Contribution ID: **45** Type: **Nuclear and Particle Physics**

Characterization of a Spatially Resolved Multi-element Laser Ablation Ion Source for Barium Tagging with nEXO

Friday, 18 February 2022 10:00 (12 minutes)

The proposed nEXO experiment is searching for neutrinoless double beta decay ($0\nu\beta\beta$) in ^{136}Xe in a five tonne liquid Xe time-projection chamber (TPC). The addition of Barium tagging may allow for the positive identification of a candidate $0\nu\beta\beta$ event as a true $\beta\beta$ decay, by extracting and identifying the daughter Ba ion. The nEXO collaboration is pursuing various approaches to Barium tagging for future upgrades to the detector. One approach is to extract a small volume of liquid Xe at the location of a candidate event, which undergoes a phase-change to gaseous Xe, then transport and trap the extracted ions for identification in a linear Paul trap. Different parts of this Barium tagging system are currently under development at multiple Canadian institutions. Laser ablation ion sources (LAS's) are ideal for testing and calibrating the constituent devices of the Barium tagging system, since they can produce ions in vacuum or gas. Specifically, a LAS that can spatially resolve and selectively ablate different elements from a multi-element target is being used for the commissioning and calibration of a multi-reflection time-of-flight mass-spectrometer (MRTOF). The MRTOF will perform systematic studies of the ion extraction technique, as well as provide further identification of the Barium isotope. The capabilities of the LAS, such as the spatial resolution, scanning range and ion transport efficiency will be discussed, as well as progress towards the commissioning of the MRTOF.

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Please select: Experiment or Theory

Instrumentation

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