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The Fermilab Muon g-2 Experiment: Status and Outlook

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The Fermilab Muon g-2 (E989) collaboration has published the most precise measurement of the muon anomalous magnetic moment a_μ with an uncertainty of 460 ppb in 2021 based on the Run 1 (2018) dataset. The new experimental world average of a_μ deviates by 4.2 standard deviations from the Standard Model prediction provided by the Muon g-2 Theory Initiative.

Following Run 1, experiment upgrades have improved the stability of the detector and storage ring systems and refined the characteristics of the stored muon beam. Together with the significantly larger statistics, specialized measurement campaigns, analysis improvements, and simulation efforts, these aim to reduce the combined uncertainties toward the ultimate precision goal of 140 ppb.

Following the Run 1 publication, the analysis of Run 2 and 3 data is in progress. Meanwhile, the experiment reached with the recently completed Run 5 almost the required number of observed muon decays to achieve the ultimate precision goal.

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