

Tracking Studies Using GenFit for the MUon Scattering Experiment—Abstract
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The Proton Radius Puzzle (PRP) is one of today's most recognized problems in physics. The puzzle is based on the fact that when one measures the proton charge radius via elastic electron-proton scattering or electronic hydrogen spectroscopy, the result is significantly different (over 5σ) than if one were to use muonic hydrogen spectroscopy. The MUon Scattering Experiment (MUSE) will take place with the hopes of contributing to solving the PRP. It will be carried out at the Paul Scherrer Institute in Willigen, Switzerland, and will use the π M1 beamline where the protons will be converted into a mixed species beam comprised of electrons, positrons, muons, antimuons, and charged pions. Simultaneous electron- and muon-proton scattering will then be performed allowing for the proton charge radius to be extracted from all four probes. Unlike many scattering experiments, the beam from the MUSE experiment is created at an angle and focused at the target, creating the need to reconstruct the beam line and scattered particle tracks. My project involves the GEM detectors, or Gas Electron Multipliers, which allow for a 3D reconstruction of incident beam particles. With the help of the GenFit software, I have been able to create small test cases to better understand the fitter, and I have been able to conclude that the GenFit fitter has a torque arm behavior favoring the outer GEMs, and that it presently cannot handle noise properly. I am currently working with the simulated files in order to determine the behavior of the track at the target, and will continue to work with this data to better understand the software.