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The ICONE project: towards a new neutron source in France for materials science and industry

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HiCANS, High Current Accelerator-based Neutron Sources, is a concept proposed several years ago which aims at revisiting how neutron sources suitable for neutron scattering could be built [1]. The concept of HiCANS relies on technical progress in accelerator technology, neutron moderator design and neutron instrumentation developments to be able to propose a source using a low energy accelerator, in the tens of MeV of energy, while still being able to provide competitive neutron instrumentation. There are currently in Europe three main projects of HiCANS proposals, HBS in Germany, ARGITU in Spain and ICONE in France. In 2024, the CEA and the CNRS have been mandated to write a Technical Design Report for a HiCANS source, namely ICONE, following a first Avant-Projet Sommaire published in 2023 [2].

We will present the different key aspects of HiCANS sources: accelerator, target-moderator assembly and neutron instrumentation. We will focus on the current status of the foreseen instruments on the ICONE project. Detailed Monte-Carlo simulations have been performed to be able to project as precisely as possible what performances can be expected on different instruments.

The long-term goal is to eventually build a user facility, ICONE, which would offer a suite of 10 neutron scattering instruments to the French community. We aim at achieving performances comparable to the instruments which were operated around the ORPHÉE reactor.

[1] LENS Report Low Energy Accelerator-driven Neutron Sources (Nov. 2020) [https://www.lens-initiative.org/wp-content/uploads/2021/02/LENS-Report-on-Low-Energy-Accelerator-driven-Neutron-Sources.pdf]

[2] ICONE, Une Nouvelle Source de Diffusion Neutronique Française. Avant-Projet Sommaire (2023) [https://2fdn.cnrs.fr/wp-content/uploads/2023/09/ICONE-digital.pdf]

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