Abstract Submitted
for the APR20 Meeting of
The American Physical Society

A data-driven approach to the lost muon systematic uncertainty in the Muon $g-2$ experiment at Fermilab[1] HANNAH BINNEY, University of Washington, MUON G-2 COLLABORATION — The Muon $g-2$ experiment at Fermilab plans to measure the muon anomaly a_μ to high precision. The goal of the experiment is to measure a_μ more precisely than the earlier Brookhaven experiment, which found a $> 3\sigma$ deviation from the Standard Model prediction of the anomaly. The Fermilab experiment is now in its third run of data taking, and analysis of the first run is underway. In order to achieve design sensitivity, systematic uncertainties must be well understood. One key uncertainty results from muons that are lost from the magnetic storage region before decaying into positrons. If the lost muon population has a different average spin phase than the stored muon population, the measured anomalous precession frequency ω_a will be biased. A correlation between phase and momentum can drive this type of effect if muons of a certain momentum are preferentially lost. In this talk, I will present a data-driven approach to measuring this bias for Run 1 data, including a measurement of the phase-momentum correlation and a measurement of the momentum dependence of the losses. I will then compare the measurements to beam simulations. Finally, I will present a calculation of this systematic uncertainty for Run 1.

[1]The author is supported by the DOE Office of Nuclear Physics under award DE-FG02-97ER41020.

Hannah Binney
University of Washington

Date submitted: 09 Jan 2020 Electronic form version 1.4