SNAP

Spallation Neutrons and Pressure Diffractometer

Spallation Neutron Source

BEAMLINE

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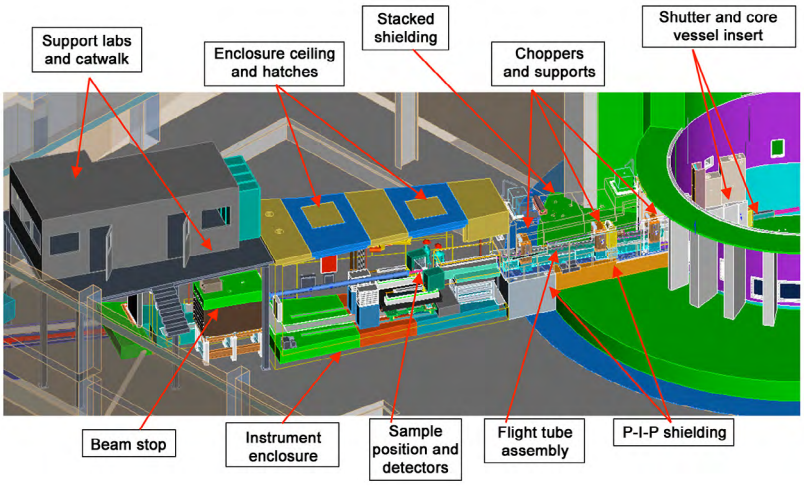
SNAP is a high-flux, medium-resolution diffractometer. It is equipped with moveable area detectors that allow studies on powdered, single-crystal, and amorphous materials under extreme pressure and temperature. Its beam-focusing optics allow measurements on sub millimeter sized samples. The beamline has available a wide variety of pressure devices, including a suite of Paris- Edinburgh (PE) presses that can reach 20 GPa in the temperature range of 80–1500 K, with experiments at high temperature limited to 6 GPa. Higher pressures can be reached with the in-house developed "large-volume" diamond anvil cells (DAC). These can be loaded with gaseous pressure transmitted media for increased sample hydrostaticity, and allow access to 10 K, significantly lower temperature than PE presses. The devices available to users routinely achieve pressures up to 30 GPa for samples on the order of 0.05 mm^3. Higher pressures are not yet available to general users; commissioning-type experimental collaborations are welcome.



APPLICATIONS

- Magneto-structural correlations in lanthanides and transition metal compounds
- Planetary ices—structure and strength of ices under pressure
- Structural signatures of pressure-induced phenomena in quantum systems
- Structural studies in functional oxides such as thermoelectrics and ferroelectrics
- Hydrogen bearing systems under extreme conditions
- Hydrogen bonding in organic and inorganic systems as a function of pressure and temperature
- Silicate melts—glasses at high pressure and temperature and the dynamical changes occurring during heating and pressurization

SPECIFICATIONS

Moderator	Decoupled poisoned supercritical hydrogen
Source-to-sample distance	15 m
Sample-to-detector distance	0.5 m
Angular coverage	In-plane: 26-138° Out-of-plane: +/- 22.5°

Pressure range	Gas Cell: 0.5 GPa Clamp Cell: 2 GPa PE Press: 20 GPa DAC: 40 GPa
Temperature range	10 K to 400 K up to 1500 K (limited to 6 GPa)
Focused beam size	From 1 cm to 400 µm

Available Ranges
At 2Θ = 90° (Crystallography) d-spacing 0.5-8 Å Momentum transfer 0.8 - 12 $Å^{-1}$
At 2Θ = 35° (Total Scattering) d-spacing 0.4-9 Å Momentum transfer 0.7 - 9 $Å^{-1}$

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