

## Contribution submission to the conference Berlin 2024

**Simulations of Beam-target Interaction for Prototype Electric Dipole Moment Storage Ring** — ●SAAD SIDDIQUE — GSI GmbH Darmstadt Germany — RWTH Aachen University Germany — JEDI and CPEDM Collaborations

The matter-antimatter asymmetry observed in the universe may be explained through CP-violation by observing a permanent electric dipole moment (EDM) of subatomic particles. An advanced approach to measure the EDM of charged particles is to apply a Frozen spin method on a polarized beam in a storage ring. To increase the experimental precision step by step and to study systematic effects, the EDM experiment will be performed within three stages: the magnetic ring COSY Forschungszentrum Jülich Germany, a prototype EDM ring, and finally an all-electric EDM ring. The intermediate prototype EDM storage ring (PTR) will be a mock-up of the final ring, which will be used to study a variety of systematic effects and to implement the basic principle of the final ring. Beam storage and beam polarization measurement are challenging due to low beam energy and small size of ring. The preliminary results suggest that the PTR lattice with maximum vertical betatron function  $< 100\text{m}$  could be acceptable to store beam for more than 1000s. However, these results need detailed studies of beam-target interaction which plays an important role in beam losses as well as in beam polarization measurements. The beam-tracking simulations are being performed with various sizes of external pellet targets and also with different positions to minimize beam losses as well as to increase the efficiency of beam polarization measurements.

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