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Search for Electric Dipole Moments of charged particles with polarised beams in storage rings

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The Electric Dipole Moment (EDM) of elementary particles, including hadrons, is considered as one of the most powerful tools 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.

Up to now EDM experiments concentrated on neutral systems, namely neutron, atoms and molecules. Storage rings offer the possibility to measure EDMs of charged particles by observing the influence of the EDM on the spin motion. A dedicated program is underway at the COSY storage ring to develop the required experimental and technical tools.

A step-wise approach starting with a proof-of-principle experiment at the existing storage ring Cooler Synchrotron COSY at Forschungszentrum Jülich, followed by an electrostatic prototype ring allowing for a simultaneous operation of counter circulating beams in order to cancel systematic effects, to the design of a dedicated 500 m circumference storage ring will be presented.

Summary

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