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Contribution ID: 3305 Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

(G*) Commissioning of a Multiple-Reflection Time-of-Flight Mass-Spectrometer for Barium-tagging

Wednesday 8 June 2022 12:00 (15 minutes)

The proposed nEXO experiment aims to search for neutrinoless double beta decay ($0\nu\beta\beta$) in ^{136}Xe with a five-tonne enriched liquid Xe time-projection chamber. The addition of barium tagging will 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 potential future upgrades to the detector. One approach, currently under development at multiple Canadian institutions, is to extract the decay daughter together with a small volume of liquid Xe at the location of a candidate event. Following a phase-change from liquid to gaseous Xe, the ion is separated from Xe with an RF funnel and transported and trapped in a linear Paul trap (LPT), where the Ba daughter will be tagged with laser fluorescence spectroscopy. Ions will then be ejected from the LPT to a multi-reflection time-of-flight mass-spectrometer (MRTOF) for mass identification. Beyond identification of the Ba isotope, the MRTOF is also essential for performing systematic studies of the ion extraction technique. A Laser Ablation Ion Source (LAS) is currently being used to commission the MRTOF. Progress on the commissioning of the MRTOF with the LAS will be presented and next steps will be discussed.

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