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The detector for the MUonE experiment at CERN.

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The Fermilab Muon g-2 experiment observes a more than 5σ discrepancy
in the anomalous magnetic moment a_μ with respect to the Standard Model prediction, which might be explained by hadronic corrections, whose theoretical prediction is difficult and uncertain. There are few ways to check this and the MUonE experiment proposes to do so by a unique direct measurement, which is extremely challenging. The essence of the measurement is a precise evaluation of the differential cross section for μ-e elastic scattering, in conjunction with recent theoretical formulations based on dispersive calculations. The apparatus is based on a series of identical tracking stations comprised of a Be or C target and a series of downstream tracking planes, using novel silicon microstrip 2S-modules developed for the CMS tracker upgrade. Much of the required information can be obtained from the angular distribution of the two outgoing particles in each event, whose directions should be precisely measured. The detector also includes an electromagnetic calorimeter and a muon filter to aid the identification of the secondary particles, and a beam monitoring station to measure the beam momentum on an event by event basis with high resolution. Careful control of systematic errors is vital for success.
A series of tests has been carried out in the CERN M2 beamline with 160 GeV muons, in collaboration with CMS, to commission modules, assess performance and provide a proof-of-principle demonstration of the MUonE experiment concept. The modules are read out at 40 MHz, in CMS to send data to the L1 trigger, which is exploited by MUonE to allow data taking with 50 MHz muons. Results from these tests will be presented with preliminary data on μ-e scattering and the system performance. Ideas on how the apparatus can be improved for the final experiment will also be discussed.

Collaboration

MUonE

Role of Submitter

The presenter will be selected later by the Collaboration

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