

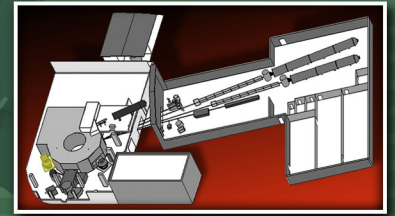
INSTRUMENT

BEAM LINE

HB-1

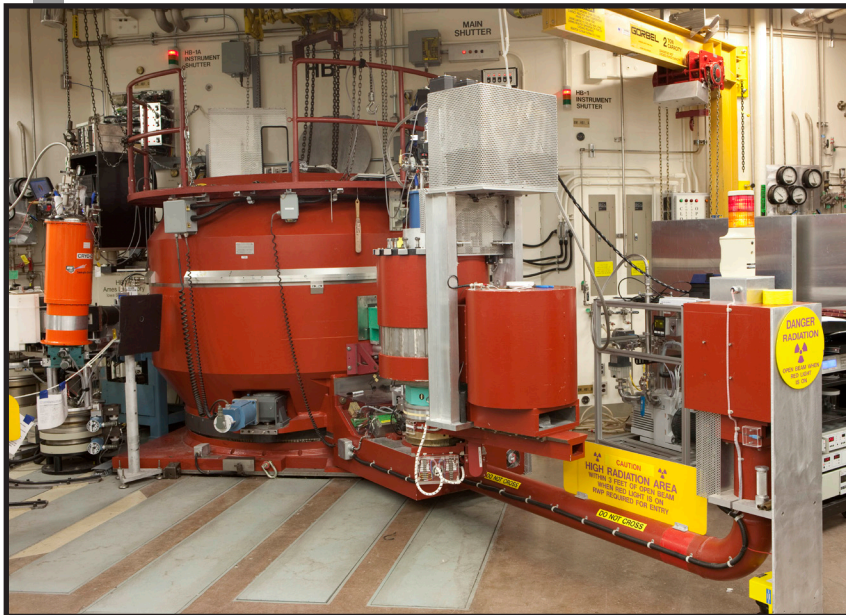
HIGH FLUX ISOTOPE REACTOR

Fact Sheet



POLARIZED TRIPLE-AXIS SPECTROMETER

The HB-1 Polarized Triple-Axis Spectrometer is designed primarily for the study of excitations in crystalline solids at intermediate energies. Thanks to the vertical beam focusing and the very high time-averaged flux at HFIR, its geometry is optimal for



investigating small samples and weak scattering in specific areas of energy-momentum space. The sample goniometers and a full software implementation of the three-dimensional sample orientation matrix allow measurements outside the traditional single-scattering plane. The unique capability of HB-1 is the polarized configuration for studies of excitations, phase transitions,

structures, and density distributions in magnetic materials. Use of a beryllium low-pass filter makes the instrument suitable for hypothermal neutron measurements with incident or final energy below 5 meV.

APPLICATIONS

The following are some of the scientific applications for which the Triple-Axis Spectrometer is particularly well suited.

- Spin waves in ordered magnetic materials
- Exotic excitations in low-dimensional, molecular, itinerate, and other “quantum” magnets
- Spin and lattice excitations in high- T_c superconductivity, colossal magnetoresistance materials, and multiferroic systems
- Spin density distributions in magnetic compounds
- Phonon dispersion curves in alloys and phonon-driven phase transitions

SPECIFICATIONS

Beam spectrum	Thermal
Monochromators	Unpolarized Vertical Focus PG(002) polarized commissioning
Analyzers	Unpolarized fixed vertical focus PG(002), Be(101), Si(111) Polarized Heusler (111)-commissioning
Monochromator angle	$2\Theta_M = 14$ to 75°
Sample angle	$\pm 180^\circ$
Scattering angle	-90 to 120°
Analyzer angle	-40 to 140°
Collimations (FWHM)	Premonochromator: 15', 30', 48' Monochromator-sample: 20', 40', 60', 80' Sample-analyzer: 20', 40', 60', 80' Analyzer-detector: 20', 70', 90', 120', 210', 240'
Detector	Single ^3He gas counter
Resolution (elastic)	5-10% Ei (adjustable with collimators)

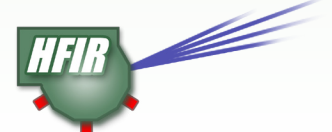
Status: Available to users

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