Programme Matter and Technologies

Spin Dynamics towards **EDM Measurements**

ARD-Concepts and Technologies for Hadron Accelerators



Marcel Rosenthal (FZJ)

Measuring Electric Dipole Moments in Storage Rings



> Matter-antimatter-asymmetry can not be explained by CP violation in Standard Model

> Permanent Electric Dipole Moments violate parity and time reversal symmetries





> New sources of CP violation?

- Coupling of EDM to electric fields
- Buildup of polarisation signal
- Polarisation measurements

Benchmarking and Extension of Simulation Tools

Cooler Synchrotron COSY/Jülich



- > Magnetic storage ring for polarised protons/deuterons
- Acceleration up to 3.7 GeV/c
- Stochastic and electron cooled beams
- Ideal starting point to investigate EDM measurements and benchmark simulations



Spin Coherence Time

> Spin precession in a magnetic storage ring around stable spin axis ($v_S = G\gamma$)



Phase space dependent decoherence



Induced Spin Resonances



- > Use RF-E×B-Dipole induced spin resonance for EDM related polarisation buildup in magnetic storage ring
- Performing studies of the impact of RF fields on polarisation lifetime using an RF-Solenoid at spin resonance condition: $f_{sol} = |K + G\gamma| f_{rev}$ ($K \in \mathbb{Z}$)







