Numerous scientific topics in physics, chemistry, mineralogy and material sciences profit from single crystal neutron diffraction studies. For this purpose, the HEiDi single crystal diffractometer at the hot source of the MLZ's neutron source FRM II offers high neutron flux, high resolution and a large Q range making it an excellent tool to obtain detailed structural information.

In addition to temperature-dependent studies, pressure-dependent studies are becoming increasingly important, for example to better understand the behavior of functional materials such as magnetocalorics [1, 2]. In order to establish these capabilities at MLZ, within a BMBF funded project on HEiDi, its neutron optics were optimized for max. flux at short wavelengths (e. g. $\lambda = 0.87$ Å) and large signal-to-noise ratio for studies on small samples $<< 1$ mm$^3$ as well as diamond anvil cells up to 1 GPa and down to low temperatures [3]. Recently, within a second BMBF project, we have complemented these efforts by developing optimized clamp cell designs [4] for other instruments (POLI, DNS and MIRA). These cells are better suited for larger sample volumes and single-crystal neutron studies under an applied magnetic field. First tests of these cells show promising results [5].

In this context, we are also developing a position-sensitive area detector (PSD) in cooperation with JCNS. This prototype uses $^6$Li glass for neutron-to-photon conversion and fifteen position-sensitive photomultipliers. This design offers high sensitivity at short wavelengths and a sensitive area of $23^\circ \times 13^\circ$ (width x height) with a reasonable resolution, allowing rapid detection of weak signals and (e.g. incommensurate or magnetic) superstructure reflections, as well as faster and more efficient sample characterization and data collection.

In our conference contribution we report on the current status and details of our project, for example on pressure cells and PSD, and hope to be able to offer users at the MLZ high-pressure diffraction experiments on a regular base in the near future.


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