

Jörg Pretz,
RWTH Aachen University, III. Physikalisches Institut B & Forschungs-
zentrum Jülich, Institut für Kernphysik

on behalf of the JEDI and CPEDM collaborations

Electric Dipole Moment Measurements at Storage Rings

Electric Dipole Moments (EDMs) of elementary particles, including hadrons, are considered as one of the most powerful tool to study CP-violation beyond the Standard Model. Such CP-violating mechanisms are searched for to explain the dominance of matter over anti-matter in our universe.

The talk will discuss EDM searches of charged hadrons in storage rings. Due to an EDM, the spin vector will experience a torque resulting in a change of the original spin direction which can be determined with the help of a polarimeter. Although the principle of the measurement is simple, the smallness of the expected effect makes this a challenging experiment requiring new developments in various experimental areas. Given the complexity of the project, a step wise approach is proposed¹⁾.

The talk will discuss activities at the existing storage ring COSY at Forschungszentrum Jülich, Germany. The next step is the design of a 100 m circumference prototype ring able to demonstrate key technologies and components. These include simultaneous clockwise and counter-clockwise beam operation with electrostatic bending elements and, by adding a magnetic field, the frozen spin technique. The final step is the operation of a pure electric storage ring of about 500 m circumference. Other projects like a measurement of the muon EDM will also be discussed.

¹⁾ Storage ring to search for electric dipole moments of charged particles, Feasibility study
CPEDM collaboration
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