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Beam dynamics studies for the target beamlines of the high brilliance neutron source

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Neutrons are an essential tool for studying the structure and dynamics of matter. The High Brilliance neutron Source (HBS) project aims to develop a scalable Compact Accelerator-driven Neutron Source that will enable neutron fluxes at the corresponding instruments comparable to existing fission-based or spallation neutron sources. The full-scale HBS facility is characterized by the simultaneous operation of a suite of neutron instruments subdivided into three target stations, each efficiently operated to deliver different neutron spectra. This is realized by different proton beam timing schemes distributed to the target stations. A corresponding beam line design has been worked out in detail. It will deliver proton beams of up to 100mA and 70MeV from the proton Linac via the target beamlines to the neutron production targets. To ensure the complex pulse structure of the proton beam, a multiplexer magnet system will be installed to generate and distribute the different proton pulse schemes to the target stations. The three individual target stations will be operated at different proton pulse frequencies, where the corresponding proton pulse length is coupled via a fixed duty cycle. Major development steps of this project are the development of a three-field septum magnet, which is an essential part of the multiplexer magnet system, the beam dynamics integration of the multiplexer magnet system into the beamline, and the ion-optical layout of the individual target beamlines.

Funding Agency

Footnotes

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