Exploring the electron + track signature to measure tau g-2

Measuring the anomalous magnetic moment ('g-2') of the tau is a fundamental test of the Standard Model and discrepancies between measurement and theoretical prediction could reveal new phenomena. However, tau g-2 is poorly constrained due to the short lifetime of the tau lepton.

The ATLAS experiment recently made one of the first new measurements of tau g-2 in nearly two decades [1]. The new constraints were achieved by measuring photo-produced tau lepton pairs using heavy ion collision data. So far only events in which at least one of the tau leptons decays to produce a muon have been utilised. The existing ATLAS result is limited by data statistics, thus motivating the exploration of additional tau lepton decay modes.

In this project we will explore the electron + track signature for improving the measurement of tau g-2. Simulated data will be used to assess the potential yields which could be achieved in this channel and, time permitting, the new heavy ion data recorded in 2023 could also be investigated to check the electron performance in data.

[1] https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.131.151802

Group

FH - ATLAS

Project Category

B1. Physics Data Analysis and Performance (software-oriented)

Special Qualifications

Any experience with bash shells, Python, C++ and ROOT would be advantageous

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