

# Orbit Response Matrix Analysis for COSY - Model Optimization using LOCO

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The matter-antimatter asymmetry might be understood by investigating the EDM (Electric Dipole Moment) of elementary particles. A permanent EDM of a subatomic particle violates time reversal and parity symmetry at the same time and a discovery of a non-zero EDM would be a strong indication for physics beyond the Standard Model.

The JEDI-Collaboration (Jülich Electric Dipole moment Investigations) in Jülich has performed a direct EDM measurement for deuterons with the so called precursor experiments at the storage ring COSY (COoler SYnchrotron).

In order to understand the measured data and to disentangle an EDM signal from systematic effects, spin tracking simulations in an accurate simulation model of COSY are needed. Such an accurate model can be achieved by measuring the ORM (Orbit Response Matrix) of COSY and fitting the model ORM against the measured ORM using the LOCO (Linear Optics from Closed Orbit) technique. Therefore, the LOCO algorithm as well as a simulation model of COSY with all knowledge of COSY available has been implemented into the software library Bmad. First results of the lattice optimization and the spin tracking simulations will be discussed.

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