

A Dedicated Period of Magnetic Field Systematics Studies in the Muon g-2 Experiment at Fermilab

The Muon g-2 experiment, FNAL E989, collected muon beam data over six accelerator operations years from 2017 to 2023. Since the final experimental uncertainty is expected to be statistically limited, time during accelerator-on periods was spent almost entirely on collecting “production” quality muon data and the necessary associated magnetic field measurements (“trolley runs”). Limited time was given during summer shut-downs to magnetic field studies, but those studies had to fit in around scheduled maintenance and power outages. After reaching the statistics goal of 21x the BNL E821 data set in early 2023, significant time was spent performing muon beam and decay positron systematic studies with the remaining beam-on time of 2023. After the end of muon data collection in July 2023, an additional ~6 month period of magnet operation was undertaken to perform final systematic studies related to magnetic field corrections, before finally warming the superconducting coils up to room temperature in February 2024. I will discuss methods and preliminary results of studies during this period that were aimed at decreasing uncertainties on some of the crucial corrections to trolley run data and improving our understanding of fast magnetic field transients.

Working Group

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