



Canadian Association  
of Physicists

Association canadienne  
des physiciens et physiciennes

Contribution ID: 471

Type: Oral (Non-Student) / Orale (non-étudiant(e))

## Barium extraction from Xe Gas and identification for nEXO

Wednesday 9 June 2021 12:45 (10 minutes)

The proposed nEXO experiment is searching for neutrinoless double beta decay ( $0\nu\beta\beta$ ) in  $^{136}\text{Xe}$  in a tonne-scale liquid xenon time-projection chamber (TPC). If observed,  $0\nu\beta\beta$  will reveal the Majorana nature of neutrinos and violation of lepton number conservation. Searches for such extremely rare events require excellent background suppression and rejection methods to achieve high sensitivities. The identification or “tagging” of the xenon-136  $\beta\beta$  decay daughter barium-136 offers a very powerful discrimination technique and is being investigated as a potential upgrade for nEXO. By leveraging the 3D reconstruction of the TPC, a sample of xenon surrounding a candidate  $0\nu\beta\beta$  event can be extracted to tag the Ba daughter, if present. To this end, an apparatus is being developed to take a gaseous sample of xenon and extract a barium ion to high vacuum using a RF ion funnel. The ion is then trapped in a linear Paul trap (LPT) and identified via laser spectroscopy in the LPT. The mass is then confirmed in a multi-reflection time of flight (MRTOF) spectrometer. The status of the Ba-ion cooling, trapping and identification will be discussed.

**Authors:** Dr CHAMBERS, Christopher (McGill University); BRUNNER, Thomas (McGill University); MURRAY, Kevin (McGill University); RASIWALA, Hussain (McGill University)

**Presenter:** Dr CHAMBERS, Christopher (McGill University)

**Session Classification:** W2-7 Instrumentation II (DNP) / Instrumentation II (DPN)

**Track Classification:** Nuclear Physics / Physique nucléaire (DNP-DPN)