Contribution ID: **31** Type: **Contributed Oral**

Mitigating Cosmogenic Backgrounds in nEXO

Saturday, 18 February 2023 14:45 (15 minutes)

The nEXO experiment is a proposed neutrinoless double beta decay ($0\nu\beta\beta$) search in the isotope ^{136}Xe. $0\nu\beta\beta$ is a lepton number violating process, and a positive observation of this decay mode in any isotope would be a direct observation of physics beyond the standard model. Anticipated to be located 2 km underground at SNOLAB, nEXO aims to discover the Majorana nature of neutrinos with a half-life sensitivity to $0\nu\beta\beta$ exceeding 10^{28} years at the 90% confidence level. To reach this sensitivity goal, nEXO employs 5 tonnes of liquid xenon in a time projection chamber (TPC), and performs a multi-parameter fit to the dataset including event-level information on: the total energy deposited in the xenon, the position of energy deposits, and the topology of detected ionization clouds.

Stringent radiopurity requirements necessitate a 1.5 kilotonne water shield in order to reduce background contributions from ambient external radiation entering the TPC. Photomultiplier tubes (PMTs) instrumented inside the water shield tank will measure the Cherenkov light from passing atmospheric muons and other secondary particles to allow the vetoing of so-called cosmogenic backgrounds from the $0\nu\beta\beta$ dataset; this active shield is referred to as the Outer Detector.

This talk will overview nEXO's Outer Detector, cosmogenic background mitigation strategies, and introduce a GPU-accelerated ray-tracing software (Chroma) to simulate Cherenkov photons in the water and optimize nEXO's muon veto.

Supervisor

Thomas Brunner

Funding Agency

NSERC

Supervisor Email

thomas.brunner@mcgill.ca

Your Email

soud.alkharusi@mail.mcgill.ca

Primary author: AL KHARUSI, Soud (McGill University)

Co-authors: CADEN, Erica (SNOLAB); BRUNNER, Thomas (McGill/TRIUMF); COLLABORATION, nEXO

Presenter: AL KHARUSI, Soud (McGill University)

Session Classification: February 18 Afternoon Session

Track Classification: Neutrino Properties