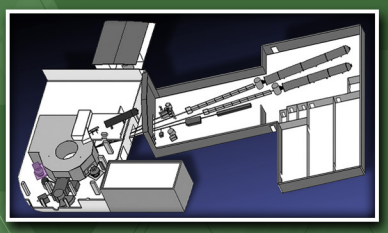
High Flux Isotope Reactor

Instrument

BEAM LINE

HB-1A



Fixed-Incident-Energy Triple-Axis Spectrometer

The Fixed-Incident-Energy (14.6 meV) Triple-Axis Spectrometer uses a double-pyrolitic graphite monochromator system. The first monochromator (M1) is flat and the second monochromator (M2) is vertically focused. Two highly-oriented pyrolytic graphic filters (HOPG), one after each monochromator, are used to reduce λ/2 contamination. These filters, together with the double monochromator system, provide HB-1A with an exceptionally clean beam nearly free of higher-order contamination neutrons: $I_{\lambda/2} \approx 10^{-4} \times I_{\lambda}$. This instrument has one of the most intense monochromatic neutron beams at the HFIR, as well as a very low background. Typical energy resolution is 1 meV (full-width half maximum at the elastic line), but this value can be reduced to 0.5 meV with the Be analyzer. Because of the combination of high flux, low background, and very low higher-order contamination of the beam, HB-1A is ideally suited for investigations of single crystals (mm-sized or larger), powders, and thin films with weak magnetic scattering signals. HB-1A is also an exceptional instrument for magnetic diffraction studies requiring extreme conditions (T, H, P, E).

Applications

- Parametric magnetic diffraction studies of single crystals, thin films, and powders under various conditions (T, H, P, E)

Specifications

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

Status: Available to users

For more information, contact

Instrument Scientist: Adam Aczel, aczelaa@ornl.gov, 865.978.0118
Instrument Scientist: Wei Tian, tianwn@ornl.gov, 865.574.6427

neutrons.ornl.gov/hb1a

OAK RIDGE National Laboratory

May 2018

18-G00146/gim