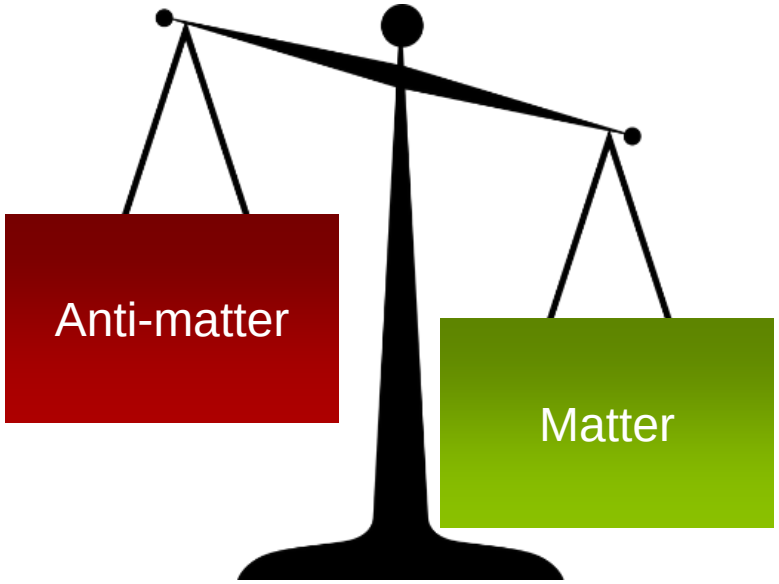
SEARCH FOR ELECTRIC DIPOLE MOMENTS AT COSY IN JÜLICH

Closed-orbit and spin tracking simulations

12.06.2018 I VERA SCHMIDT on behalf of the JEDI collaboration

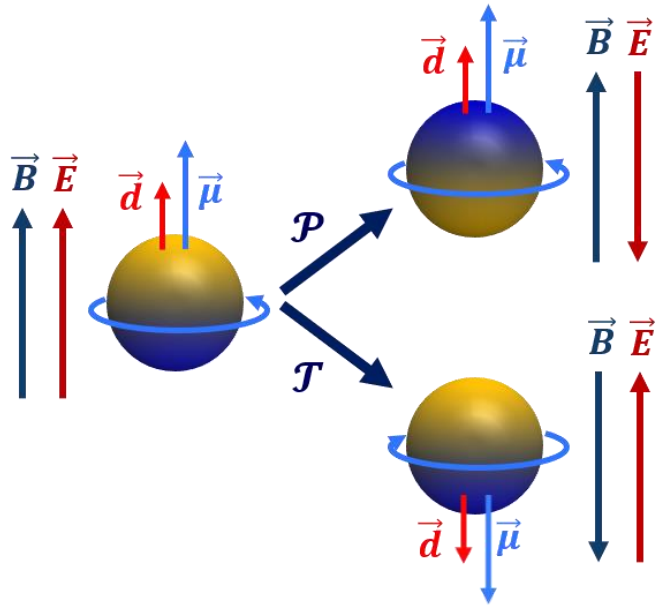
III. Physikalisches Institut B | RWTH AACHEN UNIVERSITY | JEDI | JÜLICH Forschungszentrum

EXPLAINING THE MATTER-ANTIMATTER ASYMMETRY



New source of CP violation?

ELECTRIC DIPOLE MOMENTS (EDMS)



$$\mathcal{H} = -\vec{\mu} \cdot \vec{B} - \vec{d} \cdot \vec{E}$$
$$\mathcal{P}\colon \mathcal{H} = -\vec{\mu} \cdot \vec{B} + \vec{d} \cdot \vec{E}$$
$$\mathcal{T}\colon \mathcal{H} = -\vec{\mu} \cdot \vec{B} + \vec{d} \cdot \vec{E}$$

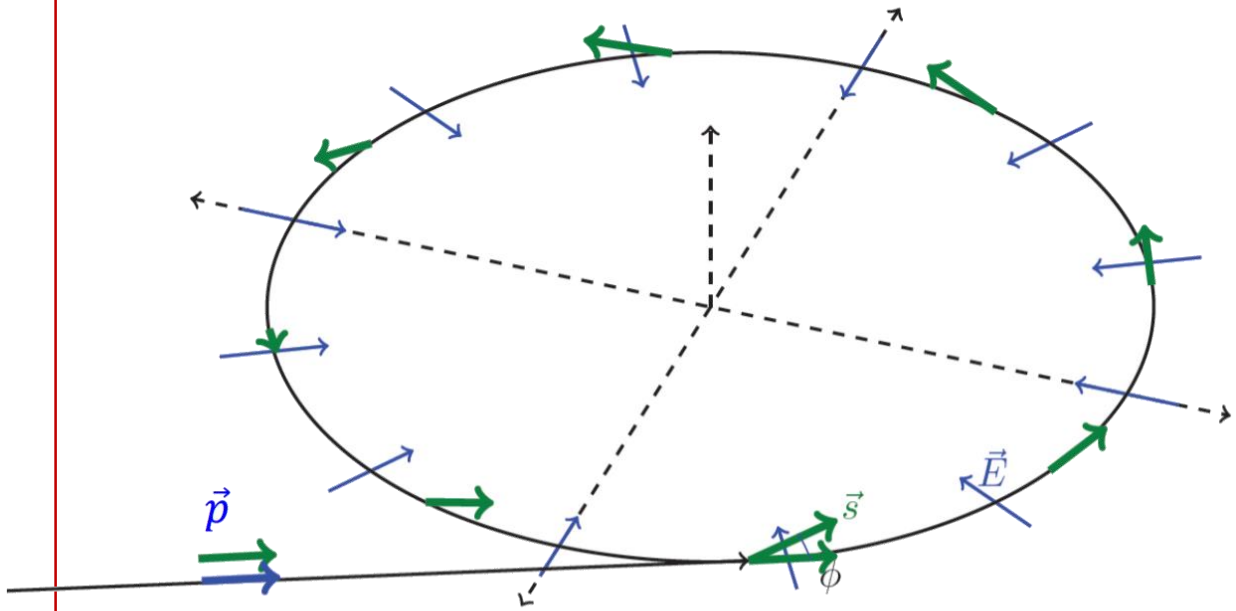
Permanent EDMs of light hadrons are $\mathcal{T}$- and $\mathcal{P}$-violating

➡ $\mathcal{CPT}$ theorem ⇒ $\mathcal{CP}$ violation

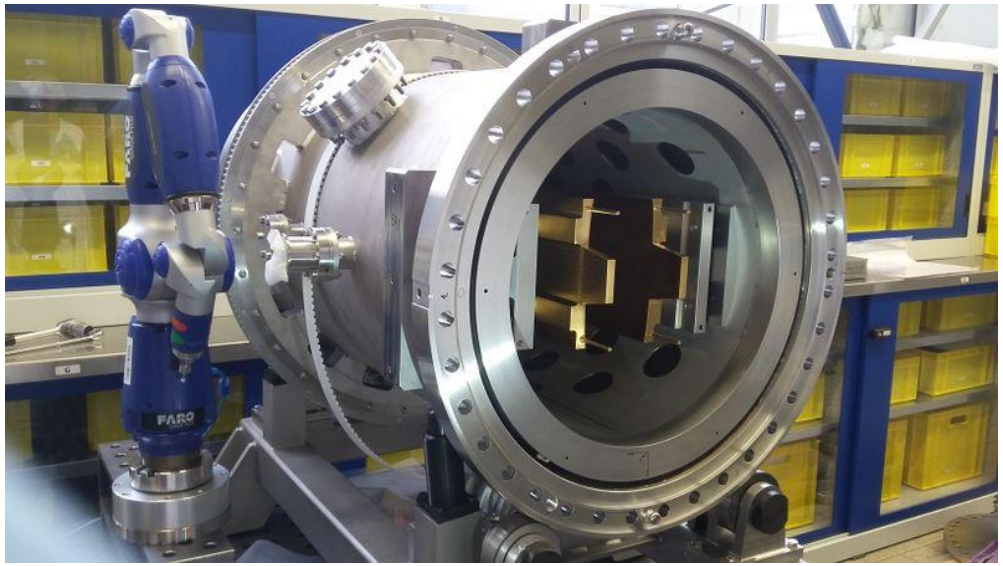
EDM MEASUREMENTS IN STORAGE RINGS

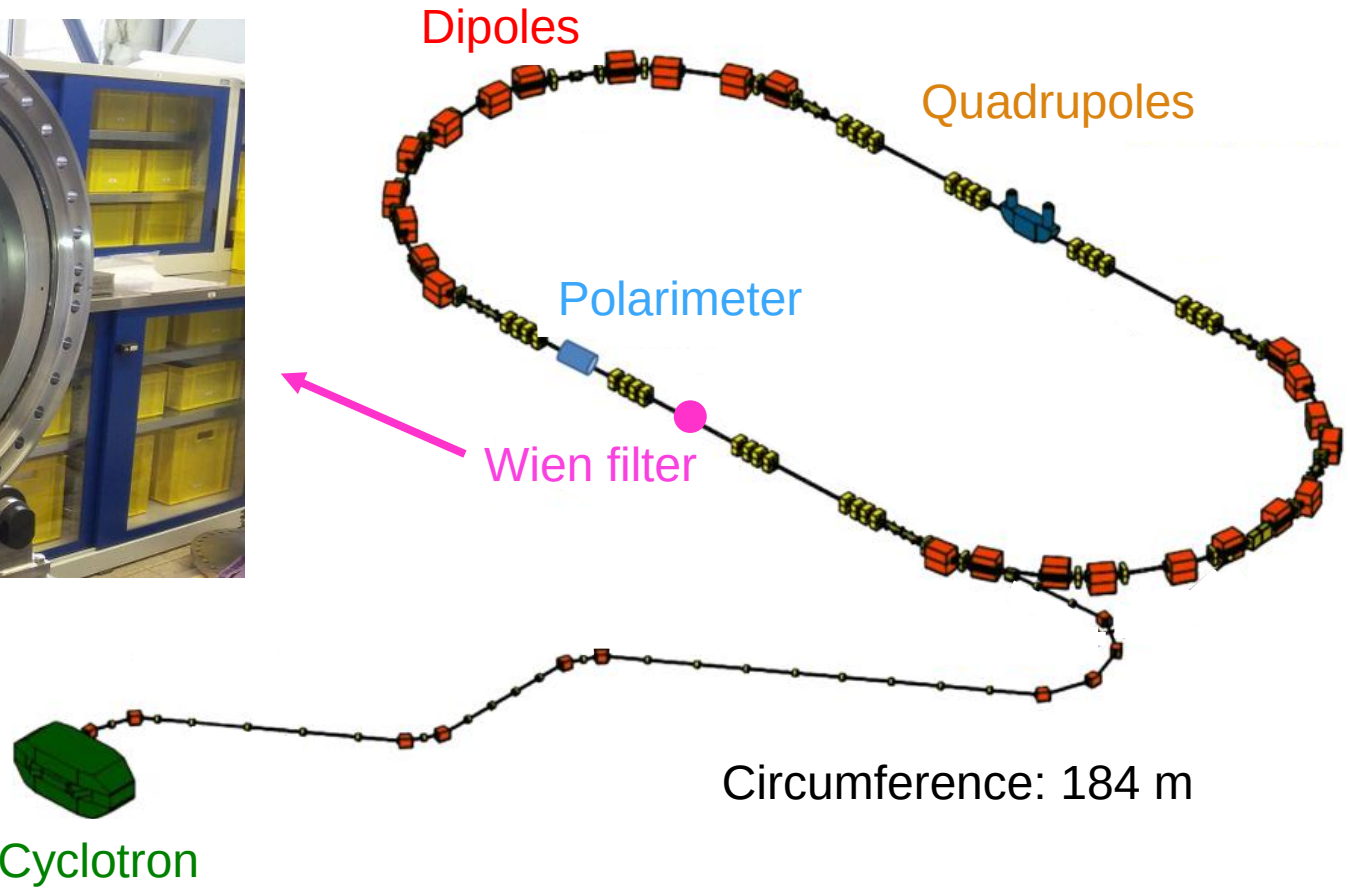
Basic idea:

- Inject particles with $\vec{p} \parallel \vec{S}$
- For EDM $= 0$: spin precesses in horizontal plane
- For EDM $\neq 0$: spin rotates out of horizontal plane
- Measure: build-up of vertical polarization ($\phi \propto |\vec{d}|$)

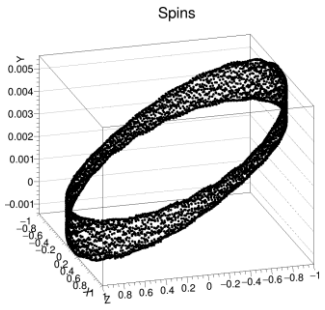


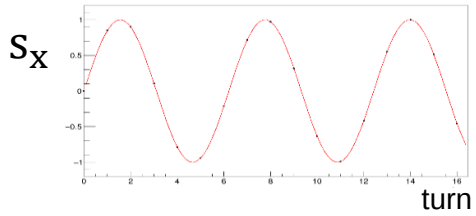
COOLER SYNCHROTRON (COSY) IN JÜLICH

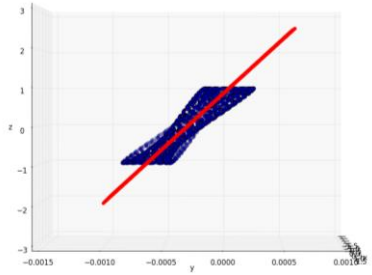




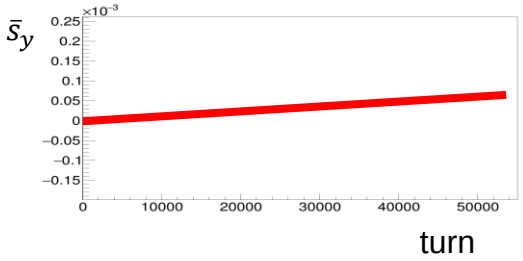
SIMULATIONS

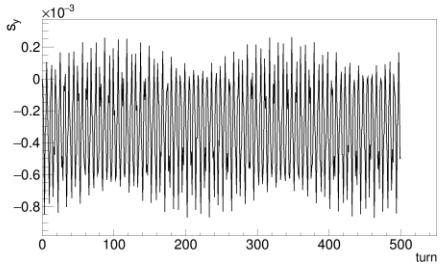


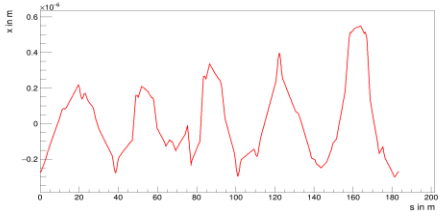




Bmad







RWTH AACHEN UNIVERSITY JEDI JÜLICH Forschungszentrum

POSTER

Search for Electric Dipole Moments at COSY in Jülich

Closed-orbit and spin tracking simulations

THANK YOU

RWTH AACHEN UNIVERSITY JEDI JÜLICH Forschungszentrum