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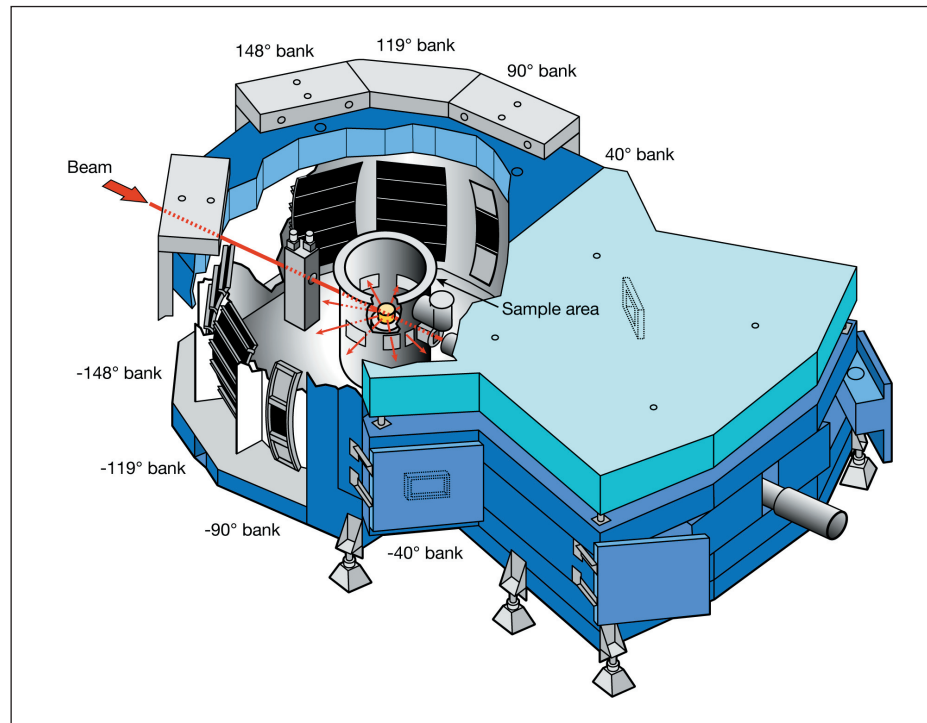
Neutron Powder Diffractometer (NPDF)

The Neutron Powder Diffractometer (NPDF) is a high-resolution total-scattering powder diffractometer located at Flight Path 1 and 32 meters from the spallation neutron target. It comprises 20 detector panels with a total of 160 position-sensitive detectors in the backscattering region of the instrument. The NPDF is designed for pair distribution function (PDF) studies of disordered and nanocrystalline materials, but it is equally well-suited for high-resolution crystallographic studies. The instrument is available to general users.

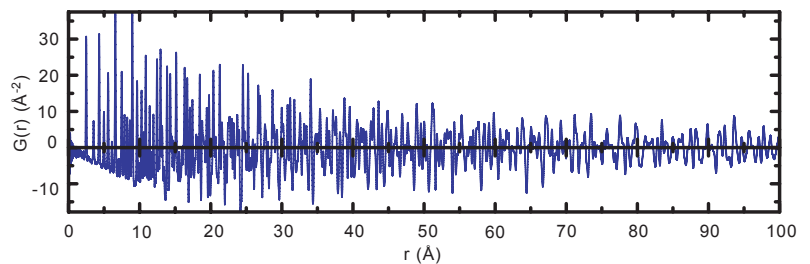
The shutter of NPDF opened for the first time in September 2002. During the rest of the 2002 run cycle, NPDF produced over 300 experimental data

sets. An example of a PDF of nickel extending out to a distance of $r = 100 \text{ \AA}$ is shown below. (A standard data set suitable for PDF analysis can be obtained in only two hours). These results put NPDF at the cutting-edge of local structure determination and also serve as a development platform for this new structure analysis tool for disordered and nanostructured materials.

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Specifications	
Moderator	chilled water (283 K)
Flight path	primary: 32 m, secondary: 1.5 m
Beam size	5-cm high x 1-cm wide
Detector Bank Information	
Bank	90 119 148
d-spacing	0.17–4.2 Å 0.14–3.4 Å 0.12–3.0 Å
Q	1.5–37.6 Å ⁻¹ 1.8–45.8 Å ⁻¹ 2.1–51.1 Å ⁻¹
Measured d/d	0.31% 0.28% 0.15%
Detector type	124 ³ He tubes 80 ³ He PSDs 80 ³ He PSDs
Pixels	124 4000 4000
Pixel size (w x h)	0.5" x 12" 0.5" x 1.0" 0.5" x 1.0"
Ancillary Equipment	
Displex	15–320 K (closed cycle refrigerator)
Furnace	ambient - 1200°C
Other	special furnaces, xyz translation table cryostat contact instrument scientist



PDF of nickel extending out to a distance of $r = 100 \text{ \AA}$.