

The MUonE experiment: use of a muon beam to perform the space-like measurement of the leading hadronic corrections to the muon $g-2$

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The anomalous magnetic moment $g-2$ of the muon is a precision measurement which exhibits one of the largest deviation between theory and experiment. In the next years it will be measured at Fermilab and J-PARC with even higher precision

The hadronic contribution to the muon $g-2$, a_{μ}^{HLO} , is the most important effect after the pure QED contributions. It is however affected by a large uncertainty which dominates the error on the theoretical prediction in the Standard Model.

Therefore it is extremely important to get independent measurement of this hadronic contribution to reduce its uncertainty.

We propose a novel approach to determine the leading hadronic corrections, consisting in measuring the effective electromagnetic coupling in the space-like region at low momentum transfer in the elastic scattering of high energy muons from atomic electrons.

The high energy muon beam M2 in the CERN North Area is adequate to perform such a measurement. The challenge of this project MUonE is in the accuracy which must be achieved, both statistical and systematic. This measurement will allow the determination of a_{μ}^{HLO} alternative to the present results obtained with the dispersive approach via time-like data.

In this talk, accent will be put on the results of testbeams performed in 2017 and 2018 at CERN.

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