Oak Ridge National Laboratory
Neutron Sciences Progress Report
May 2009

Neutron Highlights

At HFIR, Cycle 421 began May 13, 2009, and will end June 5, 2009.

At SNS, neutron production began March 12, 2009, and will continue through July 11, 2009.

Neutron X-ray School will be held May 30-June 5, 2009, at Oak Ridge and June 6-13, 2009, at Argonne

Call for Proposals: Proposals for beam time at HFIR and SNS will be accepted until noon **Monday, August 31, 2009**, ET.

Science Highlights

Neutrons prove polymer theory. A *Physical Review Letters* article (v. 102, 157801 (2009)) confirmed some long-held, yet previously unproven theoretical predictions concerning the behavior of polymers in "strong" solvents. ORNL's Gang Cheng and Yuri Melnichenko with Princeton's William Graessley collected data using the General Purpose SANS at HFIR and a SANS instrument at NIST. Their findings revealed a distinct cross-over in polymer structure from semidilute to concentrated solutions. This article was identified as an "Editor's Suggestion" suggesting high importance. Highlight summary.

ORNL papers on High T_c are highly cited. *Science Watch* has identified ORNL as the #3 institution worldwide in times of citations (>3100) to papers published on high temperature superconductors from 1999 to February 2009. These articles include publications using neutron scattering. Details.

Instruments and Users

Call for Proposals. Proposals for beam time at HFIR and SNS will be accepted until noon **Monday, August 31, 2009**, EST. This call is for experiments to be run from December 2009 through May 2010 and includes 9 instruments at HFIR and 10 at SNS. Details.

HFIR Chemistry lab now open to users. A general chemistry laboratory located in the Cold Guide Hall near the SANS instruments is now available for sample preparation. Contact Chrissi Schnell, schnellca@ornl.gov for details of its capabilities. See the image of the laboratory to the right.

Second Target Station planning session held at ICNS. The SNS-HFIR User Group solicited input about the proposed capabilities for the Second Target Station at the Spallation Neutron Source during an ICNS Satellite event, Thursday, May 7, 2009, from more than 100 attendees. The discussions point out that the 20Hz frequency may not be optimal for some of the instruments and it was agreed that this warranted further study. Also identified was the need to allocate adequate project resources to the development of detectors, data analysis software, and sample environment equipment. Details.

L'Oreal Fellowship won by ORNL neutron user. Tiffany Santos, a HFIR neutron user from Argonne, was one of 5 winners of a L'Oreal Fellowship for Women In Science. This provides support to postdoctoral women scientists. Awardees will each receive $60,000 to be used toward independent scientific research and career development.

Numbers of users grow. For fiscal year 2009 from October 2008 through April 2009, HFIR has 224 unique users and SNS has 177 users. Both neutron sources anticipate achieving goals of more 300 users for HFIR and 260 users for SNS.

Florida group fabricated sample stick. University of Florida researchers led by Mark Meisel fabricated a cryogenic sample stick with light pipe for optical pumping experiments at ORNL neutron facilities. Development continues after initial successful operation.

JINS construction underway. Construction of the Joint Institute for Neutron Sciences (JINS) building on Chestnut Ridge is progressing toward completion in 2010, see image below. Funded by the State of Tennessee through the University of Tennessee, JINS will have offices and light laboratories and will play an important role in educational and outreach activities.

JINS is funding travel for users from EPSCoR states. JINS has received funding from the Department of Energy's Experimental Program to Stimulate Competitive Research (EPSCoR) to support the travel of academic neutron scattering users from EPSCoR states Currently participating in this program are Alabama, Alaska, Arkansas, Delaware, Hawaii, Idaho, Kansas, Kentucky, Louisiana, Maine, Mississippi, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Rhode Island, South Carolina, South Dakota, Vermont, West Virginia, Wyoming, the Commonwealth of Puerto Rico, and the Virgin Islands. Contact Egami@utk.edu for more information.

ORNL neutron facilities are included in 10 EFRCs. The HFIR and SNS neutron facilities are identified in 10 of the summary write-ups of the 46 DOE Energy Frontier Research Centers named by the White House in April 2009. ORNL will host two of the EFRCs. This program is a major effort to accelerate the scientific breakthroughs needed to build a new 21st-century energy economy.

Operations

HFIR

HFIR Cycle 421 began on May 13, 2009 and will continue through June 5, 2009. The FY 2009 goals for HFIR include operation for 6 cycles with >90% predictability. This is the 15th consecutive start-up on schedule since the cold source became operational 2 years ago this month.

SNS

The SNS began accelerator startup on March 3, 2009; neutron production began March 12, 2009, and will continue through July 11, 2009. The maximum beam power delivered during this cycle is 870 kW.

Employment Opportunities

Positions in the Neutron Sciences Directorate or related to neutron scattering. Click on "View Open Positions" at http://jobs.ornl.gov/ and view Position Category noted as "Science – Neutron Science":

- Sample Environment Team Leaders

Neutron Scattering Postdoctoral Fellowship Positions with ORNL through Oak Ridge Associated Universities. Descriptions are available at http://www.orau.gov/orise/edu/ornl/postneeds.htm. Recently announced open positions are:

- Postdoctoral Research Associate for Neutron Diffraction on HB-3A Four-Circle Diffractometer Instrument [ORNL09-82-NSSD]
- Post-Master's or Post-Bachelor's Science Software Developer [ORNL09-75-NSSD]
- Post-Master's or Post-Bachelor's Neutron Scattering Instrument Associate [ORNL09-73-NSSD]

Educational and Research Experiences

ORNL has educational programs covering many scientific disciplines with the education continuum from pre-college through postgraduate including teachers and faculty. The main link to all of these programs is http://www.orau.gov/orise/edu/ornl/

Meetings of Interest to SNS and HFIR Users

May 30-June 13, 2009, The 2009 National School on Neutron and X-ray Scattering will be held at Oak Ridge and Argonne National laboratories. Sixty attendees from 41 institutions are anticipated. Lectures at the ORNL portion are open to ORNL staff members. For more details on the NXS School, see neutrons.ornl.gov/conf/nxs2009.

June 11, 2009, Industrial Access to National User Facilities, National User Facility Organization Meeting, Argonne, http://www.aps.anl.gov/Users/NUFO/2009_Meeting/agenda.htm.

August 3-5, 2009, Summer School in Biophysics at ORNL: Computational and Experimental Challenges, Knoxville, TN. http://biophysics.ornl.gov.

June 13-18, 2010, 20th Annual VM Goldschmidt Conference, Knoxville, TN. This is the foremost meeting of the year for the worldwide geochemistry community. http://www.goldschmidt2010.org.

June 26 - 30, 2010, American Conference on Neutron Scattering, Ottawa, Ontario, Canada, http://www.cins.ca/acns2010/

Neutron Science in the News

ORNL reactor is back in business (Atomic City Underground, 5/13/2009)

The High Flux Isotope Reactor was restarted today following a two-month shutdown for maintenance, repairs and refueling, and it achieved full power (85 megawatts) at about 11 a.m. That's the word from Ron Crone, the research reactors chief at ORNL, who said the outage was extremely productive. "It was pretty amazing," he said. Crone said the reactor startup involved some training for a couple of operators, then went to 10 percent power and held it there while some radiation measurements were taken at Cold Guide No. 1. The cold guide was one of the places where work was done during the lengthy outage, installing a shield box and instrument shutter, the ORNL official said. That work will allow workers now to install a developmental beam line in the area and continue the work while the reactor is running, he said.

GE announces delivery for SNS detector system (Atomic City Underground, 5/4/2009)

GE Energy, which last year signed a tech-transfer agreement with ORNL to commercialize and markets a lab-developed neutron detection system, has made the first delivery of electronics for a research instrument at the Spallation Neutron Source in Oak Ridge. In today's announcement, GE said it had completed delivery of 30 of its Reuter Stokes Position Sensitive electronic systems. They will be part of the Nanoscale-Ordered Materials Diffractometer (NOMAD) research instrument at SNS. In a statement posted on GE's Website, ORNL director of partnerships Tom Ballard said, "We are happy to see the commercialization of one of our premier technologies, the SNS 8Pack. The 8Pack is able to be applied to instruments far and wide and has broad global impact, which is one of our goals here at Oak Ridge National Laboratory."

Casting a Spall (Business TN 5/2009)

As ORNL director Thom Mason explains, research space is already getting scarce. "We've been allocating beam lines and will have filled up the first target station by 2014 or 2015," Mason says. "It takes a long time to build this, so if you're going to have the capability to continue to grow the use of SNS, you need to get started on it now." SNS's visiting scientists are interested in neutrons because they are interested in the materials that things are made out of--like polymers for use in plastics or proteins--and how they work in the body for the development of drugs. In all such cases, the materials behave the way they do because of their atomic structure. Neutron scattering provides not snapshots but movies of a structure, revealing how the atoms are arranged and how they move around. That information can be used to make materials cheaper, stronger, and lighter or more energy efficient in products common to most every household and experience--cars, computers, etc. Neutron scattering is also helpful in the pursuit of energy solutions. "With most energy problems, when you peel away the layers, you find there are materials problems underneath," Mason says. "That should position us well."

The most up-to-date news articles featuring neutron science performed at ORNL are available at http://neutrons.ornl.gov/snsnews/snsnews.shtml. You can sign up for an RSS feed here: http://neutrons.ornl.gov/snsnews/index.shtml. To receive ORNL news via twitter, use http://twitter.com/oakridgelabnews.