

Abstract Submitted
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High Precision Magnetic Field Measurement for the Muon g-2 Experiment RAN HONG, Argonne Natl Lab, MUON G-2 COLLABORATION COLLABORATION — The Muon g-2 Experiment (E989) at Fermilab will measure the anomalous magnetic moment of muon a_μ with a precision of 140 part-per-billion (ppb), aiming at resolving the 3.5 standard deviation between the previous measurement of a_μ at Brookhaven (E821) and the Standard Model calculation of a_μ . In E989, the muon spin precession frequency ω_a is measured in a storage ring magnet, and the magnetic field has to be measured with comparable precision as that for ω_a . A magnetic field measurement system was developed to measure the magnetic field experienced by the muons with a precision of 70 ppb. Nuclear magnetic resonance (NMR) probes were designed to measure the magnetic field. The field scanning system in E821 that carries the NMR probes to measure the field in the muon-storage region was refurbished and upgraded with modern motion control and electronic readout systems. 378 new NMR probes and readout electronics were installed to monitor the field drift in between field scans. A special NMR probe which has a simpler and well-measured geometry and low magnetic perturbation was designed to calibrate the probes in the field scanning system. All systems were successfully commissioned, and ready for data taking starting in February 2018.

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