

## FETS-METS: A Small-Scale Test Stand for Advancing Neutron Moderator Systems

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The moderator is a crucial component of neutron sources, slowing neutrons from a target to energies suitable for materials science. At large user facilities like ISIS, once moderators are installed, it becomes very difficult to make changes or track issues, as testing on the full-scale facility is highly limited. Therefore, testing moderators and moderator systems prior to installation at the main facility offers significant advantages. A local testing platform would facilitate the continuous development of these complex systems, including cryogenics, diagnostics, and skills development, helping to minimise risks, improve overall efficiency and foster innovation.

This project explores the potential of using an existing small-scale proton accelerator facility, the Front-End Test Stand (FETS) [1], located on the Harwell Campus. A neutron source will be added to the end of FETS to create a Moderator Engineering Test Stand (METS). The METS would include a shielded area with a target, simplified reflector, and moderator space, as well as a diagnostic neutron beamline primarily set up for moderator imaging and resolution calibration.

Currently in the concept phase, the project is investigating both the scientific performance and engineering feasibility of the facility, as well as outline costs and timescales. This paper will focus mainly on the engineering aspects that have been developed so far, including target, moderator and reflector (TRaM) concepts, safety considerations such as shielding requirements, spatial restrictions, and key equipment such as vacuum, cryogenics, services and plant, controls etc. These initial engineering insights will provide a foundation for further development, enabling a better understanding of the project's feasibility, associated costs, and the key specifications for this new facility.

[1] Letchford, A. et al. (2015) STATUS OF THE RAL FRONT END TEST STAND. In 6th Int. Particle Accelerator Conf. (IPAC'15), Richmond, VA, USA, May 3-8, 2015. <https://doi.org/10.18429/jacow-ipac2015-thpf105>

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