

Spin Motion Perturbation Effect on the EDM Statistic in the Frequency Domain Method

A. Aksentyev, IKP, Forschungszentrum Juelich, Germany
Y. Senichev, Institute for Nuclear Research of RAS, 117312, Moscow, Russia
on behalf of the JEDI Collaboration

Abstract

The spin precession axis of a particle involved in betatron motion precesses about the invariant spin axis defined on the closed orbit (CO). This precession can be observed in polarization data as a rapid, small-amplitude oscillation on top of the major effect oscillation caused by the precession of spin about the CO axis. The frequency of this latter oscillation is used in the Frequency Domain methodology as the EDM observable. [*] It is estimated by fitting polarimetry data by a sine function; the rapid oscillations, therefore, constitute a model specification error.

This model error will introduce a bias into the frequency estimate. In the present work we investigate how this bias changes depending on the beam revolution direction, its stability over time, and the EDM estimate error introduced by it.

References

[*] Senichev Y, Aksentev A, Ivanov A, Valetov E. Frequency domain method of the search for the deuteron electric dipole moment in a storage ring with imperfections. arXiv:171106512. 2017 Nov 17