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Recent Results From the Active Target Time Projection Chamber

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The Active Target Time Projection Chamber (AT-TPC) built at NSCL was recently commissioned using re-accelerated beams from the completed ReA3 linac. This detector is well suited to the energy domain covered by this accelerator, around the Coulomb barrier, using inverse kinematics reactions with radioactive nuclei. Its main asset is the enhanced luminosity gained from the active target concept that allows to use a thick target while retaining the good resolutions necessary for this type of scattering experiments. Another important aspect is the ability to measure excitation functions of reactions from a single beam energy.

Data taken on the reactions $4\text{He}+4\text{He}$ at 2-3 MeV/u and $46\text{Ar}+p$ at 4.6 MeV/u will be presented, as well as the methods and processes used in the analysis. The latter reaction was the first experiment performed with a re-accelerated radioactive beam at the NSCL. Its aim is to study the structure of 47Ar via the measured properties of resonant analog states in 47K populated via the $46\text{Ar}+p$ elastic scattering reaction at Coulomb energies. Although widely used in direct kinematics with stable targets, this method hasn't been so far applied to radioactive beams in inverse kinematics for medium to heavy mass nuclei. Methods for track analysis and noise rejection will be shown. Future developments of the detector and its electronics to improve the quality of this type of data will also be presented.

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