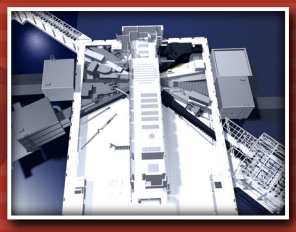
Instrument Fact Sheet

BEAM LINE 16B

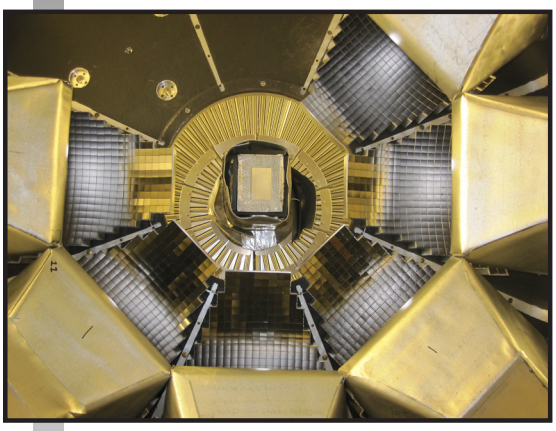
Spallation Neutron Source



VISION – Vibrational Spectrometer

VISION is the highest resolution broadband inelastic neutron scattering (INS) spectrometer in the world. It is also the world's first high throughput INS instrument. It is designed to study the vibrational dynamics of atoms in molecules and solids and by combining a series of diffraction banks it also gives their structure.

VISION is the neutron analogue of an infrared-Raman spectrometer. Optimized to characterize molecular vibrations over a broad energy range (-2 to 1000 meV), while simultaneously recording structural changes using diffraction detectors. It is equipped with double-focusing crystal arrays, that focus the desired neutrons on a small detector area. This design improves the signal to noise ratio. The overall count rate for the inelastic signal is more than orders of magnitude better than that of similar spectrometers currently available.

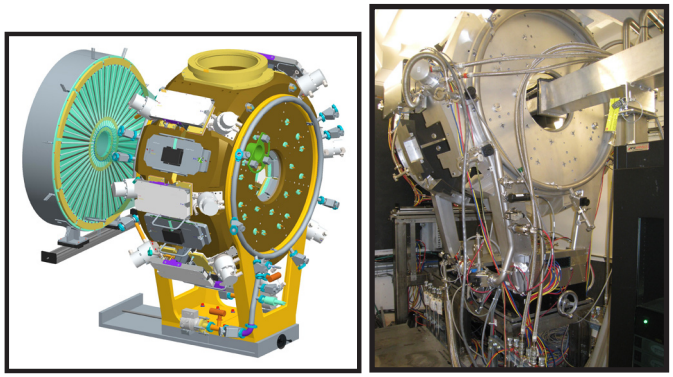


Inside view of the upstream double-focusing crystal array analyzers and corresponding beryllium filter assemblies.

VISION will give unique insights in Materials Science not only by telling us "what atoms do" with spectroscopy but also "where atoms are" with diffraction.

Applications

- Energy materials, chemistry, nanotechnology, surface chemistry, catalysis, biochemistry, biology, hydrogen bonding, geochemistry, condensed matter science etc.
- VISION will open the door to study non-hydrogenous materials routinely with INS.
- VISION is the first SNS instrument that has computer modeling as integral part of the data analysis and interpretation of the spectra.



VISION, from concept to reality: Engineering drawing (left), the outside view of the spectrometer chassis, facing upstream (right).

Specifications

Moderator	Decoupled ambient water
Source-to-T_0 chopper distance	7.6 m
Source to sample distance (primary flight path)	16 m
Sample-to-detector distance (secondary flight path)	0.732 m
Incident energy range	1–1000 meV
Analyzer Bragg angle	45°
Total analyzer area	0.7 m^2
Energy resolution	<1.5% ΔE/E (E>2meV)
Elastic line width	150 μeV
Annular diffraction detector	1.3–14 $Å^{-1}$
Backscattering diffraction bank	1.5–30 $Å^{-1}$
Δd/d	10^{-3}

Status: In commissioning

For more information contact

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