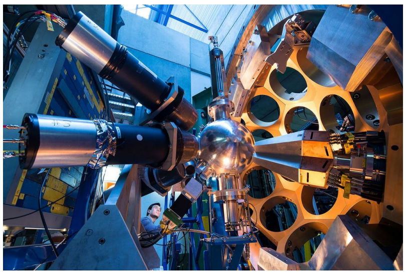

ID de Contribution: **76** Type: **Non spécifié**

LNL AGATA Exp 24.01: Development of a self-calibration technique for gamma-ray tracking arrays

lundi 15 septembre 2025 15:10 (20 minutes)

The performance of γ-ray tracking with AGATA critically depends on the accuracy of Pulse-Shape Analysis (PSA), which in turn is governed by the fidelity of the signal basis describing detector response. The currently employed AGATA Data Library (ADL) basis is derived from simulations, and its limitations are widely recognized as a key factor constraining the achievable position resolution. To address this, we have developed a novel self-calibration technique that generates an experimental signal basis directly from high-statistics source calibration data acquired in situ with AGATA. The method employs an iterative minimization procedure, guided by the Compton scattering formula, to progressively refine position assignments within detector segments until convergence to their true interaction points. Tests with simulated data demonstrate that this approach provides a more faithful description of experimental pulse shapes compared to the ADL basis, offering clear potential to enhance AGATA's position resolution.
To complete the development and validation of this technique, we carried out a dedicated, long source calibration with 88Y and an in-beam experiment at LNL in 2024 (LNL AGATA Exp 24.01), where Coulomb excitation of 28Si on a thin Au target was studied with the AGATA + PRISMA setup. The quality of the Doppler correction, which is directly sensitive to PSA accuracy, serves as a stringent benchmark for comparing the self-calibrated basis with the standard ADL. This presentation will discuss the methodology and report on the preliminary results of the self-calibration analysis of this experimental data.

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Classification de Session: ACC 1