

# New Opportunities Offered by Modern Active Target Detector Systems

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## Abstract

Rare isotope beams provide opportunities to study structure and reactions of nuclei removed from the valley of stability, informing development of modern nuclear theory and providing crucial data for nuclear astrophysics. However, they also present unique experimental challenges due to much lower (compared to stable beams) intensities and often limited energy and angular resolution and purity. Active target detector setups provide a natural solution to many of these challenges. Several gas filled active target detectors, which use the same medium as a target and as an active volume for tracking of the charged particles have been developed recently and rapidly gain popularity. I will review some of the physics cases that can be addressed using active target detectors, ranging from studies of exotic nuclei in resonance scattering and nucleon transfer reactions, to dynamics of fusion reactions of weakly bound isotopes, to nuclear reactions relevant for explosive nucleosynthesis, to  $\beta$ -delayed charged particle emission studies.