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## Geant4 Simulation of the Energy Resolution Function for the CSNS Back-n Facility

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The Back-n facility at the China Spallation Neutron Source (CSNS) is a newly-built neutron time-of-flight facility providing white neutrons. It is characterized by the high neutron flux, wide energy range, and good energy resolution. As one of the essential parameters, the Energy resolution function (ERF) has a significant impact on nuclear data measurements and related neutron techniques, such as the neutron resonance analysis. The ERF represents the inherent broadening effects in the determination of neutron energy that are due to the spallation target assembly system. These effects can be studied using the Geant4 Monte-Carlo toolkit, benefiting from its flexible capabilities of particle tracking and information recording. In this simulation work, the model of the Target Moderator-Reflector (TMR) system was constructed. The TMR system primarily consists of 11 tungsten targets encapsulated in tantalum shells, reflector models, and different types of moderators, such as the decoupled water moderator (DWM), decoupled poisoned hydrogen moderator (DPHM), and coupled hydrogen moderator (CHM). The "equivalent moderate distance" ( $\lambda$ ), defined as the product of the moderation duration of the neutrons inside the target assembly and their velocity at the target emitting surface, was obtained. The RPI (Researchers at Rensselaer polytechnic Institute, RPI) function was fitted using the parameter  $\lambda$  to derive the ERF, and it demonstrates effective performance within the 1-100 eV range.

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