

Powder diffraction at high pressure and temperature

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Neutron powder diffraction under extreme pressure and temperature conditions is a powerful technique for investigating crystal structures, material properties, equations of state, and phase relations relevant for Earth and materials science. At SAPHiR, the pressure is generated by a three-axis multianvil press with a combined press force of 2400 tons, while high temperatures are achieved through resistive heating of the sample assembly. Since diffracted neutrons can only exit the sample through the small gaps between the anvils and are detected at fixed scattering angles, diffraction measurements are performed using the energy-dispersive time-of-flight method.

In this practical, participants will perform a complete experiment, including sample preparation, compression, heating, and data collection. The acquired data will then be reduced to a one-dimensional powder diffraction pattern suitable for subsequent Rietveld refinement.

