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Simulation and Track Reconstruction Techniques for the J-PARC muon g-2 experiment

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The muon g-2/EDM proposed experiment at J-PARC is a promising and innovative attempt at the field of Precision Physics. The sensitivity goal of 0.1ppm will test the limits of our current understanding, and may probe for BSM observations.

Our project seeks out to investigate the computational techniques required by the experimental process.

The GEANT4 framework was used to simulate the late detection phase. This allowed us to observe the event hierarchy in different energies, and construct an event-selection algorithm.
Using techniques pertaining to Machine Learning and Image Feature Extraction, we were able to describe a Pattern Recognition algorithm, along a generic representation of these event categories

Finally, the modular GenFit2 framework was used to reconstruct tracks from sparse digitized event data.

Summary

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