

Measurement of the deuteron electric dipole moment using a storage ring

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The search for Electric Dipole Moments (EDMs) of elementary particles is a powerful tool for the investigation of physics beyond the Standard Model (SM) of Particle Physics. As a permanent EDM violates CP symmetry, measuring the EDM of a fundamental particle is a potential source of CP -violation that could, e.g., explain the matter-antimatter asymmetry in the universe.

Storage rings enable the measurement of charged particles EDMs by observing the effect of the EDM on the particle's spin motion in the ring. The Cooler Synchrotron COSY at the Forschungszentrum Jülich provides polarized protons and deuterons with momenta up to 3.7 GeV/c. This makes it an ideal choice for the initial stage of the JEDI (Jülich Electric Dipole moment Investigations) research program, where the JEDI collaboration aims to conduct a proof-of-principle experiment. Due to the smallness of the EDM effect and the complexity of storage rings, this study demands high precision in measurements and a thorough understanding of systematics.

In this talk, I will present the details of the analysis of the first direct precursor measurement of the deuteron EDM in COSY, discuss the various technical developments, and show recent results.