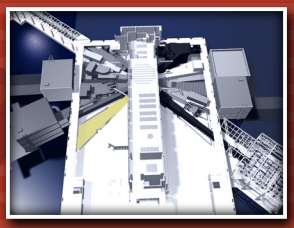
Instrument Fact Sheet

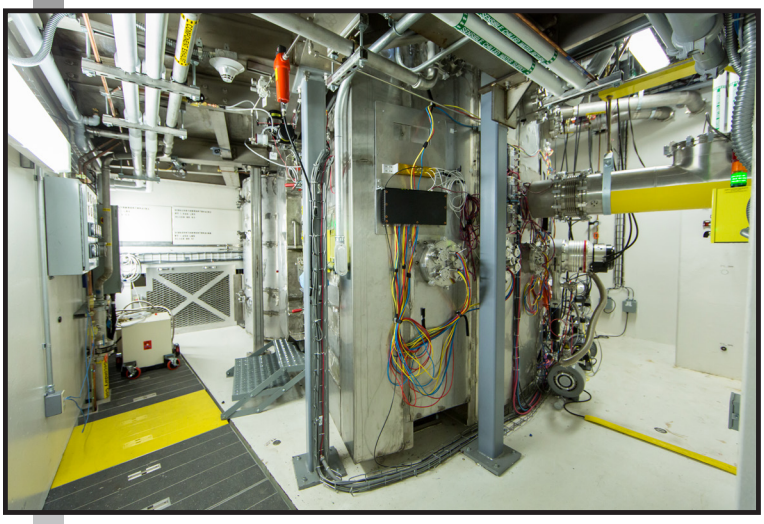
BEAM LINE 9

Spallation Neutron Source



CORELLI – Elastic Diffuse Scattering Spectrometer

CORELLI is a statistical chopper spectrometer with energy discrimination. CORELLI is designed and optimized to probe complex disorder in crystalline materials through diffuse scattering of single-crystal samples. The momentum transfer ranges from 1 to 12 Å^{-1}, and the energy of incident neutrons ranges from 10 to 200 meV. This instrument combines the high efficiency of white-beam Laue diffraction with energy discrimination by modulating the beam with a statistical chopper. A cross-correlation method is used to reconstruct the elastic signal from the modulated data. Accurate modeling of the short-range order associated with the diffuse scattering requires measurements over large volumes of three-dimensional reciprocal space, with sufficient momentum resolution to distinguish the diffuse signal from the strong Bragg peaks.



Applications

- Diffuse scattering in material science, including colossal magnetoresistance materials, ferroelectric relaxors, and fast ion conductors
- Diffuse scattering in condensed matter physics, including high-temperature superconductors, geometrically frustrated systems, and quantum critical phenomena
- Diffuse scattering in molecular systems including molecular solids and microporous framework systems

Specifications

Moderator	Ambient H_2O decoupled poisoned
Source-to-sample distance	20 m
Sample-to-detector distance	2.5 m
Anular coverage	-21.9 to +148.2° horizontally ±28.5° vertically
Energy resolution	ΔE/Einc ~ 8% (FWHM) at Einc=100 meV
Momentum resolution	ΔQ/Q ≤ 7x10^{-3} at 90° at Q=10 Å^{-1}
Incident energy range	10–200 meV
Momentum transfer	1–12 Å^{-1}
Beam size at sample position	~ 1 cm^2
Minimum solid angle coverage	0.8 sr

Status: Commissioning

For more information, contact

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