

New limit on the electric dipole moment of the neutron

Philipp Schmidt-Wellenburg¹

on behalf of the nEDM collaboration at PSI

¹ Paul Scherrer Institute, Villigen, Switzerland

Abstract

A nonzero permanent electric dipole moment (EDM) of a non-degenerate particle with spin implies the violation of time-reversal symmetry. Invoking the CPT theorem indicates the violation of the combined symmetry of charge conjugation and parity (CP). We present a new limit on the neutron EDM, $|d_n| < 1.8 \times 10^{-26} e\text{cm}$ [C. Abel *et al.*, PRL124, 081803 (2020)], from an experiment performed at the Paul Scherrer Institute deploying Ramsey's method of separated oscillating magnetic fields on stored ultracold neutrons. Our measurement stands in the long history of EDM experiments probing physics violating time-reversal invariance. The salient features of this experiment were the use of a ¹⁹⁹Hg co-magnetometer and an array of optically pumped cesium vapor magnetometers to cancel and correct for magnetic field changes. Two separate groups performed the statistical analysis on blinded datasets while the estimation of systematic effects profited from unprecedented knowledge of the magnetic field.