

The MUonE experiment: measuring the leading hadronic contribution to the muon $g-2$ via space-like data

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The precision measurement of the anomalous magnetic moment of the muon presently exhibits a 3.5σ discrepancy with the Standard Model (SM) prediction. In the next few years this measurement will reach an even higher precision at Fermilab and J-PARC. While the QED and electroweak contributions to the muon $g-2$ can be determined very precisely, the leading hadronic (HLO) correction is affected by a large uncertainty which dominates the error of the SM prediction.

We propose a novel approach to determine the HLO contribution to the muon $g-2$ based on the measurement of the effective electromagnetic coupling in the space-like region at low-momentum transfer. We will discuss the possibility of performing this measurement at CERN by the MUonE experiment, which aims at a very precise determination of the muon-electron elastic differential cross-section, exploiting the scattering of 150 GeV muons (currently available at CERN's North area) on atomic electrons of a low-Z target. We will describe the experimental challenges posed by this measurement, by the detector able to keep the systematic effects at the required level of 10 ppm and the status of this proposal.

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