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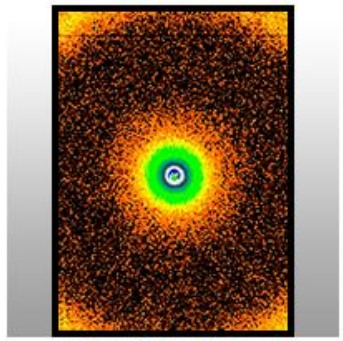
Neutron science research at Oak Ridge National Laboratory is on its way to promising developments in materials science. Neutron scattering techniques provide exceptional tools for studying the structure and dynamics of materials at the molecular level.

With the world's highest flux reactor-based neutron source (the High Flux Isotope Reactor) and the world's most intense pulsed accelerator-based neutron source (the Spallation Neutron Source), ORNL provides neutron scattering capabilities unavailable anywhere else in the world.

Proposals: Thank you for responding so enthusiastically to the last proposal call. More than 200 were received.



Two-dimensional scattering pattern of a polymer from data taken at the Bio-SANS instrument. *More . . .*

News

Oct 7 - SNS Fine-Resolution Chopper Spectrometer, SEQUOIA, starts up.

Oct 3 - Neutron Imaging at SNS workshop to be held Nov 3. *More...*

Oct 2 - Nominations for SNS-HFIR User Group Executive Committee due October 6. *More...*

Operations Status

SNS is operating with beam to target. Power on target at the end of September reached a world record of 620 kW. *Operating status...*

The High Flux Isotope Reactor is operating steadily in Mode 1 at 100% power (85MW) for Fuel Cycle 417. *Operating status...*

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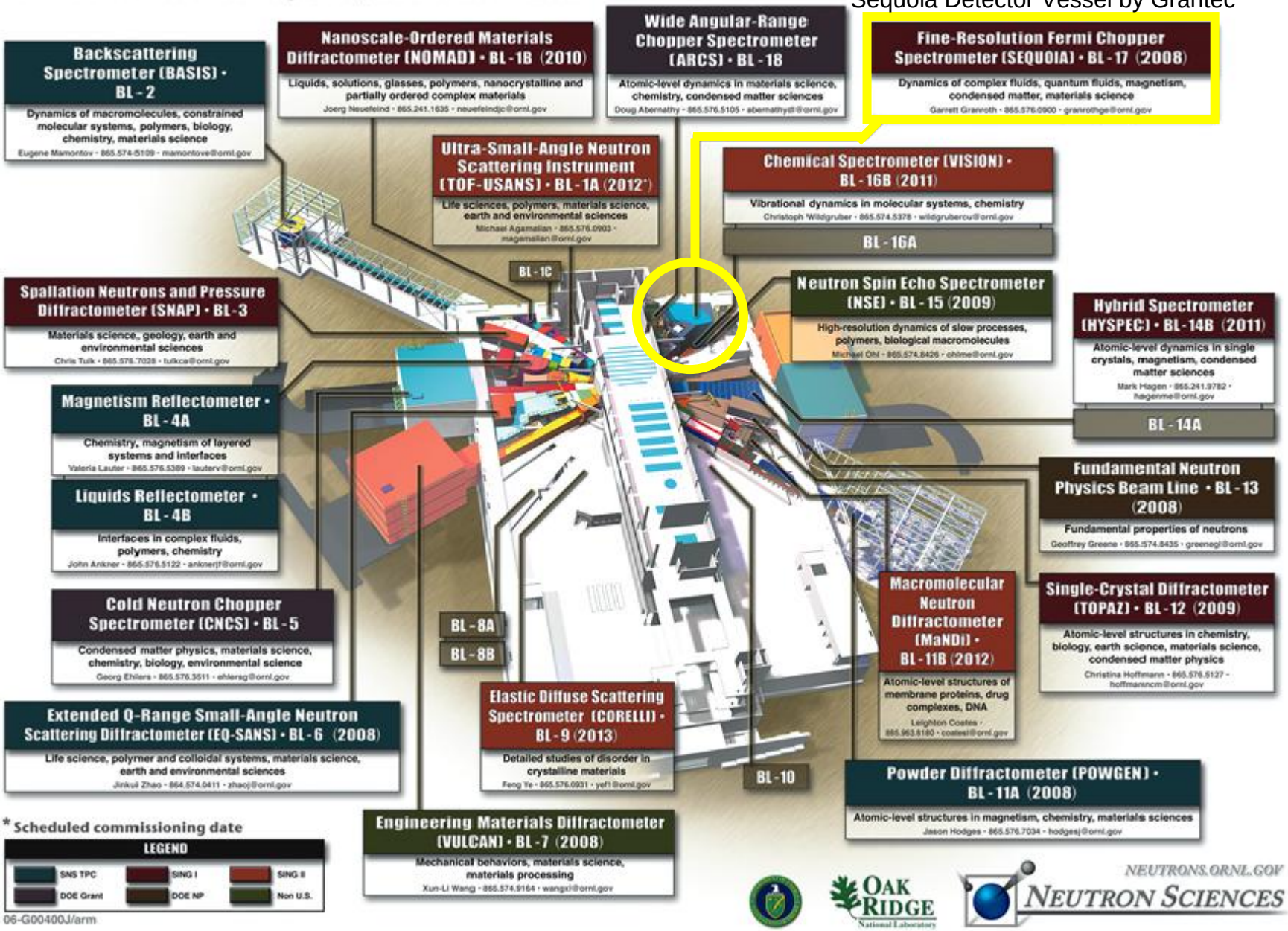
Neutron Pulse

neutronscience@ornl.gov

Spallation Neutron Source at Oak Ridge National Laboratory

The world's most intense pulsed, accelerator-based neutron source

Sequoia Detector Vessel by Grantec



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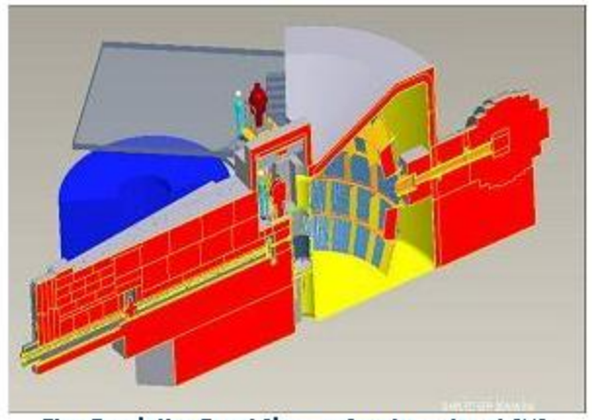
Fine-Resolution Fermi Chopper Spectrometer (SEQUOIA)

The SEQUOIA instrument is a direct geometry time of flight chopper spectrometer, with fine energy transfer (ω) and wave-vector ($\mathbf{Q}$) resolution, at the Spallation Neutron Source (SNS). SEQUOIA will be used to conduct forefront research on dynamical processes in materials. In particular, SEQUOIA will enable unprecedented high-resolution inelastic neutron scattering studies of magnetic excitations and fluctuations and lattice vibrations. The impact on condensed matter and materials science will span a wide cross-section of important research areas. Today these would include strongly correlated electrons systems, high temperature superconductors, colossal magneto resistive materials, quantum and molecular magnetism, itinerant magnets and multilayers, alloys, ferroelectric, piezoelectric and thermoelectric materials, and soft condensed matter. SEQUOIA will be an outstanding tool for the investigations of novel systems and materials that are unknown today. SEQUOIA is a necessary complement to the other main SNS chopper spectrometer, ARCS. In general, SEQUOIA will be the instrument of choice when high $\mathbf{Q}$ and ω resolution and large solid angle at low to intermediate scattering angles is required.



Fine-Resolution Fermi Chopper Spectrometer at SNS
Click image for a larger version.

To meet the technical requirements of fine resolution in both ω and $\mathbf{Q}$ a 5.5 m flight path from the sample to detector bank is required. This detector bank will cover scattering angles from -30^{o} to 60^{o} in the horizontal and $\pm 30^{o}$ degrees in the vertical in increments of $\sim 0.3^{o}$. Therefore the total solid angle coverage is 1.61 steradians. To optimize the flux on sample in this high-resolution configuration, the moderator to sample distance is as short as possible, with a provisional distance of 19.5 m. It is expected that this distance may be reduced further in the process of detailed design. The instrument will be able to use the full source spectrum provided by the decoupled water moderator. Therefore it can be used to study excitations on energy scales ranging from a few meV up to the order of 1 eV. A supermirror neutron guide will be included on the instrument to further enhance the flux of thermal neutrons on the sample. Details of a preliminary instrument design are provided in the Two Chopper Conceptual Design Report 6-6-00 (PDF 1.31M).

An instrument development team (IDT) has assembled in support of SEQUOIA. The SEQUOIA IDT consists primarily of representative scientists from the Center for Neutron Scattering at the Oak Ridge National Laboratory and the Canadian Institute for Neutron Scattering. In addition a group of distinguished scientists from the American neutron scattering community is represented in the IDT. The SEQUOIA IDT, under the leadership of Stephen Nagler, has submitted a proposal for funding to the DOE.

Garrett Granroth is the instrument scientist who is responsible for the design and construction of SEQUOIA. David Vandergriff is the lead engineer and Ed Hardin is the designer for SEQUOIA.

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