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The Thermal Powder Diffractometer of the HiCANS source HBS

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Apart from fission and spallation, neutrons can also be generated by nuclear reactions induced by protons in the MeV range. This is now applied in High-Current Accelerator-driven Neutron Sources (HiCANS), which are able to reach performances like medium sized reactor or spallation sources. One of these projects is the High Brilliance neutron Source (HBS) at Forschungszentrum Jülich, which is planned to operate a complete instrument suite enabling large scale structure investigations, diffraction, spectroscopy, imaging and analytics. Six diffractometers are under discussion for different kinds of diffraction experiments. As the pulses of the HBS source are not very short and the instrument length is limited, high resolution can only be reached by pulse shaping. This is foreseen for the Thermal Powder Diffractometer, which shall be installed at the 24 Hz long pulse target station and, as DREAM at ESS, use wavelength frame multiplication to reach a sufficient band width. Like POWTEX at FRM-II, it will be equipped with a large detector covering nearly 3π solid angle thus enabling also single crystal measurements. It can also be operated in high-intensity option, where the whole pulse is used, to offer time-resolved measurements.

Here we present the results of Monte-Carlo simulations of this diffractometer using the program VITESS to compare its performance to existing powder diffractometers.

This work is part of the collaboration within ELENA and LENS on the development of HiCANS.

Author: LIEUTENANT, Klaus (FZJ)

Co-authors: MEINERZHAGEN, Yannick (RWTH Aachen); HOUBEN, Andreas (RWTH Aachen, Institut für Anorganische Chemie); SCHWEIKA, Werner (European Spallation Source, Forschungszentrum Jülich)

Presenter: LIEUTENANT, Klaus (FZJ)

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