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RF Wien Filter Method for EDM search with CW-CCW Beams

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Searches for permanent electric dipole moments (EDMs) bear the potential to reveal physics beyond the Standard Model. The JEDI (Jülich Electric Dipole moment Investigation) collaboration explores the prospects for measurements of charged nuclei, i.e. proton, deuteron and Helium-3 EDMs in dedicated storage rings. As an intermediate step, a first direct measurement of the deuteron EDM is planned at the existing conventional magnetic storage ring in Jülich, the Cooler Synchrotron COSY. The proposed measurement methods require an initial beam polarization precessing perpendicular to the stable spin axis of the storage ring. A radiofrequency Wien filter is employed to excite a spin resonance related to the magnitude of a potential EDM. This leads to a slowly increasing polarization component along the stable spin direction. Imperfections and misalignments of the magnetic elements may enhance or reduce the associated buildup rate. Studies of these systematic contributions using the software framework COSY INFINITY have been conducted. Results of the expected order of magnitude are presented within this contribution. Furthermore, methods making use of clockwise (CW) and counterclockwise (CCW) beams to disentangle these effects from a potential EDM are discussed.

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