



Contribution ID: 125

Type: **Poster**

## **SAPHiR: Neutron science at high pressure and temperature conditions**

*Friday, 9 December 2022 15:30 (1h 30m)*

SAPHiR, the Six Anvil Press for High Pressure Radiography and Diffraction, belongs to a suite of new instruments at the FRM II neutron source in Garching. The instrument will provide high pressure and temperature environments for in situ neutron measurements of powder samples, fluids, and melts. The pressure is generated by a cubic multi-anvil press, currently capable of reaching 15 GPa, with sample volumes of 10-50 mm<sup>3</sup> and temperatures up to 2300 K. For neutron diffraction, SAPHiR employs the time-of-flight method, where scattered neutrons are measured with three position sensitive helium-3 detector banks and a wavelength-shifting-fibre scintillator detector system. Applications of SAPHiR include in situ crystallography and phase relations of light-element-bearing phases, equations of state, reaction kinetics, high-resolution radiography, and rheological studies. In addition to high-temperature conditions that are generated by an internal resistance furnace, samples can also be investigated below room temperature to ~80 K using a newly developed cryo-system. This system will be used for in situ studies of materials at low temperature, such as high-pressure ice phases, high-temperature super-conductors, and other materials science applications. The start of in situ neutron measurements and external user operation is currently projected for 2023; until that time, SAPHiR is being used offline for scientific studies.

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**Session Classification:** Poster Session

**Track Classification:** Structure Research