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Active Targets for Experiments with Rare Isotopes[1]

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Experimental studies of un-bound nuclear states and nuclear reaction rates relevant for astrophysical processes are an important area of research with rare isotope beams. Both topics require the development of specialized experimental methods to study resonant reactions. The so-called active target approach, where the target material becomes part of the detection process, promises to combine high yields from thicker targets and low background with high resolution. This presentation will describe the implementation of the active-target technique in the ANASEN detector, which was developed by researchers from Louisiana State University and Florida State University. ANASEN was used in a number of stable and rare iosotope experiments in α– and proton scattering, as well as (α, p) and (d, p) reactions at FSU's in-flight radioactive beam facility RESOLUT. ANASEN also was used to perform the first experiment, proton scattering off a ^{37}K beam at the ReA3 facility. Another active-target detector with a very different approach is found in the Active Target Time-Projection Chamber, which was developed by a collaboration between researchers from MSU, the University of Notre Dame, Western Michigan University, LLNL, LBNL, and St. Mary's University (Canada). First experiments with an AT-TPC prototype have been reported [1]. The talk will summarize the results from the first experiments with these systems, describe further development and future research projects.

[1] D. Suzuki *et al.* Physical Review **C 87** 054301 (2013).

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