technische universität dortmund

PARTICLE PHYSICS SEMINAR

Topic

The MUonE experiment: an alternative method to measure the hadronic contribution to the muon g-2

Abstract

The muon anomalous magnetic moment, a_μ, stands as one of the most compelling observables to test the validity of the Standard Model and its possible extensions. The Muon g-2 experiment at Fermilab has recently published its final measurement of a_μ with the astonishing precision of 127 ppb (parts per billion). However, a clear comparison with the Standard Model prediction is prevented by the evaluation of the leading order hadronic corrections, $a_\mu^{HVP,LO}$, which shows tensions between lattice QCD calculations and data-driven calculations based on hadronic cross-sections measurements. Independent crosschecks are thus required to solve the current disagreements and consolidate the theoretical prediction, in order to fully exploit the discovery potential of the muon g-2.

The MUonE experiment aims to shed light on this critical discrepancy by measuring $a_\mu^{HVP,LO}$ with an innovative approach, based on the extraction of the hadronic running of the QED coupling constant from a precise measurement of the shape of the $\mu^+e^- \rightarrow \mu^+e^-$ differential cross section. The experiment is carried out at the M2 beam line at CERN, where a 160 GeV muon beam is scattered off the atomic electrons of a low-Z target. A first run with a minimal prototype detector was held in 2023, while a pilot run including a reduced setup of the full detector components has been carried out in Summer 2025. The main concepts and challenges of the experimental proposal will be presented, along with first preliminary results from the 2025 run.

Speaker

Dr. Riccardo Pilato
University of Liverpool

Room

CP-O3-123

Date/Time

Thursday, 16.10.2025
15:00 – 16:00

Organisation:

Dr. Maik Becker