



## Validation of a Polyethylene Thermal Moderator for accelerator-driven neutron source

*Dienstag, 17. September 2024 22:40 (20 Minuten)*

Thermal moderators are a crucial component in the chain of neutron flux generation in neutron sources. Typically, the primary neutrons emitted from the nuclear reactions have energies in the MeV range. To be made useful for scattering or analytics experiments, their energies must decrease to reach values well below 1 eV. The primary function of the thermal moderator is to facilitate this process while maintaining a compact neutron field. This ensures the extraction of high-intensity beams from the moderator region. Inserting a cryogenic moderator into compact neutron field of the thermal moderator allows a very efficient feeding of the cryogenic moderator and a further reduction of the neutron energy into the meV range. It is therefore crucial to understand the effects a thermal moderator has on the performance of an accelerator-driven neutron source.

A modifiable target station was thus setup at JULIC, the pre-accelerator of the COSY facility in Jülich. It provides a pulsed 45 MeV proton beam with adjustable pulse lengths and frequencies and allows extensive studies of moderator setups. This study aims to test the moderator and reflector design and materials to assess their suitability and feasibility. A polyethylene moderator and a lead reflector filled with neutrons emitted from a tantalum target have been chosen. By performing comprehensive simulations and experimental validations, we aim to verify that the thermal moderator meets the requirements for forthcoming scientific investigations and experiments.

At the DN2024, we will present the performed experiments as well as the validations with Monte Carlo simulations.

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**Sitzung Einordnung:** Mounting Posters, Beer and light Dinner

**Track Klassifizierung:** Instrumentation & Data Management