

# INSTRUMENT

BEAM LINE

# HB-1A

HIGH FLUX ISOTOPE REACTOR



## FIXED-INCIDENT-ENERGY TRIPLE-AXIS SPECTROMETER

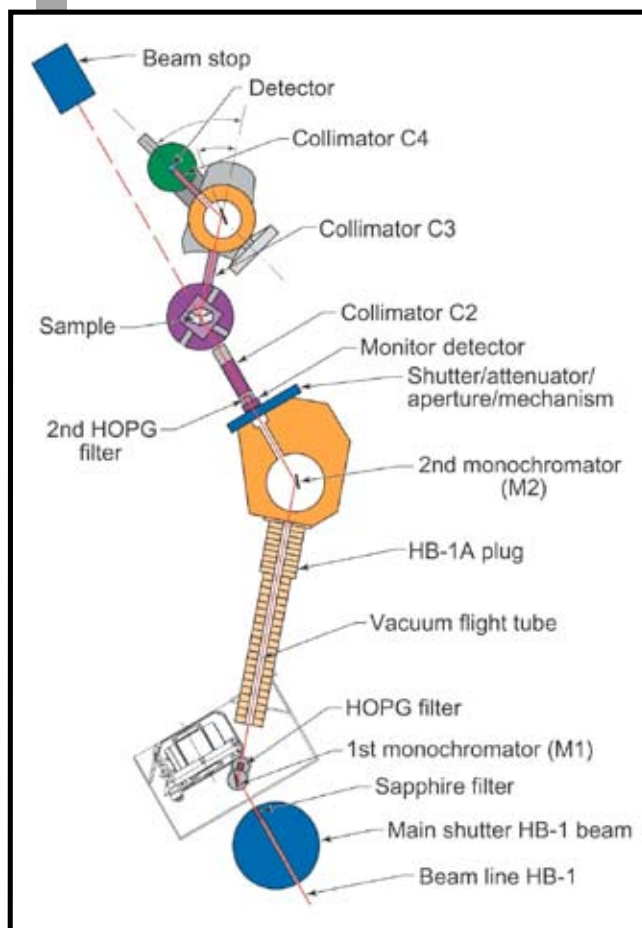
The Fixed-Incident-Energy (14.6 meV) Triple-Axis Spectrometer uses a double pyrolytic graphite monochromator system. The first monochromator is vertically focused, and the second can be either a vertically or doubly focused unit. Two highly oriented pyrolytic graphite filters (HOPG), one after each monochromator, 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 neutrons:  $I_{\lambda/2} \approx 10^{-4} \times I_{\lambda}$ . This spectrometer also has one of the most intense beams at this

energy at the HFIR, as well as a very low  $\gamma$  and fast neutron background. Typical energy resolution is  $\sim 1$  meV, but, using the beryllium analyzer, the energy resolution width can be reduced to  $\sim 0.5$  meV.

HB-1A development and operation is a collaborative effort of the Oak Ridge National Laboratory and Ames Laboratory neutron scattering groups.

### APPLICATIONS

- Excitation spectra to  $\sim 35$  meV using neutron energy gain and low-lying excitations, 1–9 meV, using neutron energy loss
- Elastic studies on crystallographic and magnetic structures and transitions in a Q range of 0.2 to  $4.9 \text{ \AA}^{-1}$
- Elastic studies and excitations in thin films and other small-volume samples where high flux and very low higher-order contamination of the beam are critical



Recent experiments on this instrument include measurement of phonon dispersion curves in martensitic, shape-memory, and magnetostrictive alloys; crystallographic and magnetic structure determinations in giant magnetocaloric, magnetoresistive, and intermetallic alloys; magnetic structures and spin-density waves in thin films; magnetism in low-dimensional systems; and spin waves and magnetic structures in magnetoelectric materials.

### SPECIFICATIONS

Beam spectrum	Thermal
Monochromator	PG(002) double crystal
Monochromator takeoff angle	$2\theta_M = 41.3^\circ$ E, $= 14.7$ meV
Analyzers	PG(002), Be(101), Be(002), Si(111), Ge(111)
Sample angle	$0^\circ$ to $360^\circ$
Scattering angle	$-5^\circ$ to $135^\circ$
Analyzer angles	$-60^\circ$ to $120^\circ$
Collimations (FWHM)	Premonochromator: 48' Monochromator-sample: 10', 20', 30', 40' Sample-analyzer: 10', 20', 30', 40' Analyzer-detector: 70', 140'
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)
Energy transfer	$\sim 35$ meV to $\sim 11$ meV at $q = 3 \text{ \AA}^{-1}$

Status: Operational



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FOR MORE INFORMATION, CONTACT

Instrument Scientist: Jerel Zarestky, zarestkyjl@ornl.gov, 865.574.4951

[http://neutrons.ornl.gov/hfir\\_instrument\\_systems/HB-1A.shtml](http://neutrons.ornl.gov/hfir_instrument_systems/HB-1A.shtml)