THE NEUTRON PULSE

2ND QUARTER 2025 EDITION

LA-UR-25-28534

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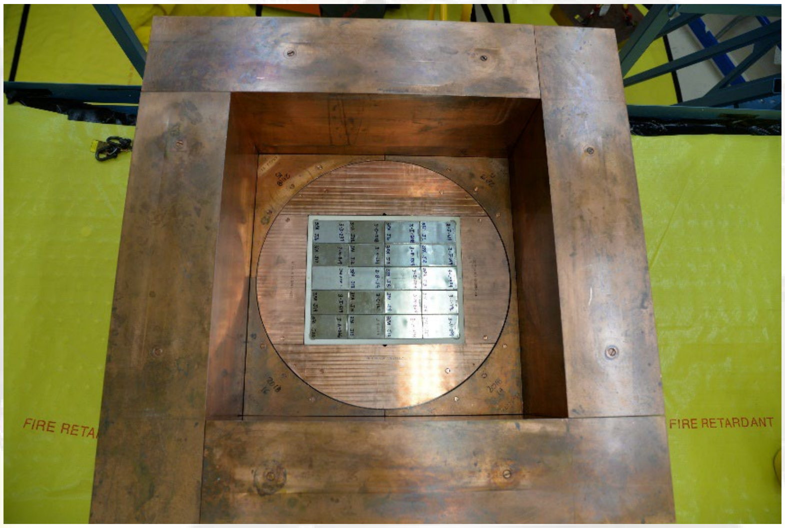
Operations Summary

NCERC conducted five weeks of critical assembly operations in support of the PARallel Approach of Differential and InteGral Measurements (PARADIGM) critical experiment on Comet. Additionally, NCERC hosted the University Measurement campaign and completed testing of Control Room I.

PARADIGM on Comet

The PARADIGM critical experiment is a part of a three-year Laboratory Directed Research and Development (LDRD) project combining integral measurements, differential measurements, nuclear data (ND) theory, and ND evaluation using machine learning. The goal of PARADIGM is to reduce uncertainties in plutonium ND in the intermediate energy range by 50% for program users. Los Alamos Neutron Science Center (LANSCE) will be performing differential experiments during their next beam cycle to fill copper ND gaps, contributing to the overall Pu ND uncertainty reduction.



▲ *PARADIGM, Pu ZPPR plates within the Zeus copper reflectors.*

The integral experiment, performed using the Comet critical assembly, focused on intermediate energy data, subdivided into two energy ranges: 1-30 keV and 30-600 keV. Two critical configurations were comprised of outer Zeus copper reflectors and new copper inner reflectors surrounding double layered Pu Zero Power Physics Reactor (ZPPR) plates in alumina trays. Configurations were optimized using alumina and graphite interstitial layers for the low energy configuration and alumina interstitial layers for the higher energy configuration. Benchmark measurements were taken on the critical configurations using the coordinate measuring machine (CMM). Additional measurements included Rossi-α, leakage spectra via Bonner spheres, and reaction rate ratios.

▼ *Arnie Harper and Nicholas Rench installing the Zeus Copper reflector on Comet for the PARADIGM experiment.*

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CONTROL ROOM I UPGRADE

Testing for Control Room I was successfully completed this quarter! The installation of a new control console and components that began in October. Performance of the software test plan and post modification testing verified all software associated with the critical assemblies. All surveillances and in-service inspections were then performed to return Planet and Flat-Top to operable status. The upgrade to Control Room I followed the Control Room II upgrade completed in 2024.

▲ *New Control Room I console.*

▲ *Nicholas Whitman (LANL, left) holding a radiation test object comprised of Compact Nuclear Power Source (CNPS) TRISO fuel pellets with Sandra Bogetic (UTK, middle), and Emma Houston (UTK, right).*

ADDITIONAL ACTIVITIES

New camera mounts and cameras were installed on existing facility Unistrut in both NCERC round rooms to allow for a clear remote viewing of critical assembly operations.

NCERC personnel performed targeted training for five members of the LANL V-5 group. They are qualifying as NCERC Fissionable Material Handlers to handle material for upcoming subcritical assembly operations.

UNIVERSITY MEASUREMENTS

Students from the Defense Nuclear Nonproliferation (DNN)-sponsored University Consortia visited NCERC to perform measurements on special nuclear material. The universities included this year were Georgia Tech, University of Tennessee – Knoxville, University of California – Berkeley, Virginia Tech, and the Ohio State University. This year marked the 10th anniversary of the annual campaign.

▲ *New camera mounted on Unistrut and view.*

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