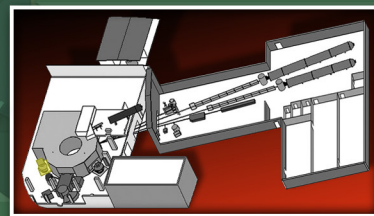


# INSTRUMENT

# HB-1A

BEAM LINE HIGH FLUX ISOTOPE REACTOR



## FIXED-INCIDENT-ENERGY TRIPLE-AXIS SPECTROMETER

The Fixed-Incident-Energy (14.6 meV) Triple-Axis Spectrometer uses a double pyrolytic graphite monochromator system. The first monochromator is vertically focused, and the second can be either a vertically or doubly focused unit. Two highly oriented pyrolytic graphic filters (HOPG), one after each monochromator, are used to reduce  $\lambda/2$  contamination. These filters, together with the double monochromator system,



provide HB-1A with an exceptionally clean beam in terms of higher-order contamination neutrons:  $I_{\lambda/2} \approx 10^{-4} \times I_{\lambda}$ . This spectrometer also has one of the most intense beams at this energy at HFIR, as well as a very low  $\gamma$  and fast neutron background. Typical energy resolution is  $\sim 1$  meV, but the energy resolution width can be reduced to  $\sim 0.5$  meV using the beryllium analyzer. Due to the high flux, low background, and very low higher-order contaminations of the beam, HB-1A is one of the few instruments that

can measure weak magnetic scattering of very small single crystals ( $m > 2$  mg) and thin film samples with various sample environments, including studies requiring ultra-low temperatures ( $> 40$  mK) and applied magnetic fields ( $< 8$  T).

### APPLICATIONS

- Elastic studies of single crystals and thin films, determination of crystallographic and magnetic structures, transitions, and phase diagrams under various conditions (T, H, P)
- Low-lying magnetic excitations up to  $\sim 9$  meV using neutron energy loss, and high temperature phonon measurements up to  $\sim 35$  meV using neutron energy gain

### SPECIFICATIONS

Beam spectrum	Thermal
Monochromator	PG(002) double crystal
Monochromator takeoff angle	$2\theta_M = 41.3^\circ$ $E_p = 14.6$ meV
Analyzers	PG(002), Be(002), Be(101), Si(111)
Sample angle	$\pm 180^\circ$
Scattering angle	$-5$ to $135^\circ$
Analyzer angles	$-60$ to $120^\circ$
Detector	Single $^3\text{He}$ gas counter
Collimations (FWHM)	Premonochromator: $40'$ Monochromator-sample: $20', 40'$ Sample-analyzer: $20', 30', 40', 60', 80'$ Analyzer-detector: $20', 40', 60', 80', 140', 240'$
Beam size	$40 \times 150$ mm max
Filters	Sapphire premonochromator 2 HOPG; after M1 and M2
Flux at sample	$\sim 2 \times 10^7$ n/cm <sup>2</sup> /s (est.)
Momentum range	$0.2$ to $4.9 \text{ \AA}^{-1}$ (elastic configuration)

Status: Available to users

### FOR MORE INFORMATION, CONTACT

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