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Sample environment and Applications of the Hot Neutron Single Crystal Diffractometer HEiDi@MLZ

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The single crystal diffractometer HEiDi is designed for detailed structural studies related to physics, chemistry and mineralogy by offering high flux, high resolution and large q range, low absorption and high sensitivity for light elements using hot neutrons from FRM II at the Heinz Maier-Leibnitz Zentrum (MLZ).

In order to fulfil the various needs of our users the instrument offers a broad suite of sample environments, for instance low temperatures down to 2.5 K for studies on quantum phenomena like complex magnetic behaviour in multiferroics or superconductivity in Cu- or Fe-based compounds, and high temperatures up to 1000°C for studies on ionic conductors using an in-house (MLZ) developed mirror furnace with tunable atmospheres [F. Magro Sastre; master thesis, 2017]. Recently, a BMBF funded project (BMBF 05K16PA) on small samples and high pressure cells has been launched to add high pressure studies up to 5 GPa to the available options on HEiDi (for details, please have a look on A. Grzechnik's presentation on this conference and e.g. A. Grzechnik et al; J. Appl. Cryst. 51, 2018).

Aside from this, some scientific examples like the oxygen diffusion pathway in $(\text{Nd/Pr})_2\text{NiO}_{4+\delta}$ [e.g. M. Ceretti et al; Inorg. Chem. 57, 2018] and studies on the hydrogen bonds with different degrees of disorder in different silicate and phosphate-based gems [e.g. D.G. Gatta et al; Phys. and Chem. of Min., 2018] will be presented in order to underline the versatile applications of HEiDi, e.g. in materials for energy research or earth sciences.

Primary author: MEVEN, Martin

Co-authors: GRZECHNIK, Andrzej (RWTH Aachen); SAZONOV, Andrew; DENG, Hao; ROTH, Georg (RWTH-Aachen)

Presenter: MEVEN, Martin

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