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Storage ring proton EDM comprehensive systematic errors study for 10^{-29} e-cm level.

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The hybrid-symmetric lattice was studied extensively using high-precision spin and beam dynamics simulation software programs. A storage ring, where the bending is provided by electric field plates while focusing is achieved by magnetic quadrupoles with alternating sign fields, can effectively store polarized proton beams simultaneously. This is the only known configuration where the main systematic error sources cancel out effectively, i.e., the vertical electric field caused by the misalignment of the electric field plates as well as the background magnetic fields. Furthermore, a highly symmetric ring lattice effectively reduces the quadrupole misalignment requirements by several orders of magnitude making the experiment possible using only currently available technology. At 10^{-29} e-cm sensitivity the experiment probes New Physics at the 300 TeV mass scale. The main requirements for a successful experiment at that level are that the ring planarity needs to be within 0.1 mm, while the separation of the counter-rotating beams needs to be kept below 0.01 mm, both of which are well within the realms of today's technology.

In-person participation

Yes

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