

A neutron target for measurements in inverse kinematics

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Virtually all of the isotopes heavier than iron would not exist without neutron-induced reactions. Despite their importance in many different astrophysical scenarios, there are almost no direct measurements for isotopes with half-lives shorter than a few years. A radically new approach is necessary to overcome this constraint.

Ion storage rings offer unprecedented possibilities to investigate radioactive isotopes of astrophysical importance in inverse kinematics. During the last years, a series of pioneering experiments proved the feasibility of this concept for the fusion of charged particles at the Experimental Storage Ring (ESR) at GSI. In the future, a combination of a free-neutron target and an ion storage ring can bring the half-life limit for direct neutron-induced reactions down to fractions of a minute.

The Neutron Target Demonstrator project at the Los Alamos National Laboratory is the first step towards such a facility. The goal of the project is to prove that a neutron capture cross section can indeed be directly measured in inverse kinematics.