The Unit of Nuclear Engineering is hosting a special seminar lecture

Characterization of Plutonium with Experimental and Simulated Gamma and Neutron Methods

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Wednesday, Dec. 24th, 2025, 13:00-14:00, Building 56, Floor -1, Room -103.

Nondestructive characterization is performed at LANL with gamma, neutron, and calorimetry methods. Within the Plutonium Facility at LANL, samples of impure plutonium metal, salts and crucibles from pyrochemical processes are quantified for Nuclear Material Control and Accountability (NMCA). Results from a Thermal Neutron Counter (TNC) instrument collocated in-line with plutonium gloveboxes are compared with qualified non-destructive analysis (NDA) techniques. Different sample types require different approaches to provide good statistics. Impure metal samples and some salts with (α,n) reactions are measured via neutron multiplicity, while coincidence methods are used for other salts and crucible products. All items fell within NMCA accuracy and precision requirements, proving feasibility of in-line TNC measurements. The Solution Assay Instrument (SAI) is an in-line quantification system for measurements of high concentration solutions in gloveboxes. Elevated environmental background levels significantly hinder the ability to detect low concentration solutions. The effectiveness of adding Compton suppression to reduce detection limits was determined with MCNP (Monte Carlo N-Particle). Modification of the source and glovebox geometry were performed to optimize the detection limit. The reduction of the continuum with Compton suppression for the optimized setup was 34.6% at 129 keV. With geometry modifications adding Compton suppression and increasing count rate, a resulting 14.14% reduced detection limit was produced.

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Everybody is welcome!

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