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## **Measurement of the leading hadronic contribution to the muon $g-2$ via space-like data**

*Friday, 21 April 2017 17:00 (1 hour)*

The precision measurement of the anomalous magnetic moment of the muon presently exhibits a  $3.5\sigma$  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 means of 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 and by a detector able to keep the systematic effects at the required level of 10 ppm. This measurement will provide an independent determination of the HLO contribution to the muon  $g-2$  competitive with the time-like dispersive approach, thus consolidating the SM prediction. It will therefore allow a firmer interpretation of the measurements of the future muon  $g-2$  experiments at Fermilab and J-PARC.

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