

# Research and Development of a Muon Entrance Trigger for the muEDM Experiment at PSI

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#### Physics Motivation of muEDM Experiment

## Frozen-spin technique in muEDM<sup>[4]</sup>

#### • A "background-free" signal [1]

- Very small contribution of CKM matrix from the SM ( $d_{\mu} \sim 10^{-42} e \cdot cm$ )
- Various BSM models that predicts large EDM [2, 3]
  - Complementary to LHC searches
- Matter-antimatter asymmetry requires more CPV

### Freezing g-2 with a radial E-field, $E \approx aBc\beta\gamma^2$

> Removes anomalous precession in storage plane > EDM inflicts an increasing vertical polarisation





CH9

#### muEDM Entrance Trigger Prototype and Geant4 Simulation

A fast entrance detector is expected to work in concert with a magnetic pulse generator to kick muons to the desired orbit

Beam view Side view Light guide





#### $\pi$ E1 Beamline Test







#### Photon distribution



• Optics parameters extracted from the measured beam profile • Simulation of beam profile from extracted parameters • Provides better reference in simulation for further study of entrance trigger



#### References

[1] M. Pospelov and A. Ritz, Phys. Rev. D89 (2014) no.5, 056006 [2] Y. Shigekami et al., Phys. Lett. B 831 (2022 137194) [3] A. Crivellin, et al., Phys. Rev. D98 (2018) no.11, 113002

[4] Muon g-2 collaboration, Phys. Rev. Lett. 126(2021) 141801

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