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Thermal moderator-reflector design of the 24Hz target station for the High Brilliance Neutron Source

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The High Brilliance Neutron Source (HBS) is expected to be the next-generation neutron facility, which uses low proton energy (70MeV) to achieve high neutron brilliance. As the moderator-reflector unit is correlated to the neutron moderation, reflection, and transportation, designing a suitable moderator-reflector unit is one of the important issues for achieving the "high brilliance" of the thermal neutron cloud. In this research, the optimization of the thermal moderator-reflector of the 24Hz target station will be conducted to optimize pulse shape and intensity. The Monte Carlo simulation is applied to the design. PHITS and Diffmod are used.

In this presentation, at first, the proof-of-principle simulation to reduce the absorption of hydrogenous moderator material is introduced. The time and energy characteristic of candidate material and structure are simulated and analyzed. Then, according to the neutron transportation simulation of different moderator-reflector unit, the specific design is presented. And we will show the result of thermal behavior and neutronic characteristics of this moderator-reflector unit.

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

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