TAMU-TRAP: an ion trap facility for Weak Interaction and Nuclear Physics Studies

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In the low-energy regime, precision measurements of nuclear β-decay continue to be an efficient tool to search for new physics beyond the standard electroweak model and is the most abundant weak interaction phenomenon. The β-decay experiments carried out until now can be explained by a time reversal-invariant pure V-A interaction with maximal violation of parity. Nevertheless, experimental error bars still leave sufficient room for the possible existence of other types of weak interaction in beta decay. The primary goal of the TAMU-TRAP facility is to test the standard model for a possible admixture of a scalar type of interaction by measuring the β-ν correlation parameter, $a_{\beta\nu}$, in T=2 super-allowed β-delayed proton emitters. The $a_{\beta\nu}$ correlation parameter can be inferred by measuring the proton energy spectrum. Low energy radioactive ion beam (RIB) will be delivered to the facility through the Heavy Ion guide, which is part of the T-REX(TAMU-Reaccelerated EXotics) upgrade project. The main components of the facility are an RFQ (cooler/buncher) and a Penning trap system. The measurement trap will be a large-bore cylindrical Penning trap with 90 mm radius, larger than any existing Penning trap. This geometry will allow for full radial containment of decay products of interest. The trap geometry is also suitable for a wide range of nuclear physics experiments. Additional goals for this system are mass and lifetime measurements. Presently, the TAMUTRAP setup is under construction and is being coupled to the T-REX upgrade project. Several parts of the beamline have been tested using an offline ion source. A brief overview of the TAMU-TRAP set-up, its current status, and the status of the T-REX upgrade project will be presented.