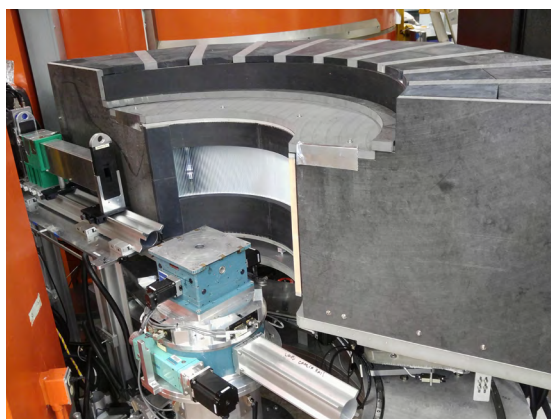


WAND²

Wide-Angle Neutron Diffractometer

The HFIR HB-2C WAND² instrument is designed to provide two specialized data-collection capabilities: (1) fast measurements of medium-resolution powder-diffraction patterns and (2) measurements of small signals and /or diffuse scattering in single crystals. In 2018, this instrument was upgraded to a curved, ³He two-dimensional position-sensitive detector (2D-PSD) with 120° of in-plane coverage, +/- 7.5° vertical coverage and a focal distance of 71 cm. This upgrade enables the rapid measurement of a large volume of reciprocal space for single-crystal samples, making WAND² ideal to identify magnetic propagation vectors and to study diffuse scattering and weak signals. WAND² is also a medium resolution powder diffractometer where the high flux and large continuous detector coverage allows for fast data sampling enabling parametric studies as well as studies of kinetics in phase transitions. Additionally, it can be used for time- resolved experiments for studying structural transformations with short time constants or in stroboscopic mode for reversible processes. The WAND² detector (BNL120) is a seamless ³He 2D-PSD with 8*480*512 pixels. This detector has 0.4 mm subwire resolution, which yields an angular resolution of 0.03125°, better than

the instrument intrinsic resolution of approx. 0.1°. The vertical focusing Ge monochromator provides high flux at the sample position. The full range of HFIR's sample environment can be used, including cryofurnaces (4–800 K), furnaces (to 1800 K), cryostats/CCRs (to 0.06 K), and cryomagnets (to 7 T). The high flux at the sample position also allows high pressure experiments with clamp cells up to 2.5 GPa and Paris-Edinburgh Presses up to 20 GPa at room T.



SPECIFICATIONS

Beam spectrum	Thermal
Monochromator	Vertically focused hot pressed Ge
Monochromator angle	$2\Theta_M = 51.5^\circ$
Wavelength	$\lambda = 1.5 \text{ \AA}$ (Ge 113) 0.95 \AA (Ge 115)
Scattering angles	$0^\circ < 2\Theta < 156^\circ$
Collimator	Radial oscillating collimator with 22.5 mm cut-off distance
Detector	Curved, ³ He 2D-PSD with $\sim 2e^6$ pixels; event mode capability
Resolution	0.4 mm spatial resolution (x and y)

21-G02331/jdh Dec 2021

APPLICATIONS

WAND² is ideal for parametric studies on powder samples, observing small signals (including due to small mass) in single crystal samples, and the study of time-resolved phenomena. It is a powerful instrument for the study of quantum materials and magnetism but has broad applications with recent research including the growth of ferroelectric ice-XI, hole and charge ordering in colossal magnetoresistance materials, and studies of magnetic structures and correlations in low-dimensional magnetic systems.

WAND² is operated in collaboration with the Japan Atomic Energy Research Institute under the US/Japan Cooperative Program on Neutron Scattering Research.

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