Contribution ID: **65**   Type: **Oral presentation**

Advances in Ultra-Cold Neutron Science at TRIGA Mainz: Detector development, spin control, simulations, and the τSPECT Experiment

Tuesday 9 September 2025 15:30 (20 minutes)

This presentation details recent developments from the Ultra-Cold Neutron (UCN) Physics group at the TRIGA research reactor in Mainz, Germany. We report on the operational performance of the UCN sources, the advancement of various detector systems, and on the implementation and improvement of a dedicated UCN simulation framework supporting the τSPECT neutron lifetime experiment. The novel detectors include a segmented detector enabling spatially-resolved UCN detection, a specialized trigger detector synchronized with the reactor pulse to tag incident UCNs, and a beamline monitoring detector providing relative UCN counts per pulse for normalization. Complementing these, we present developments in neutron spin manipulation, including UCN spin-flipper systems, and precision magnetic field control via custom NMR probes for monitoring field amplitudes and gradients. Finally, we report the successful commissioning of the τSPECT experiment at TRIGA Mainz and its subsequent relocation to PSI in 2023.

Author: VANNESTE, Sylvain (Johannes Gutenberg University Mainz)

Co-authors: AULER, Julian (Johannes Gutenberg University Mainz); ENGLER, Martin; ERMUTH, Viktoria; Prof. FERTL, Martin (Johannes Gutenberg University Mainz); FRANZ, Konrad; LAUSS, Bernhard (PSI - Paul Scherrer Institut); PFEIFER, Niklas (Johannes Gutenberg University Mainz); RIES, Dieter Achim (PSI - Paul Scherrer Institut); YAZDANDOOST KHOSRAVI, Noah Gabriel (PSI - Paul Scherrer Institut)

Presenter: VANNESTE, Sylvain (Johannes Gutenberg University Mainz)

Session Classification: Session