

Neutron Sciences Progress at Oak Ridge National Laboratory August 2007 - Revised

Summary

- Registration is open for ORNL User Week, October 8-11, 2007; see the workshop web site <http://neutrons.ornl.gov/workshops/users2007/index.shtml> for details.
- HFIR Cycle 410A concluded September 3 and Cycle 410B will run September 26-30.
- SNS neutron operations ended September 9. The next cycle will begin November 8.
- SNS is now the world's most powerful pulsed spallation neutron source, with routine operations exceeding 180 kilowatts of beam power.

ORNL Users Week, October 8-11, 2007

- This meeting focuses on the scientific resources of four ORNL user facilities funded by the DOE Office of Basic Energy Sciences: Spallation Neutron Source, High Flux Isotope Reactor, Center for Nanophase Materials Sciences, and Shared Research Equipment.
- Important scientific research challenges being addressed at these Oak Ridge facilities will be showcased by both users and facility scientists.
- Feedback will be received on developments in next-generation instrumentation.
- Current and prospective users will be acquainted with the research capabilities of the user facilities through presentations, tours, and workshops, and they will be introduced to the user proposal process.
- Deadlines are fast approaching: non-ORNL staff registration closes September 24 and ORNL staff registration closes October 1.
- Visit <http://neutrons.ornl.gov/workshops/users2007/index.shtml> for more details.

Instruments and Users

- The Wide Angular-Range Chopper Spectrometer (ARCS) team opened the beamline 18 shutter, sending the first neutrons to the instrument September 7. Commissioning of the instrument will continue into 2008. This is the fourth SNS instrument to receive neutrons.
- Commissioning of both HFIR SANS instruments is going well and some science has been performed with initial external users. Initial results show these two instruments are comparable with the best in the world. During the last run cycle, we ran the SANS1 instrument for 20 days, 5 for instrument calibration and set up, and the rest for science.
- External buildings for SNS instruments Cold Neutron Chopper Spectrometer (CNCS, beamline 5) and VULCAN (beamline 7) have been completed.



Exterior view of CNCS; VULCAN is in the background.



Exterior view of VULCAN

- Formation of an Instrument Development Team for a high resolution cold neutron inelastic spectrometer at HFIR was discussed at ORNL on August 23-24, 2007. An executive committee was formed and three Principal Investigators were elected: Young Lee, MIT, Chris Wiebe, FSU, and Wouter Montfrooij, U. Missouri. The group is working to draft a science case for consideration by the meeting attendees prior to a November presentation to the Neutron Scattering Science Advisory Committee. For more information, please contact Young Lee, younglee@mit.edu, or Stephen Nagler, naglerse@ornl.gov.
- Eight individuals from external institutions have accepted the invitation to serve as Science Review Committee Members. They will validate the assignment of individual proposals to external peer reviewers for science impact evaluation, act as “adjudicators” primarily for a defined area of science within an instrument group, participate in a meeting where all Science Review Committee Members discuss the results of their sub-section in the context of others, and provide feedback on the quality of the proposals, effectiveness of the review process, and related topics.
- Recent achievements for SNAP (SNS beamline 3) high pressure diffractometer include completion of installation of the utilities and the air duct in the instrument cave and the external raised floor.
- Vacuum testing of the sample and detector vessels has been successfully completed for SEQUOIA (SNS beamline 17).



Final pump down values for the SEQUOIA sample and detector vessels

- Two-thirds of the TOPAZ (SNS beamline 12) shielding blocks have been filled with concrete.



- On the powder diffractometer POWGEN3 (SNS beamline 11A), the installation of shims on the poured-in-place shielding is complete. The holes for the columns of the enclosure have been marked and drilled. The testing of the stacked shielding installation fixture on the mezzanine has been completed and the first layer of guide shielding is in place.



POWGEN3 super neutron guide

- On EQ-SANS (SNS beamline 6), the bulk shield insert has been vacuum tested and installed, and both the assembly of the low angle detector positioning parts and the testing of the detector's read card crates have begun.



EQ-SANS tank rails have been aligned.

Employment Opportunities

The following positions are in the Neutron Sciences Directorate or are related to neutron scattering: Click on "View Open Positions" at <http://jobs.ornl.gov/> for additional details

- SNS CAD Manager, ID 2560
- SNS Laser Scientist, ID 2558
- Senior Mechanical Engineer, ID 2554
- Junior Mechanical Engineer, ID 2553
- SNS RF Engineer, ID 2550
- Health Physicist, ID 2535
- Reactor Trainer, ID 2501
- SNS Instrument Installation Supervisor Electrical, ID 2499
- Nuclear Reactor Controller, ID 2490
- SNS Scientific Systems Programmer, ID 2478
- Software Engineer, ID 2459
- SNS Control Room Shift Supervisor, ID 2448
- Associate Laboratory Director - Neutron Sciences, ID 2432
- SNS Structural Design Engineer, ID 2431
- Polymer Morphologist , ID 2415
- SNS HFIR Instrument Support Manager, ID 2410
- SNS Controls Group Leader, ID 2391
- SNS Controls Team Leader, ID 2389
- SNS HVAC / Piping Design Engineer, ID 2382
- Neutron Scattering Instrument Scientist (Magnetism Reflectometer), ID 2262
- SNS Mechanical Designer , ID 2194

- **Neutron Scattering Postdoctoral Fellowship Positions with ORNL through Oak Ridge Associated Universities** [description available at <http://www.ornl.gov/orise/edu/ornl/postneeds.htm>]:
 - Neutron Scattering Postdoctoral Research Fellow [ORNL07-72-NSSD]
 - Beam Instrumentation Post-Doc [ORNL07-64-NSD]
 - Neutron Scattering Postdoctoral Fellowship [ORNL07-61-NSSD]
 - Dynamic Nuclear Polarization at SNS [ORNL07-46-NSSD]
 - Control System Programmer [ORNL07-32-SNS]
- **ORNL Fellowships** – These will open October 1, 2007, see <http://jobs.ornl.gov> after that date.
 - **Clifford G. Shull Fellowship** – its goal is to attract new scientific talent to ORNL for the development of its neutron science program.
 - **Instrument Development Fellowship** - to develop novel neutron instrumentation and instrument components to be used for neutron science at ORNL or other U. S. neutron centers.

Operations

- The High Flux Isotope Reactor (HFIR) began Cycle 410A began August 15 and continued until September 3; Cycle 410B will run September 26-30 for HB-4 cold neutron beam characterization.
- In addition to neutron scattering research at HFIR, isotope irradiations during the three cycles since startup with the HB-4 Cold Neutron Source have provided for Cf-252 production; Fe-59, Ni-63 and Se-75 production for industrial/commercial applications; Ba-140, W-188, and Lu-177 production for medical applications; and Te-125m, for research with CdTe nanoparticles in the imaging of small animals. A number of fusion reactor candidate material irradiation experiments were also conducted. These included an instrumented capsule to evaluate Silicon Carbide materials at elevated temperatures and several non-instrumented capsules containing Silicon Carbide, various stainless steels, and various alloys of Vanadium, Molybdenum, and Copper. Additionally, over 500 sample irradiations for neutron activation analysis (NAA) were performed for the Nevada Test Site during these three cycles. The HFIR NAA facility also produced ten small Yb-169 sources for use in gamma densitometry measurements at the National Security Complex.
- HFIR plans to resume operation in FY2008 on November 14 following plant reliability upgrades. This will begin a series of six operating cycles through the remainder of the fiscal year. Each cycle lasts 23–25 days.
- Neutron production at the SNS began on June 21 and ended September 8. SNS will resume neutron production November 8. The planned ramp to higher power and increased reliability is well ahead of schedule. On August 11, the SNS operated at 183 kilowatts and surpassed the previous record of 163 kilowatts for beam power of a pulsed spallation neutron source held by the United Kingdom's ISIS facility.

Future meetings of interest to SNS and HFIR users

- *SKIN2007 - Studying Kinetics with Neutrons* (joint with NMI3), September 27-28, 2007, University of Göttingen, Germany; http://neutron.neutron-eu.net/n_nmi3/n_networking_activities/SKIN2007
- *Residual Stress Summit*, October 2-4, 2007, Oak Ridge, TN; <http://batman.mech.ubc.ca/~residualstress/>
- **ORNL Users Week, October 8-11, 2007** <http://neutrons.ornl.gov/workshops/users2007/index.shtml>
 - *SNS-HFIR Users*, October 8-10, 2007, Oak Ridge, TN
 - *Center for Nanophase Materials Sciences Users*, October 10-11, 2007, Oak Ridge, TN
 - *SHaRe Users*, October 10-11, 2007.
- Sessions on biointerphases and magnetism during the AVS-54 International Symposium, October 13 – 18, 2007, Seattle, WA, <http://www.avs.org>.
- Materials Research Society Fall Meeting, November 26-30, 2007, Boston, MA, http://www.mrs.org/s_mrs/sec.asp?CID=4749&DID=164574
- American Crystallographic Association, *Annual Meeting*, May 31-June 5, 2008, Knoxville, TN,
- 2008 annual meeting of the DOE Experimental Program to Stimulate Competitive Research (DOE EPSCoR), proposed for Oak Ridge, summer 2008.
- International Conference on Neutron Scattering, May 3-7, 2009, Knoxville, TN.