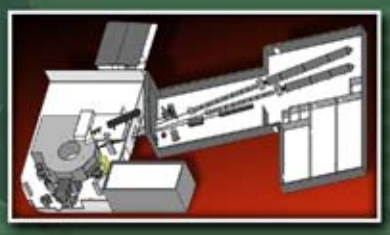
Instrument Fact Sheet

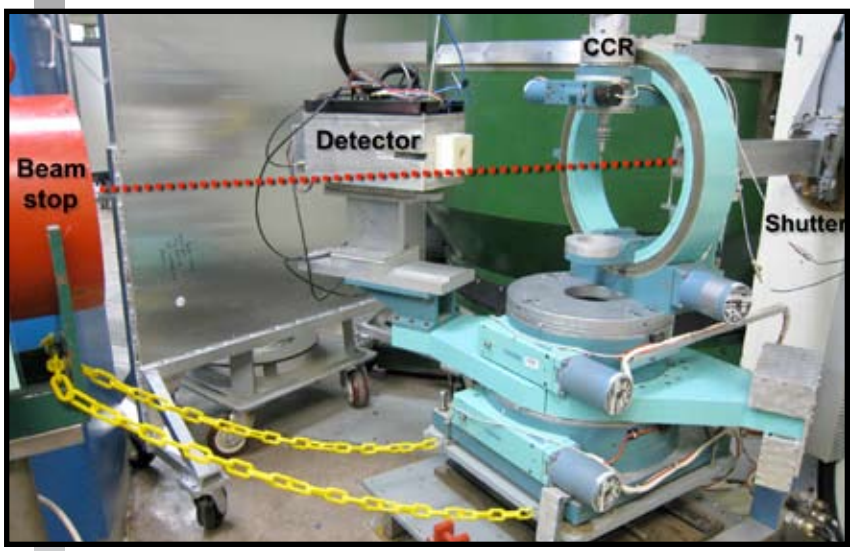
BEAM LINE **HB-3A**

HIGH FLUX ISOTOPE REACTOR



Four-Circle Diffractometer

The Four-Circle Diffractometer goniometer has a full χ circle with a 4-K closed-cycle helium refrigerator. The detector is ^{3}He with a 7-anode array in a honeycomb pattern. The upper 2Θ limit is 100°. A multilayer-[110]-wafer silicon monochromator with the reflection from planes of the <011> zone ensures sharp diffraction peaks in specified ranges of detector angles by control of the horizontal radius of curvature. Any plane from the <011> zone can be set in Bragg position, but only the (331), (220), and (111) reflections are of practical interest. For the fixed monochromator angle of 48°, these reflections provide principal incident wavelengths of 1.01, 1.56, and 2.55 Å, respectively. A PC-based system provides user-friendly diffractometer control and data acquisition. The beam size is 5 × 5 mm^2, and the minimum crystal size is 1 mm^3. The maximum crystal dimension is about 4 mm. The flux on the sample is estimated to be greater than 5 × 10^6 n/cm^2/s.



Specifications

Beam spectrum	Thermal
Monochro-mators	Vertically focusing silicon
Monochro-mator angle	48°
Incident wavelength	1.01 Å (331), 1.56 Å (220), 2.55 Å (111)
Goniometer	Huber, full chi circle, with 4 K CCR
Scattering angle	100° < 2θ < -90°
Detector	7 anode ^{3}He (honeycomb pattern)
Crystal size requirement	>1 mm^3
Unit-cell size	<15,000 Å^3
Flux at sample	>5 × 10^6 n cm^{-1} s^{-1} (est.)

Status: In commissioning

Applications

This instrument is suitable for a wide range of small-unit-cell crystallography studies, from structure refinement and solution to charge and nuclear density mapping. Problems from chemistry, physics, materials science, and mineralogy have been addressed. Specific areas of study include hydrogen bonding and weak interactions, organometallics, supramolecular chemistry and crystal engineering, metal hydrides, charge density, pharmaceuticals, and magnetic structures. More general solid-state physics problems in magnetism, diffuse scattering, and ordering phenomena can also be addressed.

For more information, contact

Instrument Scientist: Bryan Chakoumakos, chakoumakobc@ornl.gov, 865.574.5235

http://neutrons.ornl.gov/hfir_instrument_systems/HB-3A.shtml

HFIR

February 2009

06-G01639D/arm