

Abstract Submitted
for the APR17 Meeting of
The American Physical Society

Absolute Calibration of the Magnetic Field Measurement for Muon g-2¹ MIDHAT FAROOQ, TIM CHUPP, University of Michigan, MUON G-2 COLLABORATION COLLABORATION — The muon g-2 experiment at Fermilab (E989) investigates the $\sim 3\text{-}\sigma$ discrepancy between the standard model prediction and the current experimental measurement of the muon magnetic moment anomaly, $a_\mu = (g-2)/2$. The effort requires a precise measurement of the 1.45 T magnetic field of the muon storage ring to 70 ppb. The final measurement will employ multiple absolute calibration probes: two water probes and a ^3He probe. The ^3He probe offers a cross-check of the water probes with different systematic corrections, adding a level of confidence to the measurement. A low-field ^3He probe was developed at the Univ. of Michigan by employing a method called MEOP for the hyper-polarization of ^3He gas, followed by NMR to determine the frequency proportional to the magnetic field in which the probe is placed. A modified probe design for operation under high fields will be tested at Argonne National Lab. Future development also involves the study of the systematic uncertainties to attain the error budget of ~ 30 ppb for the calibration. Next, the calibration from the probes will be transferred to g-2 through several steps of a calibration chain ending in the final step of calibrating the NMR probes which measure the field in the muon storage ring at Fermilab.

¹NSF PHY-1506021

Midhat Farooq
University of Michigan

Date submitted: 30 Sep 2016

Electronic form version 1.4