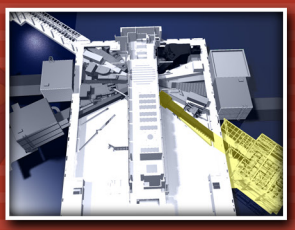
Instrument Fact Sheet

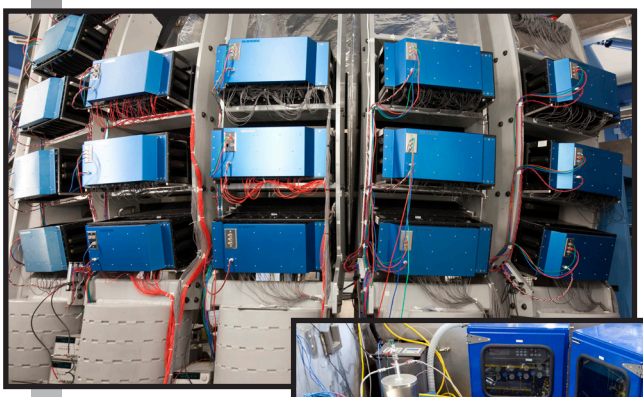
BEAM LINE 11A

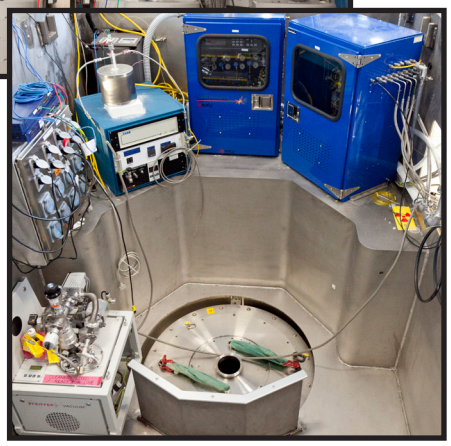
Spallation Neutron Source



POWGEN – Powder Diffractometer

POWGEN is a general-purpose powder diffractometer useful for a wide range of structural studies. It can cover d-spacings from ~0.3 Å, or less, to 3 Å in a single measurement. Rietveld measurements for traditional neutron-size samples can be completed in a few hours, with a <0.2% resolution at short d-spacings and <1% resolution for nearly all d-spacings of interest. Alternatively, much of this resolution can be traded for intensity, making it possible to take shorter measurements while still maintaining good resolution. It is also possible to collect data from much smaller samples with longer collection time. The adjustable bandwidth-limiting choppers allow for large variations in the incident wavelengths and pulse repetition rate. Insertable guide sections and the ability to trade resolution for intensity at the analysis stage allow users great latitude to optimize the data range, resolution, and statistical precision for each experiment.





Specifications

Moderator	Decoupled poisoned super critical H_2
Source-to-sample distance	60 m
Sample-to-detector distance	2.5–4.5 m
Detector angular coverage	20° < 2θ < 150°
Total detector coverage	6.9 m^2
Bandwidth	~1 Å
Frame 1	0.1–3.0 Å at 60 Hz 0.2–6 Å at 30 Hz
Frame 5	2.2–15 Å at 60 Hz
Resolution	0.001 < Δd/d < 0.016
Sample Environment	24 Sample changer: 12–300 K Orange cryostat: 2–300 K ILL furnace: 1200°C Gas atmosphere furnace (with RGA and pO_2 sensor): 850°C

Status: Available to users

Applications

Scientific studies at this instrument encompass a wide range of novel materials. These include, but are not limited to, structural studies of energy storage materials such as battery materials, ceramic membranes for solid oxide fuel cells and oxygen sensors, hydrogen storage materials and thermoelectric materials. The availability of long d-spacings also enables the study of magnetic materials such as high-Tc superconductors, metal-insulator phase transitions, charge and orbital ordering transitions, and molecular magnets. POWGEN capabilities can contribute to understanding materials such as zeolite and aluminophosphate frameworks; metals and semiconductors; dielectrics, ferroelectrics; and ab initio structure solutions of complex polycrystalline materials such as pharmaceutical compounds.

For more information, contact

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