

Anomalous Spin Precession Frequency Analysis in the Muon $g-2$ Experiment at Fermilab

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The Muon $g - 2$ experiment at Fermilab is progressing towards its physics goal of measuring the muon anomalous magnetic moment with the unprecedented precision of 140 parts per billion. The experiment collected proposed statistics (number of detected decay positrons) and completed the scientific operation in June 2023. Two previous publications in 2021 and 2023 were based on the data taken in 2018 through 2020. The analysis of the largest dataset taken in 2021 through 2023 is underway, projecting the total uncertainty to be reduced to the target uncertainty. The experiment essentially measures the muon anomalous spin precession frequency (ω_a) and the proton Larmor frequency as a measure of the magnetic field. In this talk, we will walk through the overview of ω_a measurement and its key systematics. Then, we discuss the improvements made in later operations to understand better and reduce the systematic uncertainty on the measured ω_a .

Working Group

WG 4: Muon Physics

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