

Post-doc / Neutronics.

Development of a moderator for the production of cold neutrons at the IPHI – Neutrons facility at the CEA Saclay.



CONTEXT

The landscape of French and European neutron scattering is changing. Several older research reactors have already shut down and further closures are scheduled for the current decade. To overcome these closures, the construction of a new type of neutron source using low-energy, high-current accelerators (HiCANS) is proposed by various institutes across Europe. Among the projects, we can mention SONATE in France [1], HBS in Germany [2] or ARGITU in Spain.

OBJECTIVES

We aim at developing a moderator for the production of “cold” neutrons. A cryogenic loop for hydrogen liquefaction was recently built at the Laboratoire Léon Brillouin (LLB). With the support of other CEA departments (DES/SERMA and DRF/DPhN), Monte-Carlo modelling of neutron transport in the moderator will be carried out to understand the parameters allowing optimization of the geometry of the moderator (coupling with the neutron production target, pre-moderator, reflector). The existing loop will then be optimized to be integrated into the IPHI – Neutrons source at Saclay [3]. The neutronics performances will be evaluated and compared with the models. The equipment will ultimately be used to perform neutron scattering experiments. Collaborations with the partners of the ELENA network are envisaged [4]. This platform will make it possible to test new materials and geometries for next-generation cold neutron moderators.

PROFILE & COMPETENCES

1. Knowledge in physics
2. Instrumentation
3. Monte-Carlo simulation (desirable, ex. GEANT4)
4. Cryogenics (desirable)

Keywords : neutronics, Monte-Carlo, instrumentation, cryogenics.

The offer refers to a fixed term contract of 24 months at the CEA Saclay.

The level of skill required is that of a beginner engineer – physicist.

The deadline for submitting applications is November 7th, 2022.

Contact : Frédéric OTT, Laboratoire Léon Brillouin, CEA Saclay, Frederic.Ott@cea.fr

[1] [SONATE, an accelerator-driven neutron source](#)

[2] [HBS, High Brilliance Neutron Source](#)

[3] [IPHI – Neutrons project](#)

[4] [ELENA, European Low Energy accelerator-based Neutron facilities Association](#)