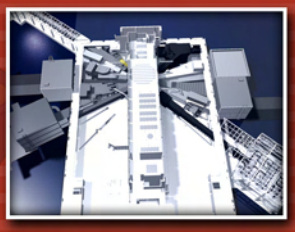
Instrument Fact Sheet

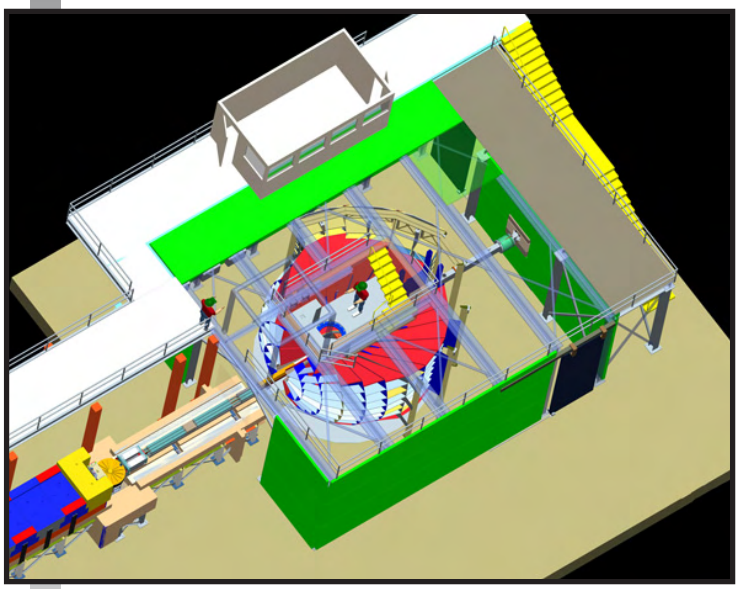
BEAM LINE 11A

Spallation Neutron Source



POWGEN – Powder Diffractometer

POWGEN is designed to study polycrystalline materials. This versatile diffractometer enables users to collect typical Rietveld statistics in ~20 minutes from a 0.6-cm^3 sample with <0.1% resolution at short d-spacings and <1% resolution for nearly all d-spacings of interest. Adjustment of the phase of the bandwidth choppers in this instrument also allows collection of diffraction data for d-spacings as large as 66 Å. Because of the third-generation conceptual design of POWGEN, users can choose the wavelengths for data collection and have complete freedom in selecting the subset of data to be included in analysis. These alternatives allow greater flexibility than most existing neutron diffractometers. In addition, this standard tool provides faster and higher precision than other diffractometers in the United States.



Secondary flight path for the Powder Diffractometer. The sample is 60 m from the moderator, necessitating a satellite building outside the Target Building for the secondary flight path.

Specifications

Moderator	Decoupled poisoned supercritical hydrogen
Source-to-sample distance	60 m
Sample-to-detector distance	1–6 m
Detector angular coverage	$6 < 2\theta < 170°$
Wavelength bandwidth	~1 Å
Frame 1	0.3 Å < d < 10 Å
Frame 6	3 Å < d < 66 Å
Resolution	$0.001 < \Delta d/d < 0.016$
Resolution at 90°	$\Delta d/d = 0.0015$

Status:
To be commissioned in 2008

Applications

Scientific studies at this instrument encompass a wide range of novel materials. These include, but are not limited to, structural studies of magnetic materials such as high-Tc superconductors, metal-insulator phase transitions, charge and orbital ordering transitions, and molecular magnets. Additional possibilities include nonmagnetic materials such as Zeolite and aluminophosphate frameworks; metals and semiconductors; dielectrics, ferroelectrics, and thermoelectrics; and ab initio structure solutions of polycrystalline materials such as pharmaceutical compounds. In addition, POWGEN is capable of acquiring refineable data sets in rapid data collection mode, making it an ideal instrument for parametric studies and time-resolved in situ studies of the electrochemistry of catalysts, ceramic membranes, hydrogen storage materials, and charging and discharging of battery materials.

For more information, contact

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http://neutrons.ornl.gov/instrument_systems/beamline_11a_powgen

SNS

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