

Modeling of low energy neutron scattering in Liquid Hydrogen using NCrystal

The design of moderators for cold neutron sources utilizes simulation software which make use of thermal scattering data files. These data files are derived from the microscopic properties of the moderation materials and can be used with numerical methods (like Monte-Carlo simulations) to simulate the moderation process of the neutrons. However, due to limitations of the software, the introduction of additional physics models to describe new materials is not always straightforward. Thus, there have been efforts at the European Spallation Source ESS to develop a modern software, called NCrystal, with the flexibility to allow for implementations of new physics models. Currently, NCrystal is designed to only support solid crystalline materials.

An ongoing Master thesis at Lund University aims to expand the current functionality of NCrystal to include simple gases and liquids, in particular the physics needed to describe neutron scattering in Liquid Hydrogen, which is one of the main moderators at the European Spallation Source. This work presents an overview of the implementation of these models to the existing NCrystal architecture and some of the recent results are presented.

Author: GÜNTER, Tim (ESS ERIC, LU)

Co-authors: DI JULIO, Douglas (ESS ERIC); MARQUEZ DAMIAN, Jose Ignacio (ESS ERIC); CEDERKALL, Joakim (Lund University (SE)); MUHRER, Günter (ESS ERIC)

Presenter: GÜNTER, Tim (ESS ERIC, LU)

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