

# Calibration of the Mu2e momentum scale using $\pi^+ \rightarrow e^+, \nu_e$ decays

*Friday 19 July 2024 10:45 (15 minutes)*

The Mu2e experiment at Fermilab will search for the neutrinoless muon-to-electron conversion in the nuclear field by stopping  $\mu^-$  on an Al target. The experimental signature of  $\mu^-$  to  $e^-$  conversion on Al is the 104.97 MeV mono-energetic conversion  $e^-$ s. Rejection of one of the most important experimental backgrounds coming from muon Decays-In-Orbit requires a momentum resolution  $< 1\%$  FWHM and a momentum scale calibrated to an accuracy of better than 0.1% or 0.1 MeV. Among other momentum scale calibration techniques, the collaboration is considering using 68.9 MeV  $e^+$ s from  $\pi^+ \rightarrow e^+, \nu_e$  decays of stopped  $\pi^+$ s. This calibration measurement has a significant background dominated by the muon decays in flight affecting the calibration accuracy. The background can be reduced by placing a thin Ti degrader in front of the stopping target and timing selection. We discuss the optimization of the momentum calibration measurement results.

## Alternate track

1. Beyond the Standard Model

## I read the instructions above

Yes

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