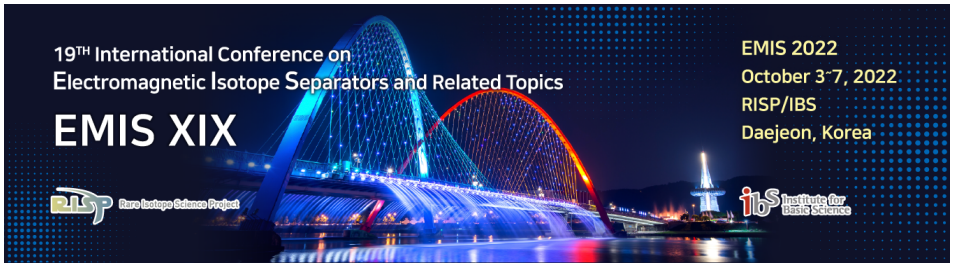

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Expanding RIB Capabilities at the Cyclotron Institute: 3He-LIG Production with an Isobar Separator

Monday, 3 October 2022 18:46 (8 minutes)

The primary goal of a new facility, TAMUTRAP, at the Cyclotron Institute, Texas A&M University, is to look for physics beyond the standard model by searching for a possible scalar currents contributing to the weak interaction. In particular, we will measure the β-ν correlation parameter, $a_{\beta\nu}$, in several $T = 2$ superallowed β-delayed proton emitters initially confined in a novel and unique cylindrical Penning trap. This trap has been designed to be very large (180-mm inner diameter) so that β-delayed protons of up to 4.25 MeV energy are fully contained radially by the 7-T field of the magnet. As the proton-rich radioactive-ion beams (RIBs) needed for the TAMUTRAP program are developed at the Cyclotron Institute, we have commissioned the facility by demonstrating the ability to perform precise mass measurements using offline ion sources. Once RIB is successfully produced and transported to TAMUTRAP, we will be uniquely suited to observe the β-delayed proton decays of ^{20,21}Mg, ^{24,25}Si, ^{28,29}S, ^{32,33}Ar and ^{36,37}Ca with 4π collection of the βs and delayed protons.

In order to produce the proton-rich RIBs for TAMUTRAP, a new production target and beamline is being constructed at the Cyclotron Institute. The high-intensity primary beam of ^{3}He from the K150 cyclotron will impinge on a heavy target with the reaction products collected and extracted using the light-ion guide (LIG) technique. Following this we have designed LSTAR, a compact, high-resolution isobar separator to purify the RIBs in order to prevent overloading TAMUTRAP's RFQ cooler and buncher with contaminants.

An overview of the He-LIG and LSTAR systems and their expected performance will be presented, largely within the context of the TAMUTRAP science program.

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