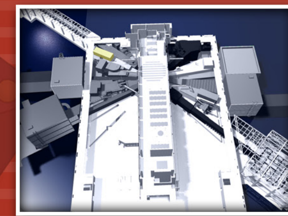
INSTRUMENT Fact Sheet

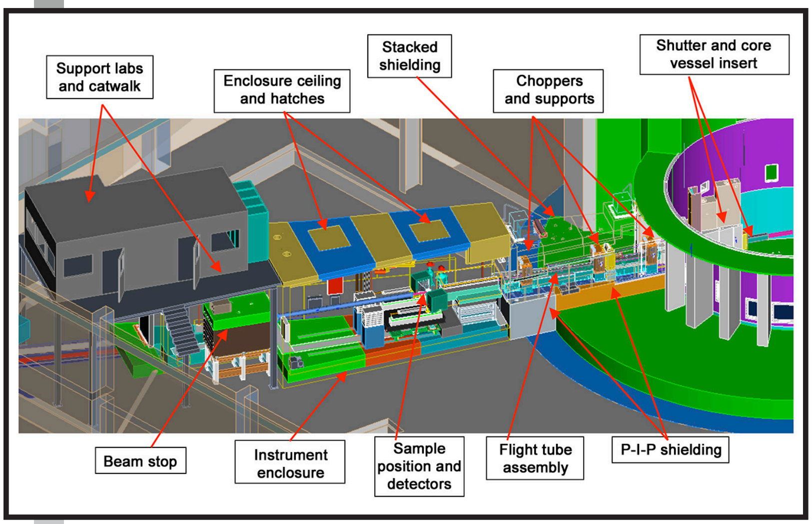
BEAM LINE 3

SPALLATION NEUTRON SOURCE



SNAP – SPALLATION NEUTRONS AND PRESSURE DIFFRACTOMETER

The Spallation Neutrons and Pressure (SNAP) diffractometer, a high-flux, medium-resolution instrument, uses highly integrated advanced area detectors, beam-focusing optics, and pressure chambers to study a variety of powdered, single-crystal, and amorphous materials under extreme pressure and temperature. Traditional Paris-Edinburgh presses are used to reach 25 GPa. The instrument staff and its instrument development team are making progress with “large-volume” diamond anvil cells in hopes of significantly extending the pressure range currently accessible to neutron diffraction. The goal is to routinely achieve pressures of 50 to 100 GPa for samples on the order of 0.1 mm^3. Though such high pressures are not yet available to general users, commissioning-type experimental collaborations are welcome.



SPECIFICATIONS

Moderator	Decoupled poisoned supercritical hydrogen
Source-to-sample distance	15 m
Sample-to-detector distance	50 cm
Angular coverage	26° > 2Θ > 138° horizontal ±34° vertical

Wavelength range (bandwidth)	
Pressure range	<25 GPa
Temperature range	100-1500 K (w/ reduced pressure range)
Focused beam size	From 1 cm to <100 μm
Liquids and glasses	Q min = 0.7 $Å^{-1}$ Q max = 17 $Å^{-1}$
At 2Θ = 90° (crystalline powder) 0.5 ≤ d ≤ 8.0 $Å^{-1}$	
At 2Θ = 35° (glasses & liquids) 0.7 ≤ d ≤ 17 $Å^{-1}$	

Status: Available to users

APPLICATIONS

SNAP offers new opportunities for scientific studies involving the following:

- Hydrogen under extreme 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

FOR MORE INFORMATION, CONTACT
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SNS
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