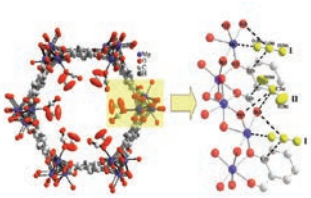
Why Neutrons?

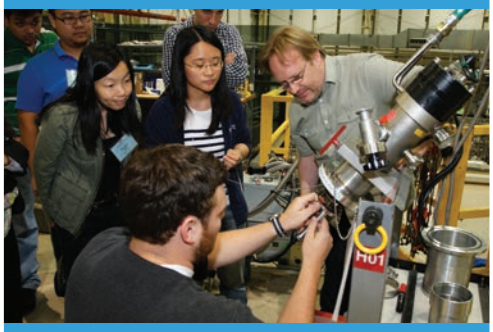
Neutrons reveal properties not readily probed by light, x-rays or electrons

Carbon Dioxide Separation Material



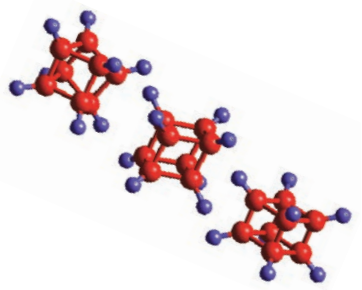
WAVELENGTHS - allow the formation of observable interference patterns when scattered from structures as small as atoms to as large as biological cells.

Measurements at Extreme Conditions



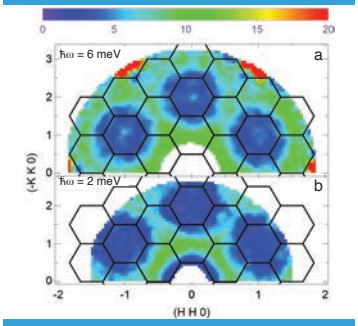
CHARGE NEUTRAL - neutrons allow deep penetration, passing through walls without destroying samples, permitting measurements under extreme conditions of temperature and pressure, conditions relevant to materials processing.

Molecular Vibrations



ENERGIES - allow motions of vibrating crystals, folding proteins, melting glasses and diffusing hydrogen to be measured.

Magnetic Structures



MAGNETISM - neutrons are sensitive to magnetic moments of both nuclei and electrons, allowing structure and behavior of exotic magnetic materials to be detailed precisely.

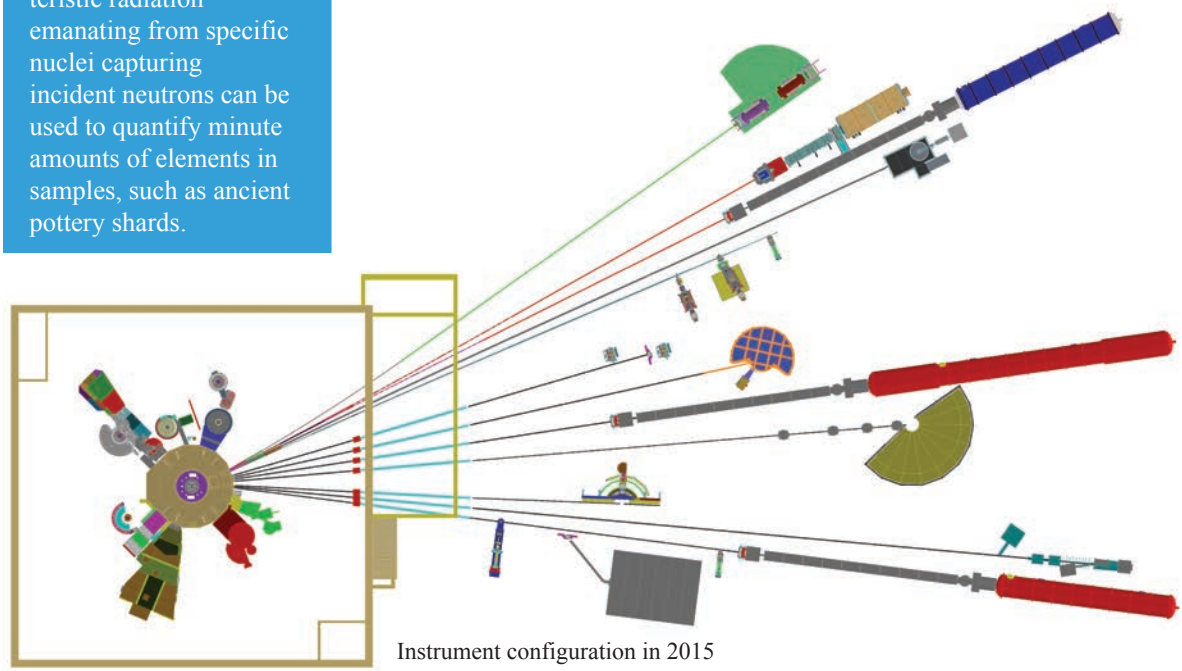
Trace Elements for Archaeology

CAPTURE - characteristic radiation emanating from specific nuclei capturing incident neutrons can be used to quantify minute amounts of elements in samples, such as ancient pottery shards.

NEUTRONS AT NIST

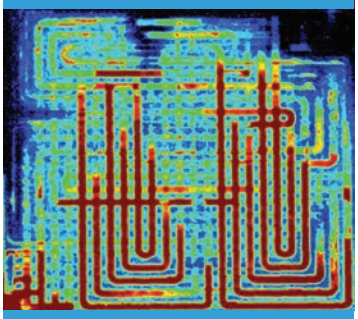
ncnr.nist.gov

Free neutrons streaming from the source at the NIST Center for Neutron Research are transformed by nearby instruments into some of the most powerful scientific and technological measurement tools available anywhere. NIST is home to one of the world's premier neutron sources with 28 experiment stations devoted to research. Instruments such as those shown in the NCNR layout below enable users to manipulate neutron beams, direct them into samples, detect neutrons that are scattered, and interpret the results to reveal material properties.



Instrument configuration in 2015

Water Flow in Fuel Cells



SELECTIVITY - Light atoms, difficult to observe with x-rays are revealed by neutrons. Hydrogen, especially, can be distinguished from chemically equivalent deuterium, allowing a variety of powerful contrast and imaging techniques.

CONTACT US

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Our Mission

The NIST Center for Neutron Research ensures the availability of neutron measurement capabilities to meet the needs of U.S. researchers from industry, academia and from other U.S. government agencies.

Access

Access to the NCNR instruments is provided through three mechanisms: a peer-reviewed, merit-based proposal process, through partnerships on specific instruments or sets of instruments, and through collaboration with NIST in support of the mission.

Proposals

Most of the time on NCNR instruments is made available through a competitive, peer-review proposal process. Calls for proposals are issued approximately twice a year.

Collaborative Access

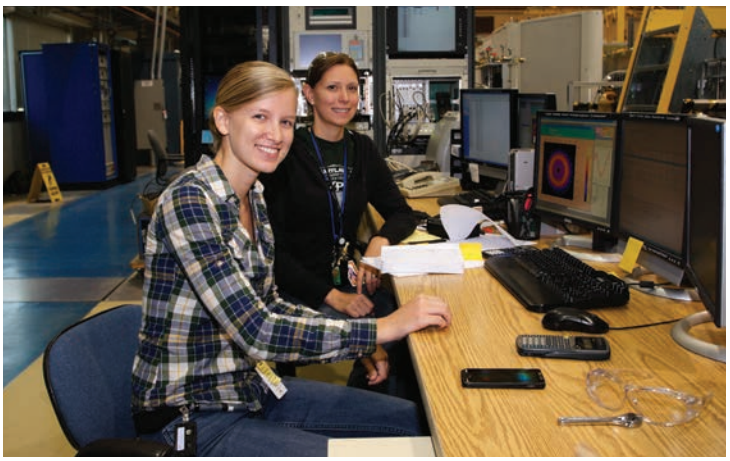
Some time on all instruments is available to NIST staff in support of our mission. A significant fraction of this time is used collaboratively by external users, who often take the lead in the research. We encourage users interested in exploring collaborative research opportunities to contact an appropriate NCNR staff member.

Partnerships

The NCNR forms partnerships with other institutions to fund the development and operation of selected instruments. These partnerships, or "Participating Research Teams", may have access to as much as 75 % of the available beam time on the instrument depending on the share of total costs borne by the team.

CHRNS | **Center for High Resolution Neutron Scattering**

The Center for High Resolution Neutron Scattering is a national user facility that is jointly funded by the National Science Foundation and the NCNR. Its primary goal is to maximize access to state-of-the-art neutron scattering instrumentation for the research community. It operates six neutron scattering instruments at the NCNR.



Research Participation

In 2013, 2148 scientists and engineers participated in the research activities of the NCNR. The number of publications per year is in approximate proportion to the participants, amounting to nearly 300 in 2013. Over-subscriptions for instruments are, on average, 2.6 but reaches 6 on some instruments. The Cold Neutron Expansion Project has addressed this community need and promises increasing activity and productivity.