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Recent developments of MCViNE and its applications at SNS

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MCViNE (Monte-Carlo Virtual Neutron Experiment) is an open-source Monte Carlo (MC) neutron ray-tracing software developed using C++ and Python. Its object-oriented design allows for flexible, hierarchical representations of sophisticated instrument components such as detector systems, and samples with shapes and scattering kernels of various sorts. Recently this flexible design has enabled several applications of MCViNE simulations at the Spallation Neutron Source (SNS) at Oak Ridge National Lab. MCViNE was found useful in assisting design of neutron instruments at the second target station (STS) such as CHESSE, a direct-geometry spectrometer (DGS), and QIKR, a reflectometer. MCViNE was used in studying effects of instrument resolution function in powder and single crystal datasets measured by DGS instruments. MCViNE also helped design of novel sample environments, such as collimators (some were 3D printed) and high-pressure cells.

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