

Design of an Inelastic Neutron Spectrometer for the French ICONE project

Monday, 2 June 2025 18:15 (15 minutes)

ICONE (Innovative COmpact NEutrons facility) is a project of a French High-Intensity Compact Accelerator-driven Neutron Source (HiCANS) aimed at delivering an instrument suite for the French scientific community at the 2035 horizon. ICONÉ will produce neutrons by accelerating protons to an energy 25 MeV and impacting them on a Beryllium target. The resulting neutrons will then be moderated to a useful energy range of 2–100 meV, making them suitable for neutron scattering instruments.

One of the key challenges of HiCANS is the design and optimization of inelastic neutron scattering instruments. Indeed, the inherent need for beam filtering in direct and indirect geometries in order to analyze the energy transfer introduces a loss in neutron flux. To make full use of the produced neutrons on ICONÉ, a combination of simulation tools is employed to develop and optimize a virtual model of an inelastic instrument, which will then enable the calculation of instrument performance by the realization of virtual experiments using McStas, and the maximization of the signal/noise ratio using the OpenMC software packages.

The data generated will then be reduced using the SCIPP software package developed at ESS and analyzed, allowing direct comparison and benchmarking with previous experimental results obtained at LLB on the Orphée reactor. This conception will present the entire simulation chain and the first results obtained.

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Session Classification: Posters