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Simulation for a Prototype Proton EDM Storage Ring
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Matter-antimatter asymmetry can be understood by investigating Electric Dipole Moments (EDM) of Elementary charged particles. Permanent EDMs of subatomic particles violate both time reversal (T) and Parity (P) invariance and also CP-violation via CPT-theorem. Finding an EDMs of charged particles with ultimate precision would be a strong sign for physics beyond the Standard Model (SM). Up to now, EDMs of neutral systems (neutrons, atoms and molecules) have been investigated. However, direct search of proton and deuteron EDMs bear the potential to reach the sensitivities beyond 10^{-29} ecm. This goal can be pursued either with an all-electric proton storage ring, or by an approach using a combined electric-magnetic lattice which shall allow access to the EDMs of proton, deuteron, and ³He in one-and-the-same machine. The purpose of this Prototype Proton EDM Storage Ring is to demonstrate the satisfactory beam lifetime and spin coherence time in the electrostatic ring, clockwise and counter-clockwise beam operation, beam spin control, beam-based element alignment, and methods for reducing systematic errors in the EDM measurements and deals with simulation of lattice and beam lifetime of Prototype pEDM Ring.

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