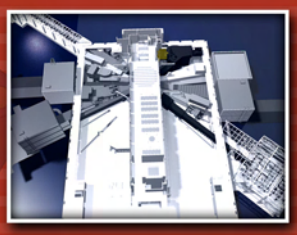
INSTRUMENT Fact Sheet

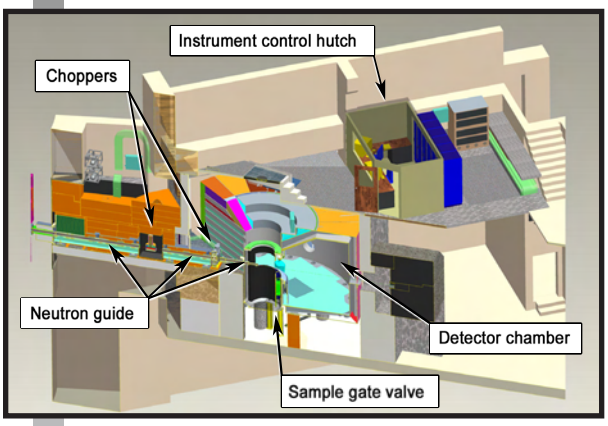
BEAM LINE 18

SPALLATION NEUTRON SOURCE



ARCS – WIDE ANGULAR-RANGE CHOPPER SPECTROMETER

ARCS is optimized to provide a high neutron flux at the sample and a large solid angle of detector coverage. This spectrometer is capable of selecting incident energies over the full energy spectrum of neutrons, making it useful for studies of excitations from a few to several hundred milli-electron volts. An elliptically shaped supermirror guide in the incident flight path boosts the performance at the lower end of this range. The sample and detector vacuum chambers provide a window-free final flightpath and incorporate a large gate valve to allow rapid sample changeout. A new T_0 neutron chopper is being developed not only to block the prompt radiation from the source but also to eliminate unwanted neutrons from the incident beam line. In addition to the instrument hardware, the ARCS project includes a significant effort for software development.



Cutaway view of the engineering model of the ARCS instrument showing the incident beam line components, sample and detector chamber, and control area.

SPECIFICATIONS

Moderator	Decoupled ambient water
Source-to-Fermi chopper distance	11.6 m
Chopper-to-sample distance	2.0 m
Sample-to-detector distance	3.0 to 3.4 m cylindrical geometry
Incident energy range	10–1500 meV
Resolution (elastic)	2–5% E_i
Detector coverage horizontal	-28–135°
Detector coverage vertical	-27–26°
Minimum detector angle	3°

Status: Operational

APPLICATIONS

Compared with current instruments, the increased sensitivity of ARCS offers new opportunities for scientific studies in the following:

Lattice Dynamics

- Entropy and the effects of vibrational modes on stability and phase transitions of solids
- Excitations in disordered materials; effects of nanoscale features on vibrational entropy and thermodynamic stability
- Equations-of-state from the measured phonon density-of-states versus temperature and pressure
- Phonons in correlated-electron materials; coupling of lattice and electronic degrees of freedom in high-Tc, heavy-fermion, and mixed-valence materials

Magnetic Dynamics

- High-temperature superconductivity—spin dynamics in superconductors and precursor compounds and crystal field spectroscopy
- Low-dimensional systems; one-dimensional quantum magnets and low-dimensional conductors
- Magnetism in actinide materials; heavy-fermion magnetism and superconductivity

Chemical Physics

- Deep inelastic neutron scattering studies of hydrogen

FOR MORE INFORMATION, CONTACT

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http://neutrons.ornl.gov/instrument_systems/beamline_18_arcs

SNS

May 2008

06-G00804B/arm