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The TUCAN EDM Experiment

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The TUCAN (TRIUMF Ultra-Cold Advanced Neutron) collaboration aims to measure the neutron electric dipole moment (EDM) with improved precision. The experiment will use a new high-intensity ultracold neutron (UCN) source currently being constructed at TRIUMF (Canada's Particle Accelerator Centre, Vancouver, BC). Our UCN production scheme is based on spallation neutron production and super-thermal UCN conversion with superfluid helium (He-II), and has been successfully demonstrated by a prototype UCN source operated from 2017-2019 at TRIUMF. With our newly upgraded source, a statistical EDM sensitivity of 10−27 e·cm would be achieved in 400 days of data taking. Core components of the new UCN source, such as optimized neutron moderators, a high-performance helium cryostat, and a nickel-plated UCN production vessel have been built and tested, and are being assembled at TRIUMF. The development of components of the neutron EDM spectrometer, such as a magnetically shielded room, atomic magnetometers, UCN polarization analyzers and a UCN precession chamber are advancing in parallel. In this presentation, an overview of the recent progress by the TUCAN collaboration will be presented, and prospects for the new neutron EDM measurement will be discussed.

Keyword-1

electric dipole moments

Keyword-2

fundamental symmetries

Keyword-3

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