

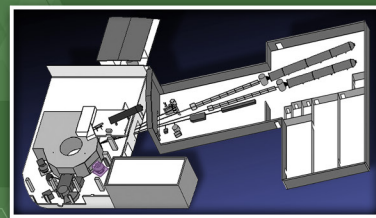
HIGH FLUX ISOTOPE REACTOR

# INSTRUMENT

BEAM LINE

# HB-3

## TRIPLE-AXIS SPECTROMETER



HB-3 is a high-flux thermal neutron three-axis spectrometer designed for inelastic measurements on single crystals over a wide range of energy and momentum transfers. The energy and momentum range for measurements is quite large at HB-3. Because of its location directly at the end of the beam tube and the availability of a beryllium



monochromator, the instrument is the ideal location for performing experiments at high-energy transfers (up to about 100 meV). The HB-3 monochromator provides three crystal choices (PG 002, Be 002, and Si 111) with variable vertical focus. This focus is calibrated to maintain a 2.54 cm beam height at the sample position, thus optimizing incident neutron flux as the incident energy varies. Of the three monochromators,

pyrolytic graphite provides the highest neutron intensity as a result of its very high neutron reflectivity. The high-quality beryllium monochromator allows measurements with good energy resolution at higher energy transfers, whereas the silicon 111 monochromator has the advantage of an absent second-order reflection, providing a higher order contamination-free beam.

### APPLICATIONS

The availability of three different monochromator crystals makes HB-3 an extremely versatile instrument for studies of excitations in materials with energies ranging from 2 to 100 meV. Typical applications include spin and lattice dynamics in high-temperature superconductors and related compounds; low-dimensional magnetic model systems; magnetic excitations and phonons in colossal magnetoresistive materials, multiferroics, and ruthenates; and spin waves in magnetically ordered materials. The high incident neutron flux makes HB-3 well suited to studying samples that have a small volume or weak scattering characteristics.

### SPECIFICATIONS

Beam spectrum	Thermal
Monochromators	Variable vertical focusing PG (002), Be (002), Si (111)
Analyzer	Fixed vertically focused PG (002), Si (111), Be (101)
Monochromator takeoff angle	$2\theta_M = 12$ to $88^\circ$
Sample angle	$\pm 180^\circ$
Scattering angle	$-90$ – $120^\circ$
Analyzer angle	$-40$ – $90^\circ$
Detector	Single $^3\text{He}$ gas counter
Resolution (elastic)	5-10% Ei (adjustable with collimators)
Collimations (FWHM)	Premonochromator: 30', 48'  Monochromator-sample: 20', 40', 60', 80'  Sample-analyzer: 20', 40', 60', 80'  Analyzer-detector: 30', 70', 90', 120', 210', 240'

Status: Available to users

### FOR MORE INFORMATION, CONTACT

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