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The Prototype Active-Target Time-Projection Chamber used with TwinSol Radioactive-Ion Beams

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The study of low-energy reactions with radioactive-ion beams has been greatly enhanced by the recent use of active-target detectors, which have high efficiency and low thresholds to detect low-energy charged-particle decays. Both of these features have been used in experiments with the Prototype Active-Target Time-Projection Chamber (PAT-TPC) to study alpha-cluster structure in unstable nuclei and 3-body charged-particle decays after implantation. Predicted alpha-cluster structures in C-14 were probed using resonant alpha scattering and the nature of the 3-alpha breakup of the Hoyle state after the beta decay of N-12 was studied. These experiments used in-flight radioactive-ion beams that were produced using the dual superconducting solenoid magnets TwinSol at the University of Notre Dame. Preliminary results from these experiments as well as the development of future radioactive beams to be used in conjunction with the PAT-TPC will be presented.

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