

Conceptual insight into the moderators of ARGITU: A preliminary neutronics study

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Abstract

This work reports on preliminary calculations of potential low-dimensional moderators for the high-current accelerator-driven neutron source (HiCANS) ARGITU [1]. Simulations start with the selection of materials, depending on the neutron energy range to be used for each instrument. Results evaluate the performance of water for thermal moderators to deliver neutrons for thermal instruments, whereas para-H₂ and solid methane have been analyzed to deliver cold neutrons. Additionally, alternative concepts like using hybrid moderators (water/liquid methane) or reduced-size cold moderators (reduced-size para-H₂) have been scrutinized for their use in bispectral instruments that require a wide range of intermediate neutron energies. The dimensions of the moderators have been refined to improve the neutron yield for the neutron wavelength range selected in each case. After that, a space-efficient layout has been proposed to implement four moderators next to the Be target, linked to a preliminary suite of instruments that these moderators would serve. Although the eventual selection shall consider both the final instrument suite (that shall be agreed with the local scientific community), and the phase space volume required for such neutron instruments (that defines their neutron optics features), the results presented here represent a qualitative step towards the conceptual development of the ARGITU neutron source.

References

- [1] ARGITU, Compact Accelerator-Driven Neutron Source: A Unique Infrastructure Fostering our R&D Ecosystem. CFM / BC-Materials / Ineustar / ESS Bilbao.

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