



Canadian Association
of Physicists

Association canadienne
des physiciens et physiciennes

Contribution ID: 237 Type: Oral Competition (Undergraduate Student) / Compétition orale (Étudiant(e) du 1er cycle)

Shim coils and their importance in measuring the neutron electric dipole moment for the TUCAN EDM experiment

Tuesday 10 June 2025 11:15 (15 minutes)

Precise measurements of the neutron electric dipole moment (EDM) could result in a discovery of a violation of particle-antiparticle symmetry, and of new physics beyond the standard model.

The TRIUMF Ultracold Advanced Neutron (TUCAN) collaboration is preparing an experiment to measure the neutron EDM with an accuracy of 1×10^{-27} ecm, a factor of 10 better than the world's previous best, published in 2020. Neutron motion in the EDM cells in the presence of magnetic field inhomogeneity could result in a false neutron EDM signal. Shim coils are used to characterize and reduce magnetic field inhomogeneities. The shim coils must make the field inside the EDM measurement cells very homogeneous, $\sigma(B_z) < 40$ pT in field of $B_z = 1$ μ T, in order to meet the requirements of the experiment. I will present my design studies of a shim coil system for the TUCAN EDM experiment, which is based on square coils placed on the walls of the magnetically shielded room (MSR) surrounding the EDM cells. I will also report on the construction of the coils, which was completed in August 2024. The coils were installed inside the MSR in early 2025. I will present results from MSR magnetic field mapping that will begin May 2025, as a part of the commissioning of the magnetically shielded room and precision atomic magnetometer systems. I will further present our plans for the operation of the coil system.

Keyword-1

shim coils

Keyword-2

neutron EDM measurement

Keyword-3

magnetic fields

Author: KATOTOKA, Modeste (The University of Winnipeg)

Presenter: KATOTOKA, Modeste (The University of Winnipeg)

Session Classification: (DNP) T1-6 Hadrons | Hadrons (DPN)

Track Classification: Technical Sessions / Sessions techniques: Nuclear Physics / Physique nucléaire (DNP-DPN)