

# VERITAS

## Triple-Axis Spectrometer

High Flux Isotope Reactor

BEAMLINE

# HB-1A

The VERITAS triple-axis spectrometer uses a double-bounce pyrolytic graphite (PG) monochromator system to select neutrons at a fixed-incident-energy of 14.5 meV. The first monochromator (M1) is flat and the second monochromator (M2) is vertically focused. Two PG filters, one after each monochromator, are used to reduce  $\lambda/2$  contamination. These filters, together with the double-bounce monochromator system, provide VERITAS with an exceptionally clean beam nearly free of higher-order contamination neutrons. This instrument has one of the most intense monochromatic neutron beams at 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. Due to the combination of high flux, low background, and very low higher-order contamination of the beam, VERITAS is ideally suited for investigations of single crystals, powders, and thin films with weak scattering



signals. VERITAS is also an exceptional instrument for diffraction studies under extreme conditions requiring variable temperatures (T), magnetic fields (H), high pressures (P), and electric fields (E).

## APPLICATIONS

VERITAS is a useful instrument for condensed matter physics and materials science researchers. Typical applications include:

- Parametric neutron diffraction studies (T, H, P, E) of structural and magnetic phase transitions
- Phase diagram investigations under various extreme conditions
- Magnetic structure determination, especially for materials with small, ordered moments
- Exploration of quantum criticality and magnetic correlations
- Inelastic scattering studies of low-lying magnetic excitations

## SPECIFICATIONS

Beam spectrum	Thermal
Monochromator	PG(002) crystals
Monochromator takeoff angle	$2\theta_M = 41.3^\circ$ $E_i = 14.5 \text{ meV}$
Analyzers	PG(002), Be(002), Si(111)
Sample angle	$\pm 160^\circ$
Scattering angle	$-5$ to $130^\circ$
Analyzer angles	$-60$ to $120^\circ$
Detector	Single $^3\text{He}$ gas counter
Collimations	Premonochromator: $40'$ Monochromator-sample: $10', 20', 40'$ Sample-analyzer: $20', 40', 80'$ Analyzer-detector: $20', 80'$
Filters	Sapphire pre-monochromator 2 PG; after M1 and M2
Flux at sample	$\sim 4.2 \times 10^7 \text{ n/cm}^2\text{-s}$
Momentum range	$0.2$ to $4.8 \text{ \AA}^{-1}$ (elastic configuration)

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