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Anomalous Precession Frequency Analysis with a focus on the beam dynamics modelling in the Fermilab Muon g-2 Experiment

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The Muon g-2 Experiment at Fermilab aims to achieve an unprecedented precision of 140 ppb in measuring the muon's anomalous magnetic moment. The experiment is designed to determine the difference frequency (ω_a) between the muon spin precession and cyclotron motion, as well as the magnetic field (ω_p) experienced by the muons. This high-precision experiment requires meticulous analysis strategies for two equally important quantities. In August 2023, the collaboration released their second results, which incorporated data from Run-1, Run-2, and Run-3. These results showed a significant discrepancy from the Standard Model prediction, reaching the 5σ level. The final central value, including data from Run-4, Run-5, and Run-6, is expected to be released in late 2025. This poster will present a detailed analysis of the anomalous precession frequency (ω_a), highlighting improvements in the analysis since the 2021 results, with a focus on the beam dynamics modeling.

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