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Guide- and instrument simulations for the European Spallation Source

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Abstract

The European Spallation Source (ESS) will be the first long-pulsed spallation source to be built. Therefore, a large design work lies ahead by investigating concepts and optimizing parameters for instruments for a long-pulsed source. One early insight is that many of the instrument models investigated will be very long, in excess of 100 meters, in order to obtain sufficient resolution. This calls for investigations of neutron guide systems to optimize neutron transport over long distances. We here present the status of the ongoing extensive simulation efforts related to ESS guides and instruments. In particular, we show how simulations of simple instrument models have helped optimizing the source time structure. We show selected examples from particular instrument models, including spectrometers and diffractometers. Our simulation results comprise flux and beam profiles at the sample position as well as complete simulated experimental data. Finally, we argue from simulation results that transport of both cold and thermal neutrons is efficient over very long distances by use of parabolic or elliptical guides.