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The muEDM experiment at PSI

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Electric dipole moments (EDMs) of elementary particles violate time-reversal symmetry. According to the CPT theorem, this also implies the violation of combined charge-conjugation and parity-inversion (CP) symmetry, making EDMs powerful tools for probing physics beyond the current Standard Model (SM) of particle physics.

The muEDM experiment at PSI aims at setting the ground for a new direct electric dipole moment (EDM) search using muons. The experiment will perform this dedicated search using the frozen-spin technique for the first time worldwide, aiming at improving the current sensitivity by more than three orders of magnitude to better than $6 \times 10-23$ e cm, an astonishing jump. This search is a unique opportunity to probe previously uncharted territory and to test theories Behind Standard Model physics.

The experiment will be performed in two phases.

Phase I: In this exploratory phase, we will set up an experiment to demonstrate the frozen-spin method and collect a first data sample. Although the sensitivity to a muon EDM will be sufficient to improve the current best measurement, the main purpose is to establish all necessary techniques and methods for a measurement with the highest possible sensitivity.

Phase II: In this second phase we aim at integrating all lessons learned from Phase I and push the sensitivity down to 10–23 e cm.

The first data taking is expected by 2026. We will present the status and key features of the experiment.

Secondary track

T09 - Beyond the Standard Model

Author: PAPA, Angela (PSI&INFN-UniPi)

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