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**Title:** NCERC Provides Unique Opportunities for University Student Researchers

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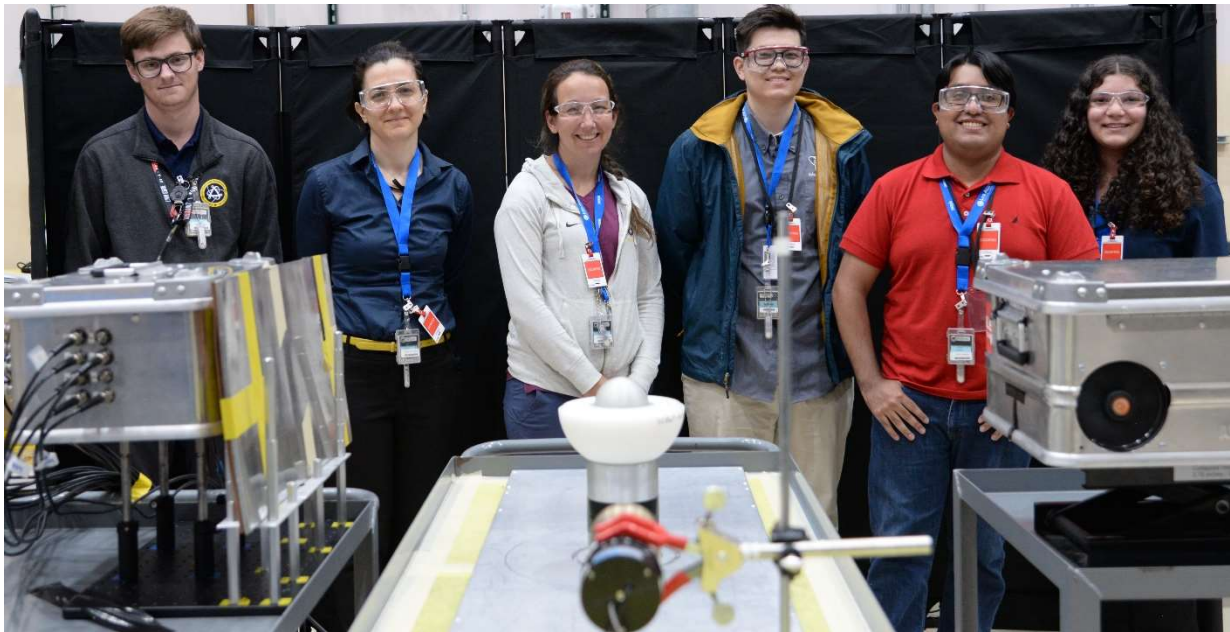


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# NCERC Provides Unique Opportunities for University Student Researchers

## University Consortia Measurements:

Five students and one faculty member - sponsored by the Defense Nuclear Nonproliferation (DNN, NA-22) university consortia - visited the National Criticality Experiments Research Center (NCERC) in July of 2023 to measure radiation signatures from Category I Special Nuclear Material (SNM) in a week-long measurement campaign organized by staff at Los Alamos National Laboratory. Participants included University of Florida, University of Michigan, and University of Illinois-Champaign Urbana. The measurement campaign was organized on behalf of the Consortium for Monitoring, Testing, and Verification (MTV), the Nuclear Science and Security Consortium (NSSC), and the Consortium for Enabling Technologies and Innovation (ETI).



*University consortia participants next to their experimental measurement setups and a replica of the BeRP ball (4.5 kg alpha-phase plutonium) surrounded by polyethylene.*

The National Criticality Experiments Research Center (NCERC) is sited at the Device Assembly Facility (DAF) on the Nevada National Security Site (NNSS) in Nevada and offers a world-class facility and staffing for making measurements on a myriad of available SNM forms available nowhere else with a multitude of varying reflectors and moderators, such as aluminum and polyethylene.

The university participants were able to measure kilogram quantities of HEU, plutonium, and neptunium with varying radiation detection equipment: correlated neutron instruments, gamma spectroscopy, and gamma scatter imaging. The participants were also able to make measurements to test discrimination between physically separated similar and dissimilar SNM forms.



*University consortia experiments measuring physically separated differing quantities of Zero Power Physics Reactor (ZPPR) fuel plates containing weapons-grade plutonium metal.*

This year was the 8<sup>th</sup> measurement campaign for the DNN university consortia at NCERC. One cornerstone of the DNN consortia is to provide students with unique opportunities within the NNSA related to nonproliferation. The NCERC campaigns provide a unique and memorable experience to make measurements and gain training on SNM detection and analysis for these students. During the eight years of NCERC campaigns, there have been more than 10 universities, 50 students, and 150 Radiation Test Object (RTO) configurations.



*Left: University consortia student handling the Neptunium sphere. Right: BeRP ball demonstration showing the effect of hand reflection.*

### **The NSSC Keepin Nonproliferation Science Summer Program Demonstrations:**

The Dr. G. Robert Keepin Nonproliferation Science Summer Program, sponsored by DNN, offers an opportunity to learn about how game-changing science, engineering, and technology are applied to reduce the dynamic threats of nuclear proliferation. The Keepin program is performed each summer at Los Alamos National Laboratory through the Nuclear Science and Security Consortium (NSSC), led by the University of California, Berkeley. This program is a summer-long program that includes guest lectures,

tours, workshops, and training sessions. One workshop included in the Keepin program is a workshop performed at NNSS. This workshop includes a hands-on demonstration with the BeRP ball (a 4.5 kg sphere of plutonium) and the neptunium sphere (a 6 kg sphere of neptunium) in addition to a criticality demonstration on Flattop at NCERC. In addition, the workshop includes a stop at Sedan crater. This was the third year that the Keepin workshop was performed at NCERC. It involved over 25 students for a one-day workshop.



*Keepin workshop visitors at the Sedan crater at NNSS.*