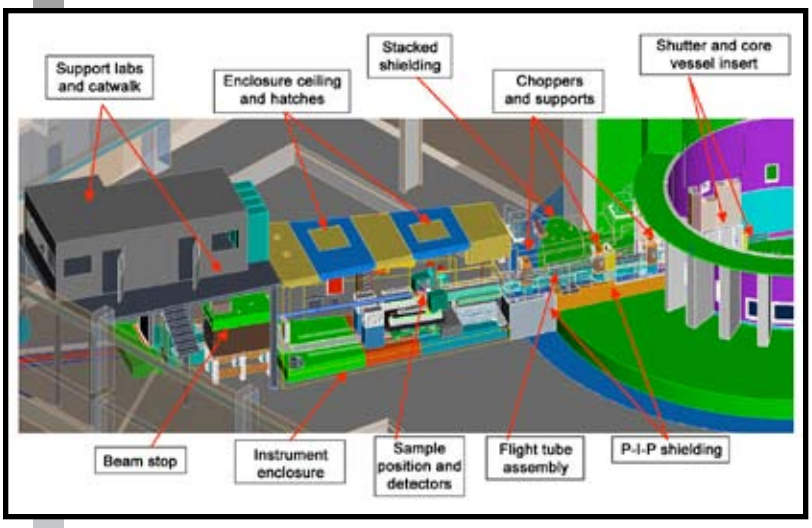
INSTRUMENT Fact Sheet

BEAM LINE 3

SPALLATION NEUTRON SOURCE

SNAP – SPALLATION NEUTRONS AND PRESSURE DIFFRACTOMETER

The SNAP Diffractometer allows studies of a variety of powdered and single-crystal samples under extreme conditions of pressure and temperature. The increased neutron flux, coupled with large-volume pressuring cells using large synthetic single-crystal opposed anvils, allows significant advances in the pressure range accessible to neutron diffraction. The pressure goal is 50 to 100 GPa on an ~1-mm^3 sample on a routine basis. We are currently working with powdered samples up to 15 GPa and are developing the ultrahigh-pressure capabilities. In addition, recent advances in next-generation detectors will allow the incident beam-focusing optics, pressure chamber, and detector array to be highly integrated, providing a highly flexible facility for materials studies under extreme conditions.



APPLICATIONS

SNAP offers new opportunities for scientific studies involving the following:

- Hydrogen under extreme conditions
- Elastic anisotropy of ε-iron at Earth core conditions
- Real-time in situ monitoring of "real rocks" as an analogue to the down-going slab in the subduction context
- Planetary ices—structure and strength of ices under pressure
- Silicate melts—glasses at high pressure and temperature and the dynamical changes occurring during heating and pressurization
- Strength and rheology of materials and the relationship to brittle and ductile failure, including stress release as a function of time
- Structural changes accompanying transitions in Fullerenes and their derivatives
- Hydrogen bonding in organic and inorganic systems as a function of pressure and temperature, including liquids

SPECIFICATIONS

Moderator	Decoupled poisoned supercritical hydrogen
Source-to-sample distance	15 m
Sample-to-detector distance	50 cm
Angular coverage	381–42° \ 981–50° horizontal ±34° vertical
Wavelength range (bandwidth)	
Frame 1	0.5–3.65 Å
Frame 2	3.7–6.5 Å
Pressure range	From ambient pressure to >50 GPa (500 kbar)
Focused beam size	From 1 cm to <100 μm

Status: Operational

FOR MORE INFORMATION, CONTACT

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http://neutrons.ornl.gov/instrument_systems/snap.shtml

SNS

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