

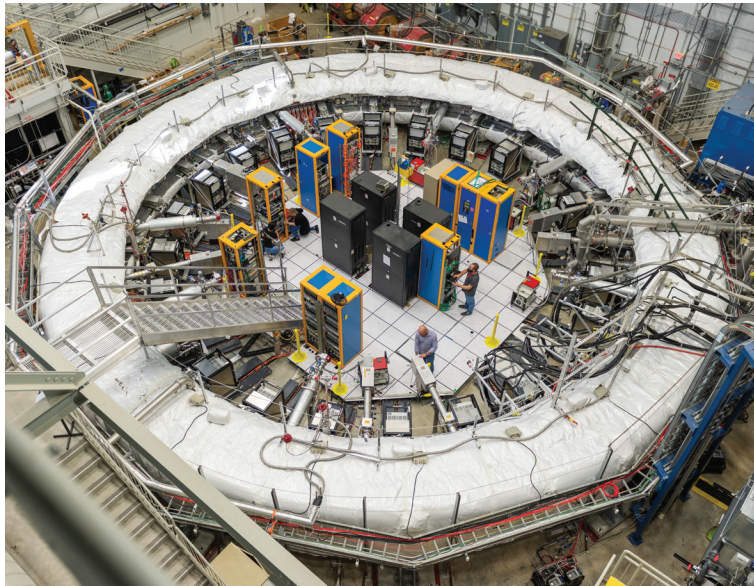
Muon g-2 Experiment

By studying the properties of muons, scientists at Fermilab hope to learn whether there are elementary particles beyond the ones we know.

The experiment

The Muon g-2 experiment probes the magnetic properties of the muon — a heavy sibling of the electron — in the search for new physics. Muon g-2 (pronounced gee-minus-two) is an international collaboration between Fermilab and dozens of labs and universities in seven countries.

The Muon g-2 experiment studies the precession or “wobble” of muons when placed in a magnetic field. Based on what we already know about muons and other particles, scientists can predict with great precision the value of the muons’ wobble. If the experiment comes up with something different, it means that our current understanding of physics is incomplete, and it may indicate the presence of additional particles or hidden subatomic forces. It would open the door to exciting new realms of science.



The final result of Fermilab's Muon g-2 experiment was announced on June 3, 2025. It agrees with Fermilab's results from 2021 and 2023 but with much better precision.

What are muons?

Muons are subatomic particles similar to electrons, but 207 times heavier.

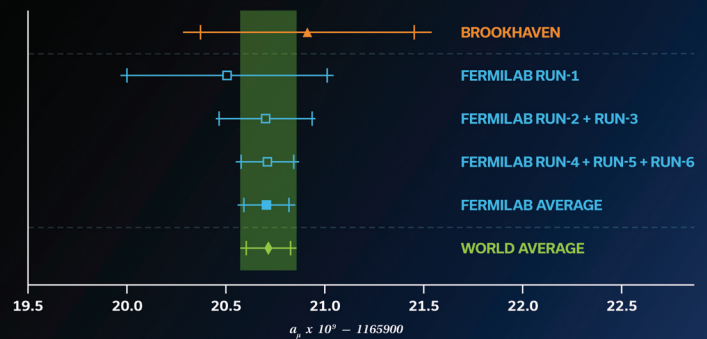
They carry the same electrical charge as an electron.

They exist for only about 2.2 millionths of a second.

Scientists at Fermilab can make and store large quantities of muons.

When placed in a magnetic field, muons behave much like a gyroscope, and it is this property, called the g-factor, that the Muon g-2 experiment measures.

MUON g-2 2025 RESULTS



The final Muon g-2 measurement is based on the analysis of the last three years of data, taken between 2021 and 2023, combined with the previously published datasets.

The most precise measurement for years to come

The Fermilab Muon g-2 experiment improved on a version of the same experiment at DOE's Brookhaven National Laboratory that concluded in 2001.

20 years later, the first result of the Muon g-2 experiment at Fermilab showed strong evidence that muons behaved slightly differently than what was predicted by the Standard Model, hinting at the possibility of new physics. Their 2023 result confirmed this with double the precision.

On June 3, 2025, the Fermilab Muon g-2 collaboration released their third and final measurement of the muon magnetic moment, which agreed with the 2021 and 2023 numbers but with even better precision. The result is based on the analysis of the last three years of data combined with the previously published datasets, more than tripling the size of the dataset used for their 2023 result. It will be the world's most precise measurement of the muon magnetic anomaly for years to come.

Theoretical physicists recently published a prediction, based on a new computational technique, that better agrees with the experimental value but is in tension with the prediction from the previous technique. Efforts are continuing toward an evaluation of g-2 using both calculations in hopes of one day solving the mystery of the muon's magnetic moment.

After six years of collecting data, the Muon g-2 experiment at Fermilab stopped running in 2023. But the Muon g-2 collaboration will continue to analyze their data and share what they learn about the muon.

More information

Muon g-2 experiment website: muon-g-2.fnal.gov