

High Pressure Workshop



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In situ mechanical uniaxial pressure devices for SINQ and S μ S facilities at PSI

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Uniaxial pressure is emerging as a powerful experimental tuning parameter for quantum materials that can be employed with various experimental techniques. In recent years, the sample environment capabilities of PSI's neutron facility SINQ have been enriched by the adoption of the 200 N *in situ* uniaxial pressure device [1]. Its mechanical transmission rod allows the user to accurately measure the applied force using a load cell and keep it constant through the temperature changes with the control feedback loop. In addition to the compressive stress, it allows for the application of tension to the samples, as well as the measurement of true zero force by mechanical decoupling of the force rod from the pressure cell. The device was already successfully tested in user program, both for diffraction and inelastic neutron scattering studies, which will be briefly presented in the talk.

To offer comparable uniaxial capabilities to the users of PSI's muon spin spectroscopy (μ SR) facility S μ S, we designed and built an *in situ* 2000 N press with a uniaxial pressure cell that will be ready for the first tests on the μ SR beamline in 2026. The press has all the advantages of mechanical force transmission, while the pressure cell is designed for simple sample mounting, allowing for different sizes and thicknesses of the samples, permanently mounted strain gauges, pluggable temperature sensor and the ACS coils, and a reusable sample holder that can be immobilized until the experiment to protect the samples. I will present the current status of the commissioning of the device, focusing on the force calibration and the integration of strain gauge readings into the control software.

[1] Simutis *et al.*, Rev. Sci. Instrum. **94**, 013906 (2023)

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