

Standalone Geant4 Simulation for High-Eta Muon Detection with Iron-Core Toroids

Standalone Geant4 Simulation (part time)

One variant of high-eta (up to ~ 4.5) muon detection involves three stations of detectors in a new set of iron-core toroids. Preliminary studies have shown that such toroids are feasible. The deflection achievable with saturated magnetic field in iron is useful, the number of ampere-turns needed to saturate the iron is manageable, the heat generated by copper coils can be dissipated without difficulty, and the shielding properties of iron vs existing brass is likely to be acceptable. The next step is to perform a simulation with Geant4 to quantify physics performance. We anticipate doing this in a standalone setup so we are not tied to the complexities of Athena-G4.

The project involves setting up the iron toroid geometry and a simplified endcap calorimeter geometry with Geant4. Use a single-particle gun to shoot muons of various momentum through the system. Record hit information at three locations, and analyze the physics performance.