

Challenges of the world-wide experimental search for the electric dipole moment of the neutron



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R \& D Toward a new nEDM Experiment at LANL

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Los Alamos National Laboratory (LANL) currently operates a proton-beam-driven solid-deuterium-based UCN source, providing UCN for various neutron beta decay experiments as well as R&D for the SNS nEDM experiment. An estimate shows that the combination of further optimization of the source geometry and cold moderator material, increased proton beam current, and more optimized proton pulse structure will give us a 10-fold increase in UCN source performance. With such an improvement, an nEDM experiment with a sensitivity goal of several $\times 10^{-27}$ e-cm based on the already proven Ramsey's separated oscillatory fields method at room temperature could be performed at the LANL UCN source. Currently, an R&D effort is under way to improve the UCN source and demonstrate a storage of the number of UCN sufficient for such an nEDM experiment in a prototype nEDM apparatus. In this talk, the current status of this R&D effort, with an emphasis on the source upgrade, will be presented.

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