



Shielding performance of the prototype target station for the High Brilliance neutron Source (HBS) project

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As a novel option for the next generation of neutron sources, the development of High-Current Accelerator-driven Neutron Sources (HiCANS) has received growing interest. High neutron yields can be achieved by irradiating metal targets with proton beams with energies in the MeV range and currents of several tens of milliamperes. In alignment with this concept, the High Brilliance Neutron Source (HBS) project has been developed at Forschungszentrum Jülich to provide a high neutron flux and brilliance for a variety of scattering, analytical, and imaging instruments.

With the aim of keeping the dose rate in the monitored areas of HBS well below the radiation protection limits, minimising background radiation from neutrons and gamma to ensure high-quality measurements and reducing material activation to minimise decommissioning waste the shielding of the HBS target station has been developed and optimised.

To achieve a most compact and modular biological shielding design, the HBS shielding prototype was realised with a multi-layer structure comprising several layers of lead and borated polyethylene supported by a suitable stepped structure. The performance of the shielding prototype was tested in 2023 on the JULIC neutron platform, which was established within the HBS project for the testing and operation of components of neutron sources based on pulse accelerators. The concept of biological shielding was verified, and its performance evaluated, demonstrating its effectiveness in meeting the desired level of radiation protection.

The analysis of the distribution of the neutron and gamma dose rate in the target station and in the experimental hall will be presented from the perspective of radiation protection. The dosimetry experiment on the JULIC platform will be given and the Monte Carlo simulation in comparison to the measurements and the subsequent analysis will be discussed.

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Sitzung Einordnung: Mounting Posters, Beer and light Dinner

Track Klassifizierung: Sources & Upgrades