Contribution ID: **277** Type: **Poster**

Search for novel β^--delayed proton decay in ^{11}Be

In 2014, an accelerator mass spectrometry measurement counted a surprisingly large number of ^{10}Be atoms in a sample of ^{11}Be decay products, inferring the ^{11}Be$\rightarrow^{10}$Be decay branch to be 9(1) ppm. The presence of ^{10}Be can be interpreted as the first evidence of the never before observed β^--delayed proton decay. A measurement of the low-energy charged-particle emission in 2019 appeared to confirm the discovery of this novel decay channel, measuring ^{11}Be(β^-p) protons with 13(3) ppm intensity and center-of-mass energy 196(20) keV. However, more recent AMS measurements suggest molecular contamination during the sample preparation in the previous measurement resulting in a revised limit of $<$2 ppm for ^{11}Be$\rightarrow^{10}$Be. Additionally, theoretical studies of ^{11}Be decay are not unified in their pre- and post-dictions of a $\sim$10 ppm ^{11}Be(β^-p) branch.

We will present, for the first time, the results of an independent search for ^{11}Be(β^-p) performed using a fast, fragmented ^{11}Be beam at the National Superconducting Cyclotron Laboratory (NSCL) and the Gaseous Detector with Germanium Tagging (GADGET) system. GADGET consists of a gaseous proportional detector that is sensitive to low-energy charged-particle emission and the Segmented Germanium Array that provides gamma-ray detection. Leveraging the two detection systems, detector characterization is performed by the well-studied ^{11}Be($\beta^-\alpha$)^{7}Li decay *in situ* to construct the anticipated proton signal.

This work has been supported by the U. S. Department of Energy under Award No.: DE-SC0016052
and the U. S. National Science Foundation under Award No.: 1565546 and 1913554.

Topic

Experiment

Author: SURBROOK, Jason (Michigan State University & Facility for Rare Isotope Beams)

Co-authors: KRUSKIE, Aaron (Michigan State University & National Superconducting Cyclotron Laboratory); GLASSMAN, Brent (Michigan State University & National Superconducting Cyclotron Laboratory); FRY, Cathleen (Michigan State University & National Superconducting Cyclotron Laboratory); WREDE, Christopher (Michigan State University & National Superconducting Cyclotron Laboratory); POLLACCO, Emanuel (CEA Saclay); STOMPS, Jordan (Michigan State University & National Superconducting Cyclotron Laboratory); SUN, Lijie (National Superconducting Cyclotron Laboratory); CORTESI, Marco (Facility for Rare Isotope Beams); ROOSA, Michael (Michigan State University & National Superconducting Cyclotron Laboratory); JANASIK, Molly (Michigan State University & National Superconducting Cyclotron Laboratory); FRIEDMAN, Moshe (National Superconducting Cyclotron Laboratory); MAHAJAN, Ruchi (Facility for Rare Isotope Beams); BUDNER, Tamas (Michigan State University & National Superconducting Cyclotron Laboratory); WHEELER, Tyler (Michigan State University & National Superconducting Cyclotron Laboratory); AYYAD, Yasid (Facility for Rare Isotope Beams)

Presenter: SURBROOK, Jason (Michigan State University & Facility for Rare Isotope Beams)

Session Classification: Poster session