

Measurements the g-2 of the Muon at Fermilab

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The anomalous magnetic moment of the muon has been measured since the 1960s and is one of the most precise measured quantities in particle physics today. With similar precise theory calculation, the anomalous magnetic moment yields one of the most stringent tests for the standard model of particle physics. The Fermilab Muon g-2 collaboration aims to reducing the uncertainty on the anomalous magnetic moment by a factor of four compared to the latest BNL result from 2004, which showed slight tension to the theory prediction. In spring 2021 the Muon g-2 collaboration published its first result with a 460-ppb uncertainty based on data from run 1. The measurement principle is based on a clock comparison between the anomalous spin precession frequency of spin-polarized muons, which is the deviation of the Larmor- from the cyclotron-frequency, and a high-precision measurement of the magnetic field environment using nuclear magnetic resonance (NMR) techniques, expressed in terms of the (free) proton spin-precession frequency. Here we discuss the measurement principle, the latest result and improvements in operation and analysis of the Fermilab experiment.