Ph.D. Dissertation Prospectus

Measurement of the Anomalous Magnetic Moment of the Muon to X parts per billion in Run 1 of the Fermilab Muon $g-2$ Experiment

Nicholas Kinnaird

Boston University Physics Department

Overview

this is a test
and another test

Outline

1 Introduction

- Magnetic moments of particles
- Standard Model contributions to a_μ
- QED
- Electroweak
- Hadronic
- Experimental value and discrepancy with theory
- Beyond the Standard Model

2 Principle Techniques of E989

- Measuring the precession frequency
- Measuring the magnetic field
- Production and injection of polarized muons
- Storage of muons
- Muon beam dynamics
- Corrections to the precession frequency

3 Detector Systems

- Auxiliary Detectors
- Calorimeters
- Laser calibration system
- Straw trackers

4 Track Reconstruction and Analysis

- Track finding
- Track fitting
- Track extrapolation
- Muon beam measurements

5 Precession Frequency Analysis

- Details of Run 1
- Hit reconstruction

- Fitting with the Ratio Method
- Stability vs fit start time
- Individual calorimeter fits
- Systematic studies vs pileup
- Systematic studies vs gain
- Systematic studies vs beam dynamics
- Systematic studies vs muon losses
- Systematic studies vs other

6 Conclusion

- Summary of systematic errors
- Final value of a_μ
- Looking forward to the next runs