

#NEUTRON PULSE



4TH QUARTER 2024 EDITION

LA-UR-25-21830

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OPERATIONS SUMMARY

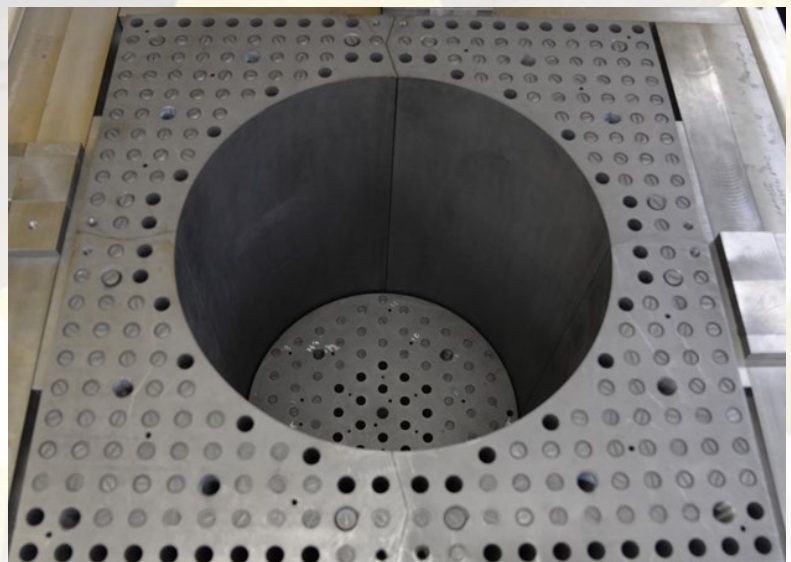
NCERC conducted six weeks of critical experiment operations this quarter including the Deimos Benchmark experiment on Comet and Helion detector testing using Godiva-IV. Two criticality safety classes were hosted, one sponsored by NCSP and one for PF-4 personnel. Additionally, Control Room 1 upgrades were initiated with the complete removal of the existing consoles.

DEIMOS ON COMET

Deimos was constructed from large graphite monoliths surrounded by a beryllium reflector encased in an aluminum shroud. The fuel for Deimos was HALEU TRISO fuel encapsulated using hollow graphite tubes called “cups.” Building upon the success of the Deimos heated tests completed in the previous months, five new configurations were created for the purpose of creating room temperature configurations in support of HALEU validation. The five configurations for the benchmark were created to target different aspects of reactors including void coefficients and fuel pitch. The first configuration created a baseline with the inner core fully loaded and fuel cups loaded sequentially on the outer core. The second configuration was to examine the worth of creating voids on the inner edge of the outer core. The third configuration was to examine an even larger void coefficient by creating a large empty area in the center of the experiment. The fourth configuration combined the large central void with the inner edge voids of the outer core. Lastly, the fifth configuration created a hexagonal array throughout the experiment, which effectively changed the pitch of the fuel in the experiment. These configurations are currently being evaluated for inclusion in the International Criticality Safety Benchmark Experiments Project (ICSBEP) Handbook.



▲ Deimos with detectors for Rossi- α measurements



▲ Configuration 4 – Inner and Outer Voids

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GODIVA IV DETECTOR TESTING AND CALIBRATION

NCERC experimenters performed multiple Godiva-IV pulses at varying yields to support diagnostic equipment calibration and testing. This work supported Helion's objective to develop a pulsed fusion machines by providing a large yield of neutrons. This effort was part of the Strategic Partnership Program at LANL.

CRITICALITY SAFETY CLASSES

NCERC hosted two Criticality Safety Classes, one sponsored by the NCSP and one by the MR&R program at LANL. These classes provided a hands-on experience showing the effects of changing parameters important to nuclear criticality safety. Participants used the approach-to-critical methodology to guide the construction of a critical configuration and remotely operated Comet. The classes also observed a Godiva-IV burst.

ADDITIONAL ACTIVITIES

NCERC began Control Room 1 upgrades by disconnecting and relocating the previous control consoles. An elevated cable management system was installed to allow for new console cables to be routed discreetly and increase overhead space for the new monitor wall system. Select junction boxes and power distribution units were relocated and wired to the back wall. Lastly, NCERC disassembled the new CR1 consoles and equipment that had been tested at the Blue Box building in Mercury and shipped them to the DAF in preparation for installation.



▲ Detectors set up next to Godiva-IV.



▲ Student participating in the approach-to-critical hand stacking demonstration.



▲ CR1 elevated cable management system.