

Measurement of the magnetic field in the Fermilab Muon $g-2$ experiment

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The Muon $g-2$ experiment at Fermilab measures the muon magnetic-moment anomaly, $a_\mu = (g - 2)/2$, with the ultimate goal of 140 parts per billion (ppb) precision. This requires determining the absolute magnetic field, averaged over space and time, experienced by the muons, expressed as the nuclear magnetic resonance frequency of protons in a spherical pure water sample at a specified reference temperature. A chain of calibrations and measurements maps and tracks the magnetic field providing the muon-weighted average field with precision better than 60 ppb. This talk will present the principles, practical realizations, and innovations incorporated into the measurement and analysis of the magnetic field for the 2019-20 data sets.

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