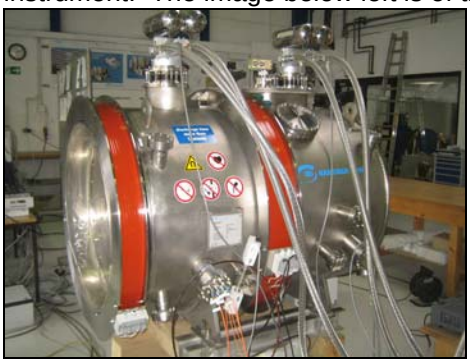
Neutron Sciences Progress at Oak Ridge National Laboratory
January 2009

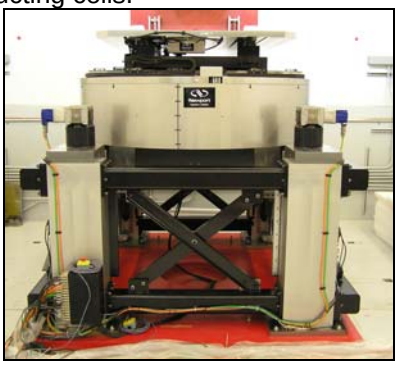
Summary

- HFIR Cycle 419 began on January 7, 2009, and continued until January 31, 2009. Cycle 420 began February 18, 2009.
- SNS neutron production cycle ended January 3, 2009. Neutron production will next begin March 12, 2009, and will continue through July 11, 2009.
- The 2009 National School on Neutron and X-ray Scattering will be held May 30-June 13, 2009, at Oak Ridge and Argonne National Laboratories. Applications close March 7, 2009. Details and registration information are at http://www.dep.anl.gov/nx/.
- A major milestone was completed with the approval on the Alternative Selection and Cost Range for the Power Upgrade Project (PUP) for the SNS. The PUP project increases the linac beam energy from 1 GeV to 1.3 GeV; construction is proposed to begin in 2012 with completion in 2015.
- A stent was installed on one of the SNS hydrogen moderators to improve its performance.

News and Updates

- **Stent inserted to improve the performance of a lower hydrogen moderator.** To improve the performance of a liquid hydrogen moderator feeding beamlines 13-15, a 36-inch long stent (0.4 inch outside diameter) was inserted through over 50 feet of transfer line that was 0.5 inch inside diameter. This was complicated by passage through two mitered (right-angle) joints in a nested hydrogen coolant inlet, return and vacuum system. A YouTube clip of the remote insertion of the stent is available at http://www.youtube.com/watch?v=EwUNiOZpMOU. This stent will allow greater circulation of liquid hydrogen in the moderator, providing enhanced performance over the current situation.
- **Linac upgrade for the SNS one step closer**. A Power Upgrade Project (PUP) milestone was completed with the approval of the Alternative Selection and Cost Range critical decision for the SNS. This project was ranked high as a mid-term priority in the Department of Energy's publication "Facilities for the Future of Science, A Twenty Year Outlook." The project status was reaffirmed in an August 2007 update of the report when it was ranked as a very high mid-term priority. The Power Upgrade Project will design, build, procure, and test the equipment necessary to increase the SNS proton beam energy from 1.0 GeV to 1.3 GeV. This will be accomplished by adding nine additional high beta cryomodules into the remaining nine open slots in the superconducting section of the linac. The accelerator tunnel structure and cryogenic system were constructed to allow this upgrade. In addition to this energy upgrade, we are pursuing other accelerator and target improvements to bring the power up to 3 MW. PUP will also enable the eventual construction of a second target station. Construction is proposed to begin in 2012 with completion in 2015. The total project cost range for PUP is $89.6M-$96.1M.
- **Superconducting coils scheduled to arrive.** The final acceptance for the superconducting coils for the Neutron Spin Echo spectrometer (SNS beamline 15) successfully took place in Würzburg, Germany, after more than three years of manufacturing. The last components of the spectrometer will be delivered to the SNS by the end of March. The Instrument Readiness Review is scheduled for March 6, 2009; this review will assure compliance with safety and health practices prior to opening the shutter to the instrument. The image below left is of the recently tested superconducting coils.





- **VULCAN received new sample positioning system**. The positioning system was installed on the VULCAN engineering diffractometer (SNS beamline 7). See image above right.

- **Physics Diversity groups toured facilities, neutron scattering education ongoing.** Oak Ridge National Laboratory's Neutron Sciences and Physical Sciences Directorates hosted 40 attendees from the Physics Diversity Summit and the annual meeting of the National Society of Black Physicists and National Society of Hispanic Physicists in Nashville, TN, for a tour of selected ORNL facilities on February 11, 2009. The Neutron Sciences Directorate sponsored a three-hour session on neutron scattering on Friday, February 13, 2009, and provided poster prizes to one graduate student and one undergraduate student. Pictured below left is ORNL's Jaime Fernandez-Baca during his address to the 600 attendees.

- **Neutron scattering symposium at TMS.** Xun-Li Wang was one of the organizers of the symposium on "Emerging Applications of Neutron Scattering in Materials Science and Engineering" at *The Minerals, Metals, and Materials Society* (TMS), February 15-19, 2009, San Francisco, CA. Over 40 lecturers participated in this event with selected proceedings to be published in *Applied Physics A*. The flyer (above center and right panels) was distributed at the exhibit booth to some of the 3600 TMS attendees.
- **Ground was broken for two instruments that require long beamlines.** The groundbreaking ceremony for construction of the two instrument buildings at SNS was held on Friday, February 6, 2009. Science objectives for both the Fundamental Neutron Physics (SNS beamline 13) and the HYBRID Spectrometer (HYSPEC, SNS beamline 14B) instruments require long beamlines that do not fit within the SNS target building. Construction of both buildings is expected to be completed in 2009.
- **Annual report on ORNL Neutron Sciences is available.** The first annual report of ORNL's Neutron Sciences Directorate "Neutron Sciences Annual Report 2007," which highlights HFIR and SNS activities, is posted at http://neutrons.ornl.gov/nscd_2007_annual_rpt.pdf.
- **Record number of proposals submitted.** About 300 proposals were submitted for review during the recent call for proposals at HFIR and SNS. Notifications have been sent to all participants: about two-thirds of the proposals were either approved or were identified as alternate or standby and about one-third were not approved. This call was for experiments to run from March through September 2009.

Operations

- HFIR Cycle 419 began on January 7, 2009 and continued until January 29, 2009. In addition to supporting neutron scattering experiments, Cycle 419 supported 56 in-vessel irradiation capsules. Cycle 419 accumulated 2046.7 MW-Days, all in January. At the end of January, HFIR had produced a total of 5,511 MW-Days in fiscal year 2009; well above the goal of 3,740 MW-Days. The FY 2009 goals for the High Flux Isotope Reactor are operation for 6 cycles with >90% predictability. Cycle 420 began February 18, 2009.
- The SNS accelerator Run 2009-1 began on September 30, 2008; neutron production ended January 3, 2009. The next SNS cycle began with accelerator startup on March 3, 2009; neutron production will next begin March 12, 2009, and continue through July 11, 2009.

Employment Opportunities

- Positions in the Neutron Sciences Directorate or related to neutron scattering are available for browsing. Click on "View Open Positions" at http://jobs.ornl.gov/ and view Position Category noted as "Science – Neutron Science":
  - Neutron Scattering Lead Detector Scientist
  - Neutron Scattering Detector Scientist
- **Neutron Scattering Postdoctoral Fellowship Positions with ORNL through Oak Ridge Associated Universities** [description available at http://www.orau.gov/orise/edu/ornl/postneeds.htm. Recently announced open positions are listed below.
  - Postdoctoral Research Associate for Neutron Scattering on CNCS Beam Line [ORNL09-37-NSSD]
  - Postdoctoral Research Associate for Developing the Spin-Echo Grazing Incidence Scattering (SERGIS) [ORNL09-36-NFDD]
  - Postdoctoral Research Associate for Neutron Scattering Research on the Backscattering Spectrometer (BASIS) [ORNL09-23-NSSD]
  - Postdoctoral Research Associate in Molecular Biology [ORNL09-22-SNS]
  - Postdoctoral Research Associate in Polarized Neutron Diffraction Studies on Protein Crystals [ORNL09-15-RAD]
- **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

- Workshop on a National Materials Irradiation Sciences User Facility, April 14-16, 2009, Oak Ridge, TN. http://neutrons.ornl.gov/conf/mi2009/index.shtml.
- International Conference on Neutron Scattering, May 3-7, 2009, Knoxville, TN. http://neutrons.ornl.gov/conf/icns2009/index.shtml.
- National School on Neutron and X-ray Scattering, scheduled for May 30-June 13, 2009, Argonne and Oak Ridge National Laboratories. Application closes March 7, 2009. http://www.dep.anl.gov/nx/.
- 20th Annual VM Goldschmidt Conference, June 13-18, 2010, Knoxville, TN. This is the foremost meeting of the year for worldwide geochemistry community. http://www.goldschmidt2010.org.