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Contribution ID: **4428** Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

(G*) Simulating Ba ion motion in a liquid Xe volume for Ba-tagging at TRIUMF

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The proposed nEXO experiment is a tonne-scale liquid xenon (LXe) time projection chamber that aims to uncover properties of neutrinos via the neutrinoless double beta decays ($0\nu\beta\beta$) in the isotope Xe-136. The observation of $0\nu\beta\beta$ would point to new physics beyond the Standard Model and imply lepton number violation, indicating that neutrinos are their own antiparticle. The nEXO detector is expected to be constructed at SNOLAB in Sudbury, Canada, with a projected half-life sensitivity of 1.35×10^{28} years. The collaboration has been pursuing the development of new technologies to further improve upon the detection sensitivity of nEXO, such as Barium (Ba)-tagging. This extremely challenging technique aims to extract single Ba ions from a LXe volume. Ba-tagging would allow for an unambiguous identification of true $\beta\beta$-decay events, and if successful would result in an impactful improvement to the detection sensitivity. Groups at McGill University, Carleton University, and TRIUMF are developing an accelerator-driven ion source to implant radioactive ions inside a volume of LXe. Additional extraction and detection methods are under development by other groups within the nEXO collaboration. In the first phase of this development, ions will be extracted using an electrostatic probe for subsequent identification using γ-spectroscopy. In this contribution, I will provide a status update on the commissioning of the Ba-tagging setup at TRIUMF and present results on ion extraction efficiency simulations using an electrostatic probe.

Keyword-1

neutrinoless double beta decay

Keyword-2

barium tagging

Keyword-3

nEXO

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