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

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The muon anomaly, $= \frac{(-2)}{2}$, 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 -2 Theory Initiative [T. Aoyama et al. - Phys. Rept. 887 (2020), 1-166] and the experimental value is $^{\boxtimes}-^{\boxtimes\boxtimes} = (251\pm59)\ 10^{-11}$, with a significance of 4.2 .
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 with a precision of 0.46 ppm using the data from the 2018 data-taking campaign. The measurement of the anomalous muon spin precession frequency, , is based on the arrival time distribution of high-energy decay positrons observed by 24 electromagnetic calorimeters, placed around the inner circumference of a storage ring. This talk will present the analysis technique of and a preliminary status of the analysis performed on the datasets collected during Run 2 and 3 (2019 and 2020 campaigns).

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