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The Uncompensated Field Drift Studies in Electric Dipole Moment of neutron (nEDM) Experiment.

Tuesday 10 September 2013 18:00 (3 hours)

In order to reach in the neutron EDM experiment using ultra cold neutrons at the Paul Scherrer Institute (PSI) the desired sensitivity goal of 5 x 10ˆ(-27)e.cm (95 % C.L.), the systematic uncertainties must be smaller than 1.3 x 10ˆ(-27)e.cm . A crucial requirement is the control of the fluctuations of a magnetic field on a level of better than hundred fT. Optically pumped cesium magnetometers (CsM) are used to reach the resolution of about sub-pT level. The so-called uncompensated field drift [Baker et al. (2006)] is one of the major sources of systematic error [Altarev et al. 2010)]. The mechanism probably is that the charging current of electric field (E) reversal causes a change in the magnetic field (B). This uncontrolled B-field change interacting with the neutron magnetic moment results in a false EDM signal. If this mechanism is sufficiently close to causing the trouble to the sensitivity of the measurement one must consider them carefully. The CsM are placed in a gradiometer configuration to measure the change in the vertical magnetic field gradients.

In December 2012 measurements were performed to estimate a systematic effect correlated with the change of a vertical field gradient correlated with the charging current polarity. Data was taken for 20 days and utilized few thousand electric field reversals. Here, the analysis technique, the result obtained and its implications on the current sensitivity of the experiment will be presented and discussed.

References

[Baker et al(2006)] C. A. Baker et al, Phys.Rev.Lett. 97, 131801 (2006).
[Altarev et al. 2010)] I. Altarev et al., Nucl. Phys. A 844, 47 (2010).

Author: Mr PATAGUPPI, Prashanth (Paul Scherrer Institute)

Presenter: Mr PATAGUPPI, Prashanth (Paul Scherrer Institute)

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