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Measurement of the anomalous spin precession frequency in the Muon g-2 experiment at Fermilab

Friday, 8 July 2022 11:15 (17 minutes)

The muon anomaly, $a_\mu = (g_\mu - 2)/2$, is a low-energy observable which can be both measured and computed to high precision, making it a sensitive test of the Standard Model and a probe for new physics. The current discrepancy between the Standard Model calculation from the Muon $g-2$ Theory Initiative [T. Aoyama et al. - Phys. Rept. 887 (2020), 1-166] and the experimental value is $a_\mu^{SM} - a_\mu^{exp} = (251 \pm 59) \cdot 10^{-11}$, with a significance of $4.2\,\sigma$.
The anomaly was measured with a precision of 0.54 ppm by the Brookhaven E821 experiment and the E989 experiment at Fermilab aims for a four-fold improvement in precision, to confirm or refute the discrepancy. In Spring 2021, E989 published the first results of a_μ with a precision of 0.46 ppm from the 2018 data-taking campaign. The measurement of the anomalous muon spin precession frequency, ω_a, is based on the arrival time distribution of high-energy decay positrons observed by 24 electromagnetic calorimeters, placed around the inner circumference of the $g-2$ storage ring. This talk will present the status of ω_a analysis performed on the datasets collected during Run 2 and 3 (2019 and 2020 campaigns), with a preliminary analysis of the systematic uncertainties.

In-person participation

Yes

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