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Contribution ID: **3163** Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

(G*) Pion background measurement and correction in the MOLLER Experiment at Jefferson lab

Monday, 6 June 2022 11:15 (15 minutes)

The Measurement of a Lepton Lepton Electroweak Reaction (MOLLER) Experiment at Jefferson lab will search for new dynamics beyond the Standard Model at low (˜100 MeV) and high energies (multi-TeV). MOLLER will measure the parity-violating asymmetry (APV) in the scattering of longitudinally polarized electrons from unpolarized target electrons to an accuracy of 2.4% using an 11 GeV beam in Hall A at Thomas Jefferson National Accelerator Facility. To achieve the expected precision, experimental corrections to the measured asymmetries are required to account for background processes characterized by fractional dilution factors and background asymmetries. Pion dilution factors and asymmetries have significant contributions to the experimental corrections and will be measured in a dedicated pion detector system. The University of Manitoba has been designing, developing, and constructing the pion detector system for MOLLER experiment. The Geant4 simulation toolkit is used to determine the optimal geometry and position of the pion detector system to maximize the signal from pions.
To improve the understanding of uncertainties introduced by experimental corrections, a Bayesian analysis method is investigated to complement the commonly used frequentist methods for background corrections in parity-violating electron scattering experiments. We anticipate that this will allow for a better assessment of the uncertainties in the corrections. This talk will review the MOLLER experiment and the optimization process for the pion detector system. Also, the idea of using the Bayesian method for the experimental corrections will be introduced.

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