

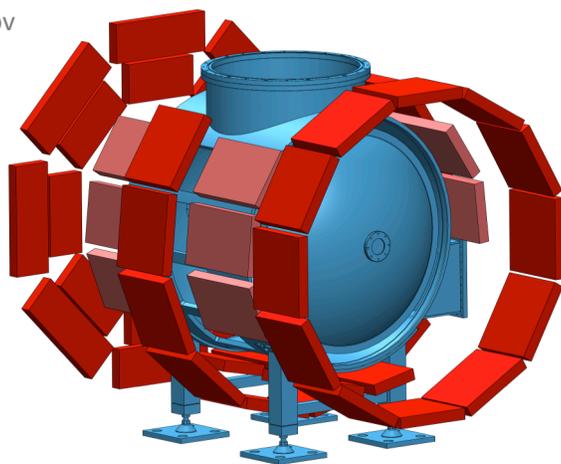
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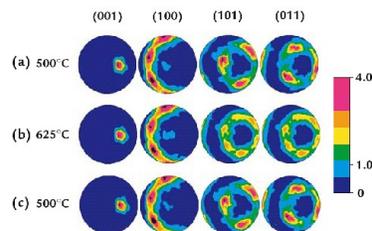
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HIPPO (High Pressure-Preferred Orientation) is a general purpose neutron time-of-flight powder diffractometer. The short distance of 8.8 m between the high-flux water moderator and the sample provides a neutron flux at the sample position of over  $10^7$  neutrons/cm<sup>2</sup>/s (at a proton current of 100  $\mu$ A). After a re-configuration in 2011, at present 1240 <sup>3</sup>He detector tubes are arranged on 53 detector panels on 5 rings with nominal diffraction angles between 40° to 144°. The combination of high flux and large detector coverage makes HIPPO very efficient for the acquisition of datasets for crystal structure refinements and allows for kinetic studies with temporal resolutions of the orders of minutes or better in some cases. The large number of detector panels probes many sample directions simultaneously, allowing to measure the orientation distribution (texture) of grains in a polycrystalline aggregate with only two or three sample rotations around the vertical axis.



A new six-axis robotic sample changer with a capacity of >100 samples for efficient collection of datasets for crystal structure and texture measurements at ambient conditions was commissioned in 2012. A large number of sample environments for HIPPO allows investigations of crystal structure, phase composition or texture at temperatures above (up to 2500 K) and below (7 K) room temperature, at high pressures (8 kbar in gas pressure cells, 8GPa in the TAP98 toroidal anvil press), under applied uni-axial load (up to 100 kN), or in a magnetic field (up to 2 T). Combinations of these, e.g. 5 kbar/10 K in gas pressure cells, 8 GPa/2000 K in TAP98, uni-axial deformation at up to 1200 K, controlled atmosphere at 1000 K, or magnetic fields at 100 K are also available to users. Many of these sample environments allow sample rotation for texture measurements to investigate e.g. phase transformation textures between 10 K and 2500 K or during uni-axial deformation at Temperatures up to 1200 K. User-specific sample environments can be provided by users or can be developed in collaborative efforts.

The short flight-path and the 20 Hz repetition rate of the spallation target provides exceptionally an large d-spacing range from 0.12 Å to 22 Å. Besides conventional Rietveld analysis, typically using the GSAS or MAUD packages, pair-distribution function (PDF) analysis or maximum entropy method (MEM) analysis were successfully applied to HIPPO data. Engineering diffraction analysis, e.g. single peak fitting for lattice-plane dependent strain evolution or texture analysis, are routinely available.



Texture of a quartzite rock before and after the trigonal $\leftrightarrow$ hexagonal phase transformation. This investigation utilized HIPPO's unique capability to measure texture at high temperatures. The results show that texture exhibits a memory effect.

Specifications	
Performance Moderator Resolution and range at 144° Resolution and range at 90° Resolution and range at 40°	Chilled water, high intensity/low resolution ~ 0.4% and 0.12 Å < d < 4.8 Å (1.31 Å <sup>-1</sup> < Q < 52.4 Å <sup>-1</sup> ) ~ 0.7% and 0.17 Å < d < 6.9 Å (0.91 Å <sup>-1</sup> < Q < 37.0 Å <sup>-1</sup> ) ~ 1.8% and 0.35 Å < d < 13.9 Å (0.45 Å <sup>-1</sup> < Q < 18.0 Å <sup>-1</sup> )
Primary Flight Path Moderator to sample Incident collimation (at sample)	8.8m 3 - 10 mm diameter (round beam)
Secondary Flight Path Sample to 144° panel and detector area Sample to 90° panel and detector area Sample to 40° panel and detector area	~ 1.0 m and 1.1 m <sup>2</sup> coverage ~ 0.7 m and 1.1 m <sup>2</sup> coverage ~ 1.0 m and 1.1 m <sup>2</sup> coverage
Sample Environments Load Temperature High Temperature Gas Pressure Cells Anvil Press Uniaxial Stress Sample size	7 K - Ambient Ambient - 2500 K Ambient - 8 kbar/10 K Ambient - 8 GPa/2000 K up to 100 k N 10.0 - 1000 mm <sup>3</sup>