

HYSPEC

Hybrid Spectrometer

Spallation Neutron Source

BEAMLINE

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HYSPEC is a high-intensity, direct-geometry instrument optimized for measurement of excitations in small single-crystal specimens. The incident neutron beam is monochromated using a Fermi chopper with short, straight blades and is then focused onto the sample using Bragg scattering optics. Neutrons are detected in a bank of position-sensitive detector tubes that can be positioned over a wide range of scattering angles about the sample axis. This combination of Fermi chopper and Bragg focusing optics, plus a position-sensitive detector bank, leads to a highly flexible instrument in which the energy and wave vector resolution can be independently varied by nearly an order of magnitude. Both linear polarization analysis and a half-polarized mode are available on HYSPEC. This is accomplished by using a Heusler crystal array to polarize the incident beam and a supermirror wide-angle polarization analyzer for the scattered beam.



SPECIFICATIONS

Moderator	Coupled cryogenic hydrogen
Moderator-to-Fermi chopper distance	37.17 m
Chopper-to-sample distance	3.61 m
Focusing crystals-to-sample distance	1.8 m
Sample-to-detector distance	4.5 m
Unpolarized incident energy range**	3.8–60 meV
Energy resolution (elastic scattering)	$0.02 < (\Delta E/E) < 0.2$
Horizontal scattering-angle range*	$60^\circ < 2\theta_H < 118^\circ$
Vertical scattering-angle range	$-6.5^\circ < 2\theta_V < 6.5^\circ$

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APPLICATIONS

- Exotic excitations in quantum magnets and quantum critical phenomena
- Complex ground states in geometrically frustrated magnets
- Unconventional superconductors
- Intertwined lattice and magnetic dynamics in functional materials: ferroelectrics, memory shape alloys, thermoelectrics and magnetocaloric materials
- Itinerant magnetism
- Coherent and incoherent dynamics in hydrogen-containing materials

*Available horizontal scatter range is a function of Incident Energy, and minimum reasonable scatter angle varies by sample size and $>2^\circ$

**Polarized incident energy range <20 meV, and high-magnetic-field (>8 T) incident energy range >5.1 meV

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