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Title Tracking Simulations towards EDM Measurements at COSY

Submitted 30-NOV-14 15:12
(GMT)

Classification 4: Hadron Accelerators

Modified

Presentation Poster

Paper ID

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Abstract Electric Dipole Moments (EDMs) violate parity and time reversal symmetries. Therefore, direct measurements of charged particles' EDMs would be a strong hint for physics beyond the Standard Model. The JEDI collaboration investigates the feasibility of such measurements for protons, deuterons, and Helium-3 in storage rings. Precursor studies are performed at the existing conventional Cooler Synchrotron COSY in Jülich. A measurement time of about 1000 seconds is proposed. This requires a setup providing a long spin coherence time in the plane perpendicular to the invariant spin axis. During the measurement run, it is planned to use radiofrequency devices to create an EDM related signal. The contribution of imperfections, which could mimic such a signal, is explored in beam and spin dynamics simulations. The software framework COSY INFINITY is used to calculate transfer maps of the magnets and performs long term tracking studies. Recent efforts extend the code by the EDM contribution to spin motion and by the calculation of time-dependent maps required for tracking in non-static fields. These enhancements are benchmarked with analytical predictions and with test measurements at COSY.

Word Count: 179 Character Count: 1182

Footnote

**Funding
Agency**

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02-DEC-14 13:22 (GMT)

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