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## Recent results from the TwinSol low-energy RIB facility

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The University of Michigan(UM)-University of Notre Dame (UND) TwinSol low-energy radioactive ion beam (RIB) facility at the UND tandem van de Graaff accelerator is a 2nd generation low-energy RIB facility that has been in active use for over 15 years. Its initial configuration was subsequently modified by transporting the secondary beam through a shielding wall into a large, low background room where most of the recent experiments have been performed. A large (1m) scattering was built together with a large neutron wall (17 m flight path), and recently a special deuterated scintillator array developed to permit a variety of measurements involving charged particles and neutrons, especially near or below the Coulomb barrier. The deuterated scintillator array developed is particularly well suited to RIB measurements as it can provide neutron energy spectra without need for long-path ToF. A variety of intense, low-energy RIBs have been produced using high cross section transfer reactions with solid or gas cell production targets, with the beam purified using a mid-plane absorber between the two solenoid magnets. Measurements have included  ${}^6\text{He}$ ,  ${}^8\text{B}$ ,  ${}^7\text{Be}$  etc. break up, fusion, and transfer reactions, most recently a  ${}^7\text{Be}(d,n)$  measurement. A TPC built by the MSU RIB group as a prototype for a larger device being constructed for the ReA and FRIB facilities at MSU has been tested and successfully used for a number of measurements using the TPC as an active-target tracking detector to produce excitation functions. Several of the measurements have yielded some unusual results that only would be seen easily using a TPC with its multi-body tracking capabilities. Future improvements to the TwinSol facility are planned and will be described.

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