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Optimization of spin coherence time for electric dipole moment (EDM) measurements in a storage ring

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The JEDI experiment is dedicated to the search for the electric dipole moment (EDM) of charged particles using storage rings, which can be a very sensitive probe of physics beyond the Standard Model. In order to reach the highest possible sensitivity, a fundamental parameter to be optimized is the Spin Coherence Time (SCT), i.e., the time interval within which the particles of the stored beam maintain a net polarization greater than $1/e$. To identify the working conditions that maximize SCT, accurate spin-dynamics simulations with the code BMAD have been performed on the lattice of a “prototype” storage ring which uses a combination of electric and magnetic fields for bending. This contribution presents an analysis of the mechanisms behind the decoherence, and a technique to maximize SCT through the optimization of second-order optical parameters.

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Footnotes

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Yes

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