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## Time of flight measurements using a compact solid methane moderator

Long-wavelength neutrons for the investigation of nano-scale materials are an indispensable tool in neutron research. To slow down the free neutrons produced in a large-scale source to energies of a few meV and below, hydrogen-rich materials at cryogenic temperatures are applied.

At the High Brilliance Neutron Source (HBS) project, multiple cold moderators will be positioned inside the same Target-Moderator-Reflector unit (TMR), each providing its own instrument with cold or even very cold neutrons. All of these moderators can therefore be optimized in terms of material, operating temperature and geometry, depending on the requirements of the instrument.

To experimentally investigate the effect of lowering the operating temperature of a compact solid methane moderator to approximately 10 K, a cryogenic system was designed and manufactured at Forschungszentrum Jülich. Time of flight measurements were conducted for various temperatures of the solid methane, using a 45 MeV proton beam provided by the cyclotron JULIC at Forschungszentrum Jülich to produce free neutrons mainly by (p,n) reactions inside a tantalum target. The neutrons were subsequently moderated and guided to a detector cradle equipped with He-3 detectors.

The results will allow a more precise validation of scattering kernels used in Monte Carlo simulations and lead to a more efficient optimization of existing and future cold neutron sources.

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