

Reaching for the stars: Next-generation neutron reaction experiments with the Neutron Target Demonstrator and the ASTRA Facility at LANSCE

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The capability to directly measure neutron reactions on unstable isotopes would grant access to many reactions of interest to the mission science and nuclear astrophysics communities. However, precision measurements in forward kinematics are currently prohibited because the stationary target radiation fields overwhelm the detection system, target sample sizes are too small, or target lifetimes are too short. We are pursuing a neutron target facility at the Los Alamos Neutron Science Center (LANSCE) to overcome these experimental challenges by circulating a radioactive sample within an ion beam storage ring and through a thermal neutron field to induce reactions in inverse kinematics. A first experiment with the Neutron Target Demonstrator (NTD) at LANSCE is underway to validate this concept. The NTD project is collaborating with the new Facility for Applications of Special Technologies for Research with Accelerators in Area A (ASTRA) to develop the high-intensity Low-Energy Heavy Ion Source (LEHIS), downstream beam transport elements, and target systems required to execute this experiment. Results from recent simulations and experimental tests of the NTD subsystems will be presented, along with an overview of the collaborative ASTRA Facility and LEHIS system.