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The anomalous precession frequency measurement in the Fermilab Muon $g-2$ experiment

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The muon anomalous magnetic moment, $a_\mu = \frac{g-2}{2}$, can be both measured and computed with high precision, therefore it can provide an important test of the Standard Model and it is a sensitive probe for new physics. The E989 Muon $g-2$ Experiment at Fermilab aims to measure a_μ with a precision of 140 parts per billion, four time more precisely than the previous experiment at Brookhaven National Laboratory. E989 seeks to either resolve or confirm the discrepancy between the Standard Model value and experimental one, which may be a hint of new physics. Recently E989 published a new measurement of a_μ from the Run 1 dataset, confirming the previous BNL value with comparable precision.

The a_μ measure requires a precise determination of both the muon spin anomalous precession frequency and the average magnetic field seen by the muons as they circulate in a storage ring. The anomalous precession frequency measure is based on the time distribution of high-energy decay positrons observed by 24 electromagnetic calorimeters placed around the inside of the ring, while the magnetic field is constantly monitored by NMR probes. In this talk will present the precession frequency analysis of the Run 1 data (2018), the related systematics and the latest results.

Working group

WG4

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