

ADVANCED PHOTON SOURCE High-Pressure Synergy at the APS

A facility-wide approach to high-pressure (HP) synchrotron research is being fostered at the Advanced Photon Source (APS) through the creation of the High-Pressure Synergetic Consortium (HPSynC), which is facilitated by scientists from the Geophysical Laboratory of the Carnegie Institution of Washington. HPSynC team consisting of research scientists, engineers, and postdocs engaged in high-pressure research, with staff support from the APS. To develop novel HP synchrotron techniques and make them available to user communities, HPSynC will develop experimental apparatus for specific beamline applications, as well as portable or fixed beamline optics and equipment to accommodate HP apparatus. HPSynC staff are seen as functioning in a manner similar to beamline scientists. But rather than concentrating on one beamline, they will conduct cutting-edge research and provide support on a range of instruments (such as high-P-T vessels, analytic probes, etc.) on many beamlines. In the process, they will bridge scientific disciplines and communities including chemistry, physics, geoscience, planetary science, materials science, and general high-pressure science.

HPSynC has been focusing on four major areas:

Development of novel HP synchrotron techniques

The standard dedicated HP beamlines have been (and will continue to be) highly successful; they provide the HP users a home base with expert helps and fundamental techniques such as HP x-ray diffraction and some forms of spectroscopy. HPSynC, on the other hand, extends the same expert help to many cutting-edge techniques that cannot be included in the dedicated beamlines but only available at specialized APS beamlines. HPSynC will tailor dozens of beamlines for the HP community, and is highly complementary to the existing dedicated beamlines.

Coordination of existing equipment and tools

A survey has been conducted by HPSynC and a detailed list of available equipment has been compiled, from sample preparation and characterization to various non-synchrotron probes (Raman, Brillouin, Mossbauer, and electron microscopy). For general HP users, HPSynC staff play an important role in facilitating access to this apparatus and providing the necessary training.

An advanced sample-preparation laboratory

HPSynC is establishing a world-leading sample-preparation laboratory that puts general users on equal footing with leading high-pressure-center scientists, who at present can prepare superior samples at their home bases and carry the high-pressure cells to synchrotron facilities. A dedicated high-pressure sample-preparation lab, located on the first floor of the main APS laboratory/office building, is equipped with tools and devices that can be accessed by any APS user.

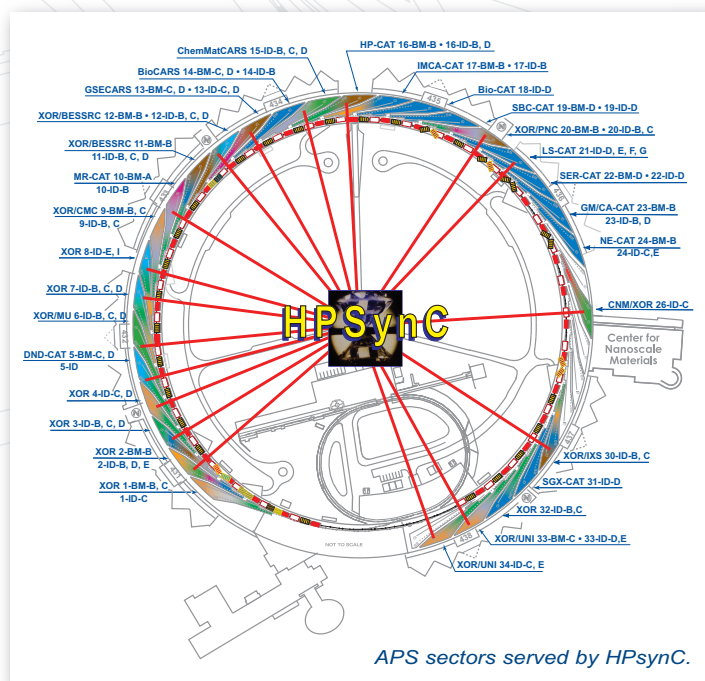
Portable systems

A series of portable systems is dedicated to high-pressure researchers at various beamlines around APS. These systems are self-contained, with attached controls systems and software. Typically, they include a Kirkpatrick-Baez mirror system able to focus beam to a size of $\sim 5 \mu\text{m}$, a ruby-fluorescence system for on-line pressure measurements, a membrane control system for pressure control, and a laser heating system for heating samples *in situ* at high pressures.

Contact: Ho-kwang Mao (h.mao@gl.ciw.edu),

Guoyin Shen (gshen@ciw.edu),

Geophysical Laboratory, Carnegie Institution of Washington



CALL FOR APS GENERAL-USER PROPOSALS

The Advanced Photon Source is open to experimenters from all scientific disciplines.

General-user proposals for beam time during Run 2008-3 are due by July 11, 2008.

Information on access to beam time at the APS is at http://www.aps.anl.gov/user/beamtime/get_beam.html or contact Dr. Dennis Mills, DMM@aps.anl.gov, 630/252-5680.

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