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Modelling the horizontal polarization lifetime curves for a storage ring EDM experiment

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One of the great mysteries in the natural sciences is why matter dominates over antimatter in the visible universe. The breaking of the combined charge conjugation and parity symmetries in the Standard Model of particle physics is insufficient to explain this. Therefore, other sources of CP-violations are sought, and these could manifest in the Electric Dipole Moments (EDM) of fundamental particles.

The JEDI (Juelich Electric Dipole moment Investigations) Collaboration works towards the direct measurement of the EDM of charged hadrons (spin-polarized protons and deuterons) in a storage ring. The observable is the minuscule vertical polarization buildup starting from a horizontally polarized beam, caused by the interaction of the EDM with a radial electric field. This requires the polarized beam to possess a long horizontal polarization lifetime. This was previously achieved at the Cooler Synchrotron (COSY). Multiple models were applied to explain the shape of the polarization lifetime curve. The underlying idea of these models and the conclusion drawn from this will be presented.

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