

Fall 2023 Colloquium

Physics & Astronomy, Texas A&M University-Commerce

Nov 30, Thursday, 4-5 PM in Science Building 127

(coffee and cookies will be served at 3:50 PM)

Nuclear Physics

Tomorrow's experimental capabilities, today: The Neutron Target Demonstrator at LANSCE

Dr. Andrew Cooper

Los Alamos National Lab



Andrew L. Cooper received his M.S. (2015) and Ph.D. (2019) from the University of North Carolina at Chapel Hill, with research emphases in low-energy, high-current proton accelerator development and experimental nuclear astrophysics, respectively. After completing his graduate work, he joined the P-27 group in the Physics Division at Los Alamos National Laboratory as a postdoctoral researcher. In 2021 he was converted to a staff scientist within the P-3 group, and he is currently a member of the Low-Energy Nuclear Physics team at the Los Alamos Neutron Science Center. His research focus is developing the next-generation of diagnostic detectors, high-power proton beam sources, and high-intensity spallation neutron targets for subcritical experiments and precision measurements on short-lived nuclei.

Abstract

The capability to directly measure neutron capture reactions on short-lived radionuclides would grant access to all s-process and some i-process reactions in the laboratory, along with many reactions of interest to nuclear energy applications. However, precision measurements in forward kinematics are currently prohibited because the radiation fields originating from stationary targets overwhelm the detection system, the target sample sizes are too small, or the target lifetimes are too short. These experimental challenges can be overcome by circulating the radioactive sample within an ion beam storage ring and through a thermal neutron field to induce capture reactions in inverse kinematics. We are pursuing such a neutron target facility consisting of a high-intensity, heavily moderated spallation neutron target coupled with a radioactive ion beam storage ring at the Los Alamos Neutron Science Center (LANSCE). First experiments with the Neutron Target Demonstrator (NTD) at LANSCE have received full support through the Laboratory Directed Research and Development (LDRD) program to validate this neutron target facility concept, and testing is underway. The simulation, design, execution, and technical impact of these NTD experiments will be described, along with Monte Carlo N-Particle (MCNP) simulations of a future neutron target facility at LANSCE. We will close with a discussion of the NTD project timeline and collaboration opportunities.