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Contribution ID: **3198** Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

(G*) Mapping the Magnetically Shielded Room for the Neutron Electric Dipole Moment Experiment at TRIUMF

Monday 6 June 2022 16:45 (15 minutes)

Discovering a nonzero neutron electric dipole moment (nEDM) provides some of the tightest constraints on extensions to the Standard Model that attempts to explain the mechanisms underlying \textit{CP}-violation. The objective of the TUCAN (TRIUMF UltraCold Advanced Neutron) collaboration is to search for a permanent EDM of the free neutron, d_n, with a sensitivity of $\sigma(d_n) \leq 10^{-27} e$cm. The typical experimental method to measure the nEDM uses polarized ultracold neutrons (UCN) and employs the Ramsey method of separated oscillatory fields. Because of their slow movement, measurement of the spin precession frequency of UCNs requires very homogeneous electric and magnetic fields in space and time over the experimental area. A large multi-layer room called Magnetically Shielded Room (MSR) shields the main precession magnetic field produced by an internal coil from the environment magnetic fields. In the nEDM measurement, many possible sources of systematic error can manifest as a false EDM signal. Historically, the dominant systematic errors have come from magnetic field inhomogeneities, reducing the statistical precision of the experiment. Providing a picture of the magnetic field environment within the experiment would help control the system's homogeneity. This presentation will discuss the simulation of mapping the magnetic field inside the MSR to extract quantities relevant to the compensation of systematic effects in the experiment.

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