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# The APS Renewal Plan

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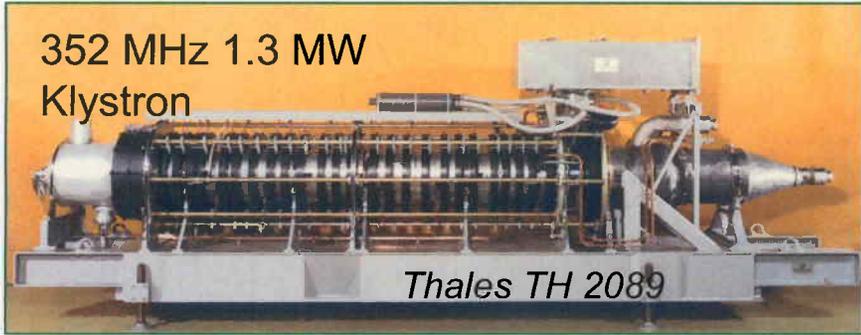
## *Goals of the APS Renewal Plan*

- **Improve the stability, maintainability, and performance of the storage ring**
- **Upgrade beamlines with better optics, detectors, control software**
- **Provide more modern infrastructure to support the user science program.**
- **Generate scientific case for a Major Equipment Proposal (MIE)**

Details at: <http://www.aps.anl.gov/Renewal/>

# Bringing the APS RF Transmitters into the 21st Century

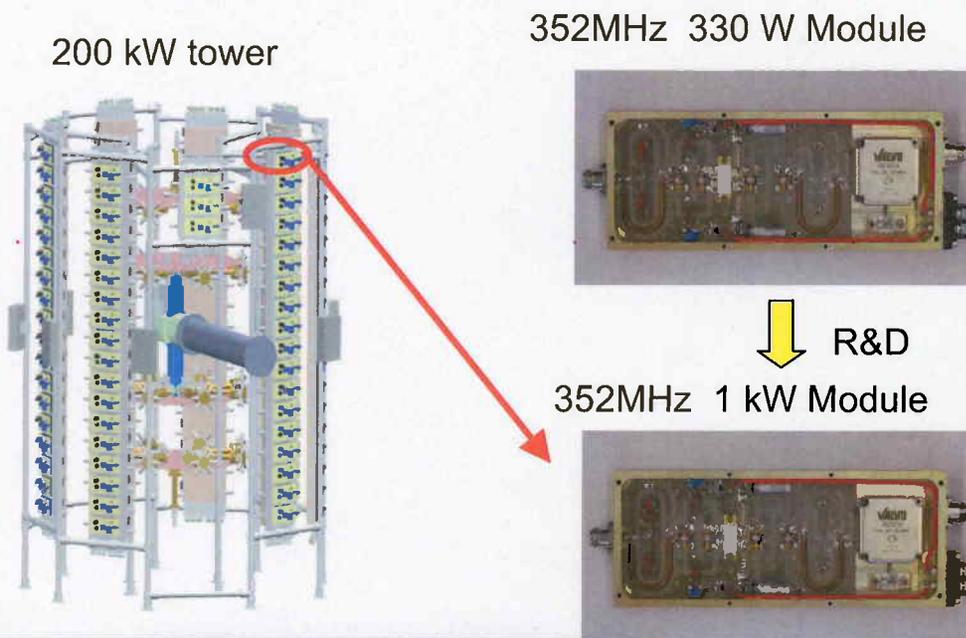
Present APS RF Transmitter



## ■ Solid-State RF Amplifier Development (R&D)

- Present system subject to instabilities
- Not optimized for light sources
- Long-term supply issue and expensive

Proposed APS Renewal/2020 RF Transmitter

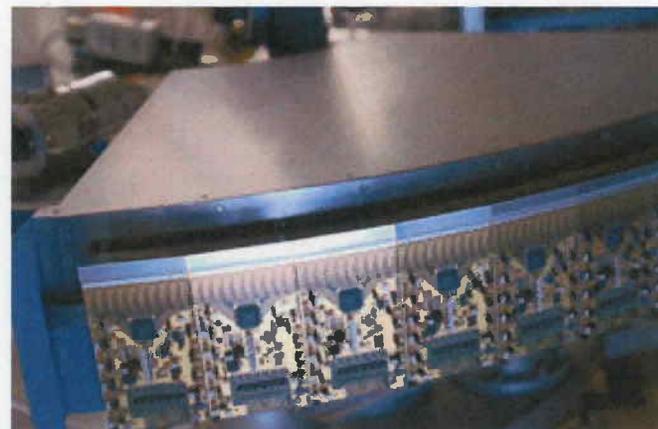
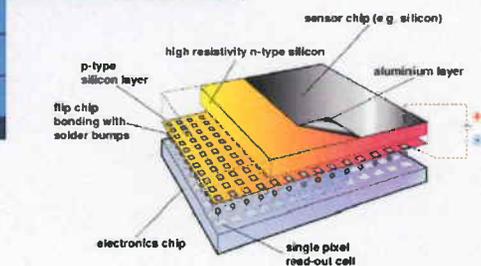


SOLEIL 50 kW tower in operation



## Beamline Renewal Proposal Example from the MX CATs

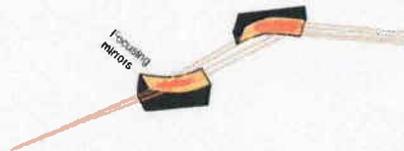
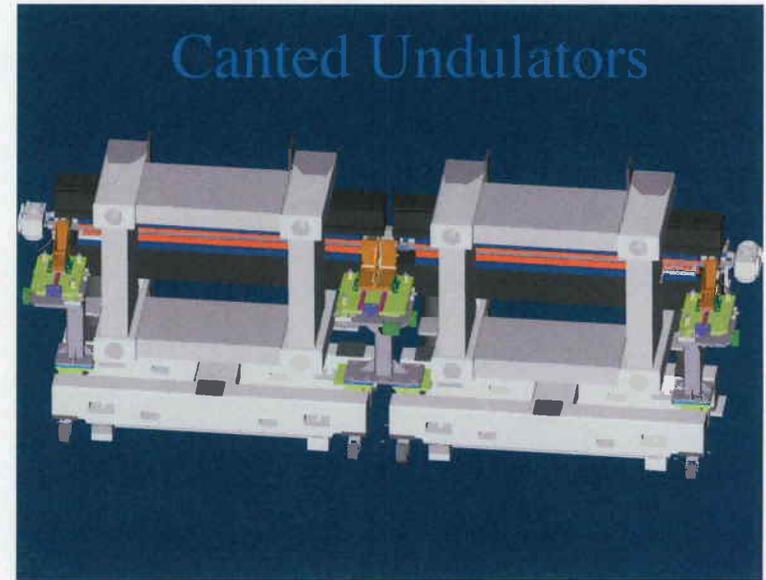
- Beamline renewal proposals covered a wide range of requests, from support of a piece of equipment to an entire beamline.
- Detectors were a frequently mentioned item.



- Support for Pixel Array Detectors (from the MX CATs)
  - Since beamlines at the APS would like to move towards pixel array detectors (PADs), ***this proposal requests that the APS define and fund a group to support PAD operations*** at the APS
  - APS should ***train staff for diagnostics and repair of PADs*** and consider the acquisition of a spare PAD modules for enable rapid repair of faulty PAD detectors

## Example Renewal Proposal from HP CAT staff

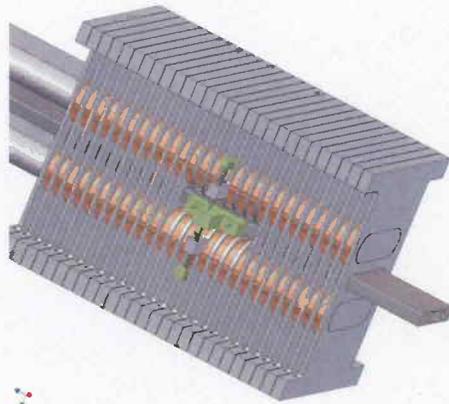
- 10 years experience have revealed clear directions for the future
- At the same time the existing facilities are aging and face steep competition from new facilities in Europe and Asia
- Request:
  - Canted IDs
  - Optimized submicron beam
  - Instrumentation for TR, inelastic, and high resolution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



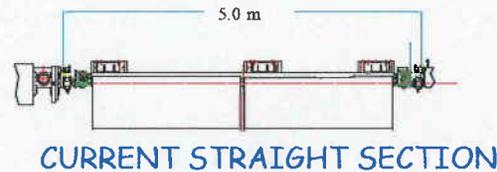
- This proposed upgrade will:
  - Permit advancement to the next generation of HP synchrotron science
  - Optimize the current (mainstream) techniques and develop new ones
  - Help to mitigate the beamtime shortages

## Example of a Beamline Renewal Proposal from XOR Staff

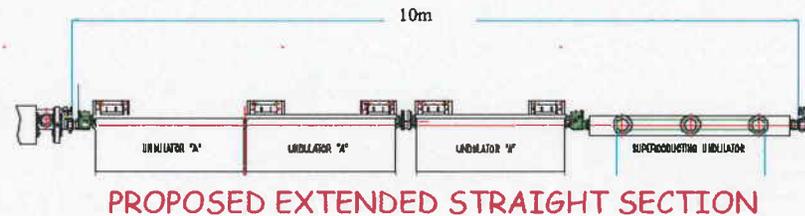
- A dedicated high-energy x-ray beamline for the study of mechanical properties
  - High-energy x-ray scattering techniques can be applied in a variety of ways to study the mechanical properties of materials
  - This proposal will allow us to **explore time scales and spatial resolutions that are currently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



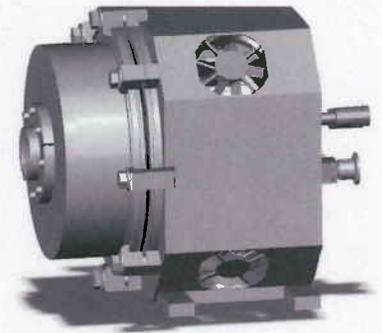
Conceptual design for the  $\text{Nb}_3\text{Sn}$  1.5-cm-period SCU and cryo-system.



CURRENT STRAIGHT SECTION



PROPOSED EXTENDED STRAIGHT SECTION



Fast CCD collaboration with LBNL



Current Sector 1 deformation rig

## *APS Renewal Process*

- **Timeline - when does this have to be done?**
- **Organization - who is going to do the work?**
- **Mechanisms for user input - how will user needs and concerns be included?**

## *Timeline of the APS Renewal Plan*

- May 28*            *Solicit science team members, 91 users volunteer*
- June 16*            *Select Science Team Chairs*
- June 20*            *Organizational meeting of Science Team Chairs*
- June 27**            **Announce Science Team Members and  
Technical Coordinators**
- Sept. 15*            *Draft Science Cases due*
- Oct. 21 & 22**    **APS Renewal Workshop – discuss draft reports  
and identify further needs and concerns**
- Dec. 15**            **Whitepaper completed**

## *The APS Renewal Steering Committee*

- **Denny Mills** Deputy Director, X-Ray Science
- **Rod Gerig** Deputy Director, Accelerators
- **George Srajer** X-Ray Operations and Research
- **John Maclean** Computer Systems
- **Denis Keane** APS PUC Chair
- **Paul Fuoss** APSUO Representative
- **Bob Fischetti** Life Sciences Council Chair
- **Dan Neumann** APS SAC Representative

## APS Renewal Science Teams

Science Area	Chair
■ <b>Macromolecular Crystallography (MX)</b>	— <b>Anthony Kossiakoff</b> University of Chicago
■ <b>Geological, Environmental, and Planetary Sciences</b>	— <b>Neal Sturchio</b> University of Illinois, Chicago
■ <b>Atomic, Optical, Molecular, and Chemical Science</b>	— <b>Stuart Rice</b> University of Chicago
■ <b>Surfaces, Interfaces, and/or Thin Films</b>	— <b>Paul Fenter</b> Argonne National Laboratory
■ <b>Polymers, Soft Materials, and/or Biology (excluding MX)</b>	— <b>Lee Makowski</b> Argonne National Laboratory
■ <b>Condensed Matter and Materials Physics</b>	— <b>Sam Bader</b> Argonne National Laboratory
■ <b>Materials Science and Technology</b>	— <b>Paul Evans</b> University of Wisconsin
■ <b>Engineering Applications/Applied Science</b>	— <b>Gene Ice</b> Oak Ridge National Laboratory

## *Charge to the Science Teams*

Members of the Science Teams are charged with developing the scientific case (for their respective areas) that will be the basis for a five year APS renewal proposal to the DOE. The scientific case should clearly define how upgrades to beamlines (optics, detectors, insertion devices, end-station instrumentation and software) and the facility will enable the science to progress and how that progression will impact the field. The APS management has already called for renewal proposals from beamline scientists that describe how those renewals will enhance the capabilities of various beamlines and/or techniques. The Science Teams should select, consolidate and optimize those proposals (and/or develop/call for new proposals, if necessary) that support their scientific cases and outline how the renewal will position APS to enable high impact science.

The Chair(s) of the Science Teams will organize and lead the development of the scientific case. Members of the Science Teams have accepted responsibility to gather information from the community and prepare the report. The Science Teams will consult with other experts in the field and with the Technique Coordinators.

## ***Charge to the Science Teams (continued)***

### **Technique Coordinators**

Technique Coordinators (experts in relevant techniques or instruments) will facilitate the identification of specific techniques that are important to each scientific discipline and, in particular, across disciplines. The Technique Coordinators will work with the Science Teams to develop a strategy for instruments that are required to enable high impact science.

### **Long-Term Considerations**

Although the goal of the Medium Term Renewal is to develop the case for a medium term (5 year) renewal of the beamlines, the Teams should also keep in mind what sort of larger, longer term upgrade of the entire APS facility would further enhance their area of science.

## *Hearing the Users*

- **Send us ideas, the more the better**
- **Talk to the Science Teams**
- **Participate in the Workshop**

Most importantly

- **TELL US WHAT ARE WE MISSING!!**

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