

XOR Tactical Plan – update

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Advanced Photon Source

Argonne National Laboratory



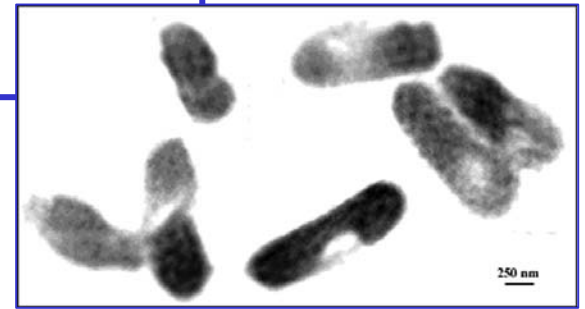
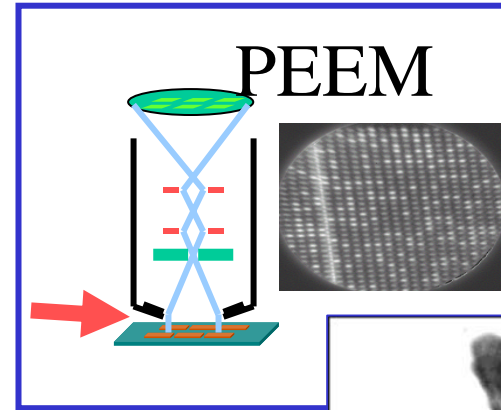
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Strategy for optimal utilization of XOR facilities

- **Optimize the source and the optics**
 - **One technique on a beamline**
 - **More than one technique on a beamline – bring the X rays to the experiments**
 - **Many active stations for techniques such as time-resolved science to make simultaneous use of special operating modes**
- **Opportunity to increase the quality and quantity of beam time at the APS**
 - **Leading edge capabilities**
 - **Support the Center for Nanoscale Materials**
 - **Ease the pressure on our oversubscribed beamlines**

Facilities in support of the CNM - examples



Nanoprobes around the APS ring

x-ray-excited optical luminescence (XEOL) < 10 nm

soft-x-ray photoelectron emission spectroscopy (PEEM)

(6 - 13 keV) scanning fluorescence microscopy and micro/nano diffraction (70 nm probe)

(1 - 4 keV) scanning transmission microscopy and fluorescence microscopy

(1 - 4 keV) coherent scattering (50 nm probe)

nanomagnetism capabilities

Additional capabilities at the APS

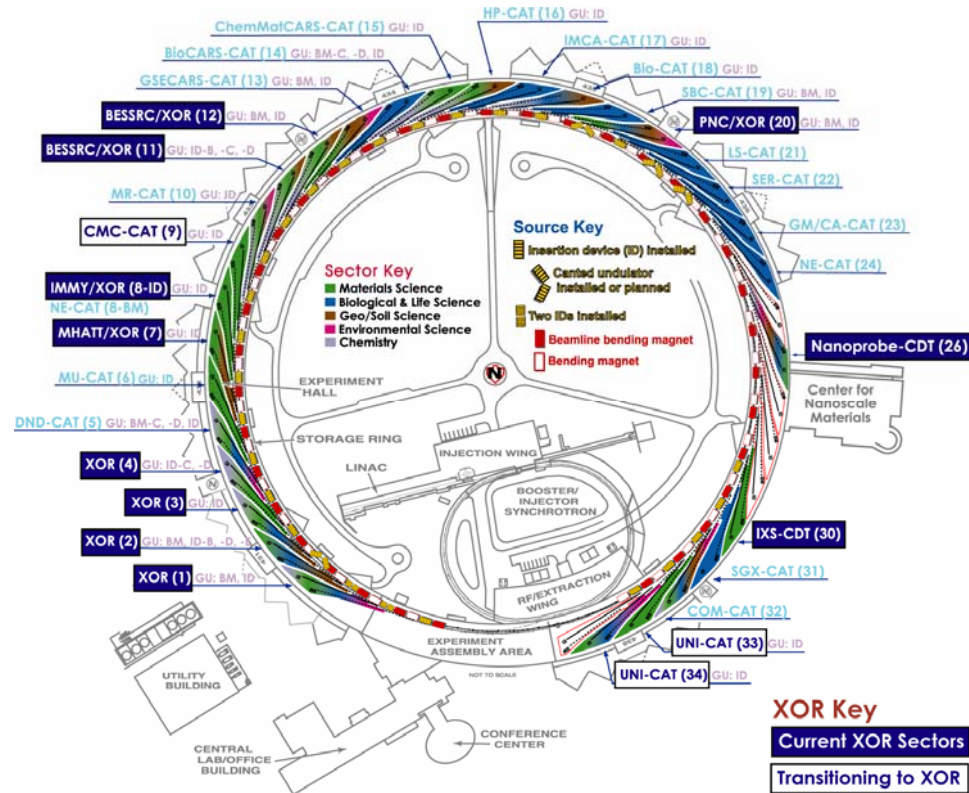
characterization of magnetic interfaces using magnetic reflectivity

SAXS and GISAXS

coherent diffraction for imaging at the nanoscale

diffraction under *in situ* growth conditions

x-ray photon correlated spectroscopy



Many-variable optimization process that started within XOR.
We are on the 9th (-> 10th) version of the XOR Plan.
We are on the 1st (-> 2nd) version that includes the APS CATs.
... your comments and corrections welcome

XOR operation of APS sectors and staffing

- **Responsible for operating sectors 1, 2, 3, 4, 7, 8, 11, 12, 20 + next year add 9, (32), 33, 34**
- **Collaborative development teams: 26, 30, 11-BM**
- **Opportunities to move toward optimized, dedicated facilities, increase GU access, support and grow strong user communities**
- *How can we begin to implement the plan*
 - *Internal funding*
 - *Develop outside funding*

	Staff	Technicians	Post Docs	Students	No. of Beamlines (in construction)
2001	28	8	10	5	8(2)
2002	31	6	8	7	8(2)
2003	51	6	10	8	17(3)
2004	64	5	17	12	19(3)
2005*	69	8	19	11	21(3)

Strategic planning within XOR

- **XOR Strategic Planning Meeting - August 11-12, 2004**
 - Scientists from sectors 1, 2, 3, 4, 7, 8, 11, 12, 20 presented their ideas
 - Outcomes
 - *Extended abstract book*
 - *Presentation at the APS Strategic Planning Meeting September 2, 2004*
- **APS Users' Organization Steering Committee**
 - **January 13, 2005**
- **APS Partner Users' Council meeting**
 - **January 14, 2005**
- **APS Scientific Advisory Committee Meeting**
 - **January 27, 2005**
- **APSUO/PUC-sponsored meeting with APS resident users**
 - **April 15, 2005**
- **XOR comment line May 1 - 20, 2005**
 - **Comments can be read online starting next week**
- **DOE review May 25, 2005**
- **Announce the beginning of implementation June 2, 2005**

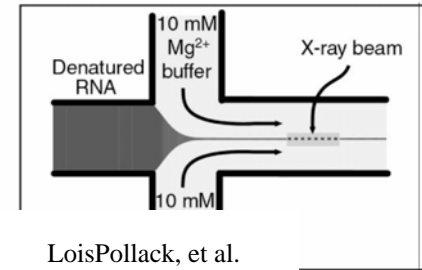
Dedicated facilities - partial listing

- **Inelastic x-ray scattering on 3-ID, 30-ID, and (in future) 9-ID**
- **Nanomagnetism on 4-ID-C, 4-ID-D and (as yet uncommitted) sectors**
- **Synchrotron environmental science on Sector 13 (GSE-CARS) and Sector 10 (MR) and on 20-ID**
- **High energy x-ray science on 1-ID and 11-ID**
- **X-ray diffraction on 6-ID, 33-ID, 1-BM and 33-BM**
- **X-ray micro/nanodiffraction on 2-ID-D, 7-ID, 26-ID, 34-ID**
- **Powder diffraction on 11-BM, 11-ID (HP on 13-ID, 13-BM, 16-ID)**
- **X-ray absorption fine structure on 9-BM, 20-BM, 20-ID**
- **X-ray full-field imaging on 32-ID, coherent diffraction imaging on 34-ID**
- **Time domain science on 7-ID, 8-ID and 11-ID**
- **Small angle x-ray scattering (SAXS) and USAXS on 12-ID**
- **Surface and interface (*in-situ*) scattering (tbd) - planning workshop 9/05**
- **Nanomaterials science on 26-ID**

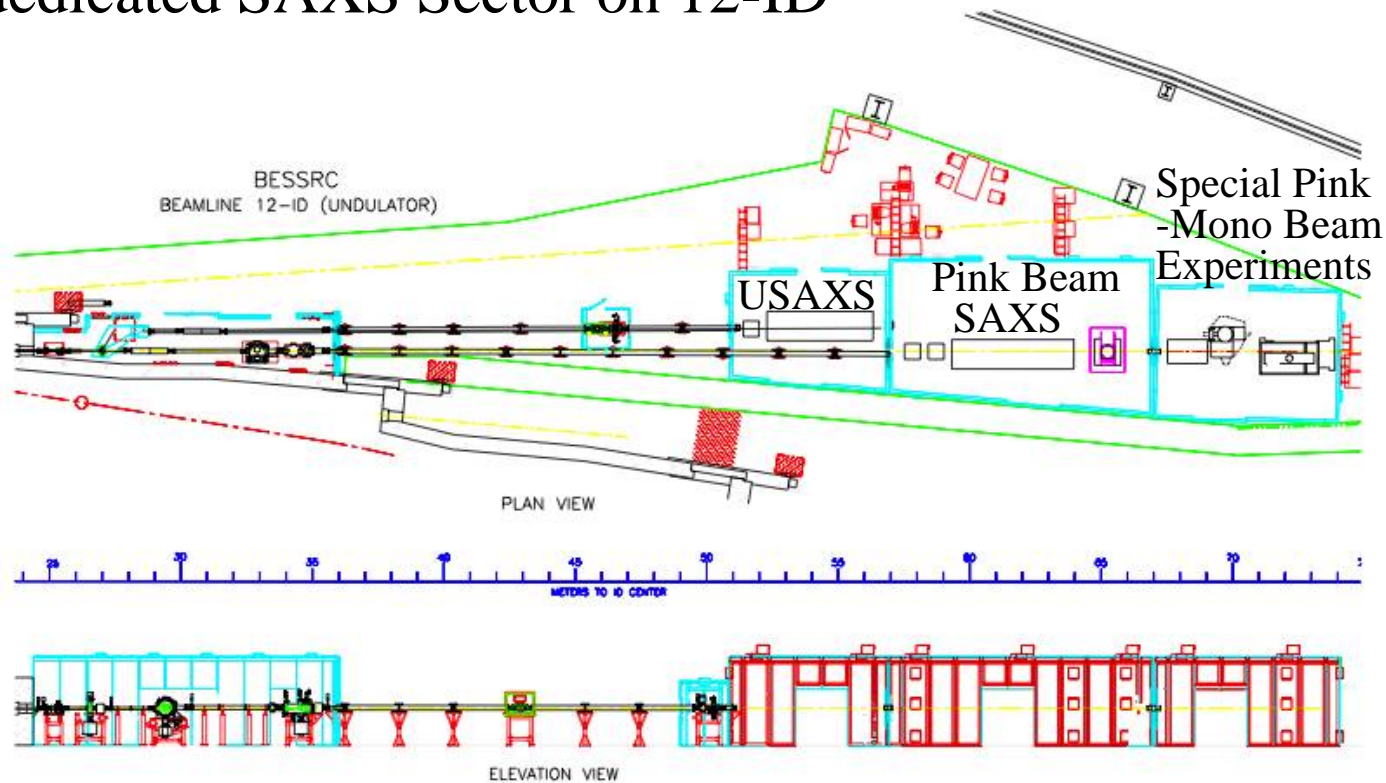
Begin implementation

- **Begin implementation with internal funding**
- **Start three projects**
 - *Dedicated SAXS and USAXS*
 - *Develop X-ray imaging at the APS*
 - *Create premier high energy x-ray scattering capabilities*

SAXS and USAXS

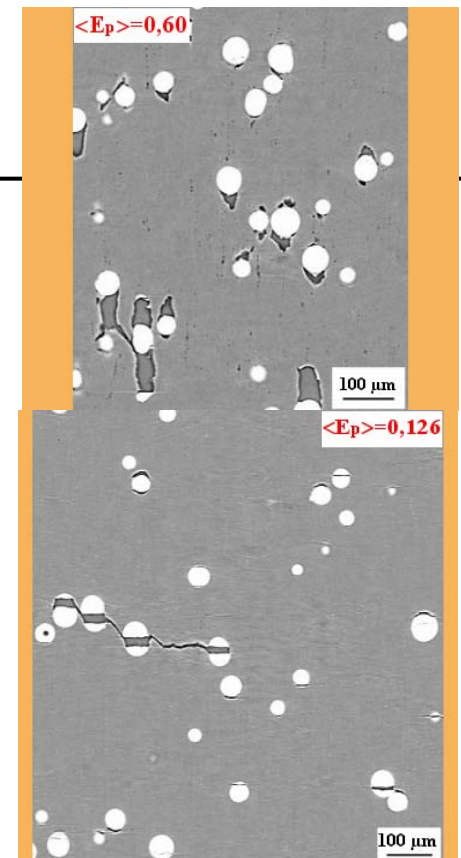


Use dual canted undulators to create a dedicated SAXS Sector on 12-ID



Dedicated imaging ID beamline

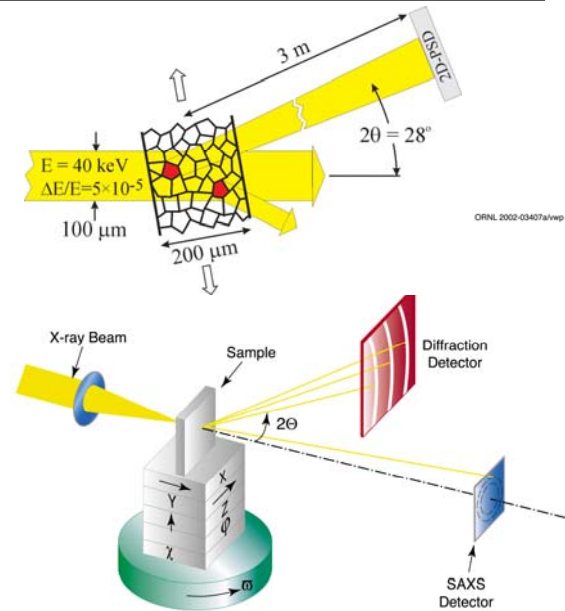
- **Phase imaging / tomography**
- **Diffraction topography**
- **Real-time high speed imaging**
- **Diffraction enhanced imaging**
- **USAXS imaging**
- **Many benefits**
 - **Provides immediate home for imaging to satisfy demand and expand user base.**
 - **Frees 1-ID to become dedicated to high energy**
 - **Potential future expansion into long beamline with optimized insertion devices.**



High energy x-ray scattering

dedicated on 1-ID

- Materials research
 - Macroscopic stress/strain, texture
 - Stress/strain, texture on a grain by grain level
 - High-energy small-angle scattering
 - High-energy x-ray imaging
- Instrumentation development
 - Brilliance preserving optics
 - Microfocusing optics
 - 2 undulators for full energy tunability



dedicated on 11-ID

- 11-ID-B and 11-ID-C dedicated to high energy powder diffraction pdf and diffuse scattering



Summary

- **Begin implementation**
 - *Dedicated SAXS and USAXS on 12-ID*
 - *Develop X-ray imaging at the APS on 32-ID*
 - *Create premier high energy x-ray scattering capabilities on 1-ID and 11-ID*
- **Continue to work on the plan**
 - **Your input needed**
- **Support world-class facilities for world-class science**
 - **New users**
 - **New resources**