

# SNAP

## Spallation Neutrons and Pressure Diffractometer

SNAP is a high-flux neutron diffractometer with tuneable resolution for studying materials under extreme conditions. It combines large-area spatially resolved detectors, beam-focusing optics, and a versatile suite of pressure devices to enable diffraction measurements on very small samples inside complex sample-environments. Sample environment capabilities include the Paris–Edinburgh press, SNAP’s unique large-volume diamond anvil cells (DACs), and the SNS’s broader gas-pressure and clamp-cell infrastructure. SNAP is used to investigate both average and local structure in crystalline and amorphous materials and is suitable for powder, single-crystal, and liquid samples. Designed as a true micro-diffraction instrument, SNAP can measure extremely small crystalline samples, including powders of less than 0.2 mg. This capability is especially valuable for studies of samples recovered from extreme environments, highly absorbent materials that are difficult to measure with larger sample volumes, and other specimens that cannot be produced in large quantities.



## APPLICATIONS

SNAP is a dedicated micro-diffraction beamline with a strong emphasis on in situ and ex situ research under extreme conditions, including:

- Hydrogen-rich minerals in the geosciences
- Structure, mechanical properties, and phase evolution of ices in planetary physics
- Pressure-induced evolution of local structure in crystalline materials
- Molecular crystallography and hydrogen bonding in organic and inorganic compounds, including pharmaceuticals
- Exotic magnetic states in rare-earth metals, high-entropy alloys, and other quantum materials
- Structure–property relationships in functional materials
- Fundamental crystallography and method development
- In situ crystallization from liquids and melts
- Time-dependence and metastable behavior
- Small-volume recovered samples (e.g., from multi-anvil synthesis)

## 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	PE Press: 20 G Pa DAC: 40 GPa
Temperature range	10 K to 350 K
Focused beam size	400 $\mu\text{m}$

### Standard conuguration

1st frame: d-spacing 0.5–6 Å  
2nd frame: d-spacing 3.5–11 Å

### Total-scattering conuguration

$Q_{\text{min}}$  0.9 Å<sup>-1</sup>  
 $Q_{\text{max}}$  20 Å<sup>-1</sup>

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