

INSTRUMENT

BEAM LINE

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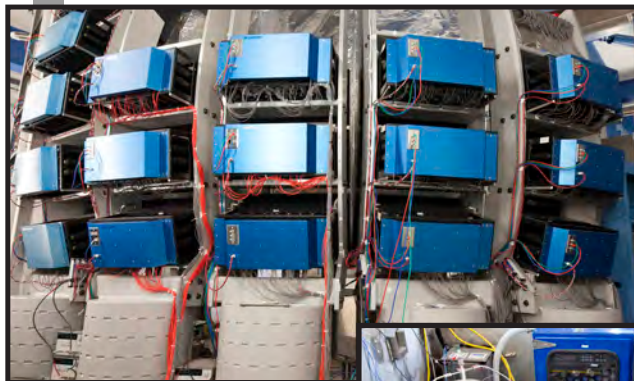
SPALLATION NEUTRON SOURCE

Fact Sheet



POWGEN - POWDER DIFFRACTOMETER

POWGEN is a flexible and versatile general purpose diffractometer useful for a wide range of structural studies. It can cover d-spacings from $\sim 0.3 \text{ \AA}$ or less to 3 \AA in a single measurement, and is capable of collecting typical Rietveld statistics in ~ 1 hour from a 1.0 cm^3 sample 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 make measurements in <15 minutes with still quite good resolution. The adjustable bandwidth-limiting choppers allow 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 particular experiment.



SPECIFICATIONS

Moderator	Decoupled poison super critical H_2
Source-to-sample distance	60 m
Sample-to-detector distance	2.5–4.5 m
Detector angular coverage	$30 < 2\theta < 150$
Total detector coverage	6.9 m^2
Bandwidth	$\sim 1 \text{ \AA}$
Frame 1	$0.0\text{--}2 \text{ \AA}$ (0.2–4 \AA at 30 Hz)
Frame 5	2.2–10.2 \AA
Resolution	$0.001 < \Delta d/d < 0.016$
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 magnetic materials such as high- T_c 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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