

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



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Analysis of Magnetic Field Mapping of the nEDM apparatus of PSI

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An improved experimental search for a neutron electric dipole moment (nEDM) is currently taking data at the Paul Scherrer Institute, Switzerland using ultra-cold neutrons (UCN).

The experiment requires the holding field (\mathbf{B}_0) to be homogeneous over the UCN precession volume to maintain the polarization of the stored UCN and to suppress some of the systematic effects.

The accurate knowledge of all magnetic fields generated by the trim coils located on the vacuum tank is of paramount importance to optimize the magnetic field homogeneity better than $\sim 10^{-3}$.

The magnetic field inside the vacuum tank was mapped with a tri-axial fluxgate magnetometer and a vector cesium magnetometer.

However, the mechanical limitations of the setup provoke errors in the field measurements by these sensors.

These measurement errors could be up to a few tens of μT without correction.

We demonstrate an approach to extract and correct these errors in the offline analysis.

Primary author: Mr PATAGUPPI, Prashanth (Paul Scherrer Institute)

Co-author: -, on behalf of the nEDM collaboration (PSI)

Presenter: Mr PATAGUPPI, Prashanth (Paul Scherrer Institute)

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