

Status of the On-Site High Pressure Diffraction Option on Single Crystals at MLZ

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The neutron single crystal diffractometer HEiDi uses the hot source of FRM II to offer high flux down to short wavelengths. Its large q range and flexibility concerning experiments between 2.5 K and 1300 K make it a versatile tool for detailed studies on structures for many topics in physics, chemistry and mineralogy.

In two consecutive BMBF-funded projects from 2016 to 2022 (05K16PA3, 05K19PA2), the application suite of HEiDi (and its polarized twin POLI) was extended to enable high-pressure (HP) experiments, firstly with diamond anvil cells [1, 2] and recently by introducing clamp cells for larger sample volumes [3]. These cells can also be used on DNS and MIRA to perform comprehensive experiments on shared samples/PCs.

This overview presents the status of the various new HP cells and their possible applications as well as some related technical developments in neutron optics at HEiDi, for instance a new 2D PSD currently under construction. These extensions will increase the instruments performance not only for HP experiments and thus open up further applications as well.

[1] A. Eich et al.; Magnetocaloric Mn_5Si_3 and MnFe_4Si_3 at variable pressure and temperature; Mater. Res. Express 6, 096118 (2019).

[2] A. Grzechnik et al.; Combined X-ray and neutron single-crystal diffraction in diamond anvil cells; J. Appl. Cryst. 53(1), 1 - 6 (2020).

[3] A. Eich et al.; Clamp cells for high pressure neutron scattering at low temperatures and high magnetic fields at Heinz Maier-Leibnitz Zentrum (MLZ); High Press. Res., 41[1], 88–96.

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