?)

## A Successful Path Forward

- Science Teams:
  - Based on discussions at this Workshop, finalize the Science Cases
    - *Edit existing material*
    - *Add missing material*
    - *Impact on solving the “big problems”*
  - Snazzy figures are always good
  - Final version of Science Case to APS in the next couple of weeks....



## Keep the Momentum Going



### ■ APS

- Develop a more detailed document (pre-proposal?), based on refined Science Cases, that could be the basis for a full proposal
- With the help of the users and APS SAC, prioritize the beamline and accelerator proposals
- Develop better cost estimates
- Incorporate feedback from DOE Managers on White Paper into document
- Ensure that our proposal is an integral part of the ANL Business Plan

## How Will the Prioritization Process Work?

- The primary criterion for prioritization will be the same that is described in the mission of APS, namely to ***deliver world-class science and technology by operating an outstanding synchrotron radiation research facility accessible to a broad spectrum of researchers.***
  - Highest priority items are those which will maximize the scientific impact of our x-ray source.
  - Stay focused on those techniques that are best suited to APS, matched to the needs of our general user and partner user community.
  - Request that the science working groups, along with the technical coordinators, pull together the highest priority proposals to make their cases.
- We will seek input from the user community to assist in setting the priorities for the accelerator proposals.
- In addition to assisting in the selection of the submitted accelerator proposals, we will ask the science and technique working groups to incorporate in their planning possible ***revolutionary upgrades to the source*** in the future, e.g., energy recovery linacs, x-ray free electron laser oscillators.
- We will utilize the APS Scientific Advisory Committee to help us make priority choices.

## Summary

- We are at a critical point in developing an important document detailing our ***plan for investment in the APS over the next 5 years*** to remain a vital, internationally competitive facility.
- We will begin to formulate more detailed pre-proposal for the APS Renewal and, with the help of the Users and APS SAC, develop a prioritized list of the beamline and accelerator proposals.
- Discussion of the plan with the User community will continue at the next User Meeting in May, where the focus of that meeting will be the Renewal Plan.
- We see this as the first step in a larger plan, ***APS 2020***, that will lay the foundation and provide a path that will ensure that the APS facility remains at the state-of-the-art well into the future.

**Thanks for all your help!**

**The  
End**