



Uniform Beam Simulation Updates: Understanding Statistical Effects

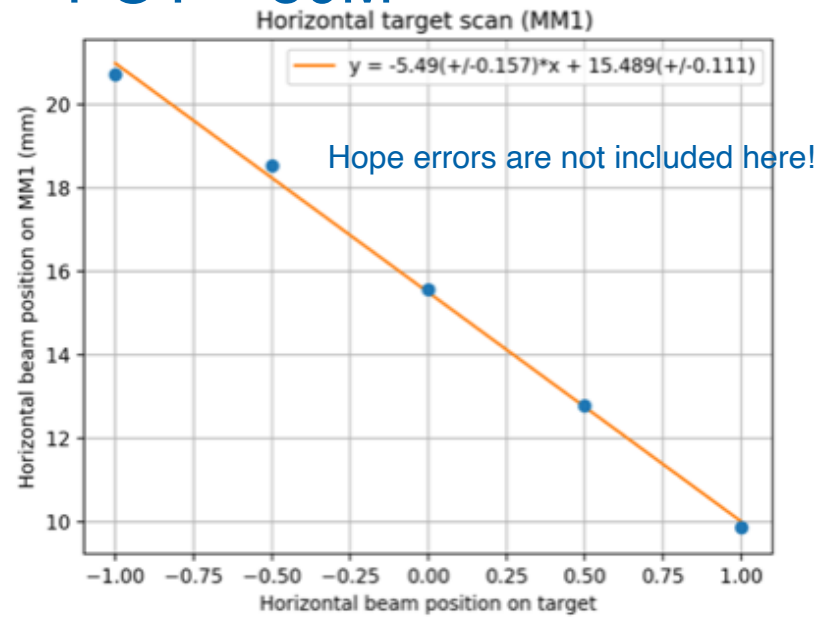
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11/29/2023

Arguments

- **Slope study data points from the uniform beam simulation are not scattered but aligned with the fitting curve.**
- **Slope vs POT is one directional and not like nominal.**

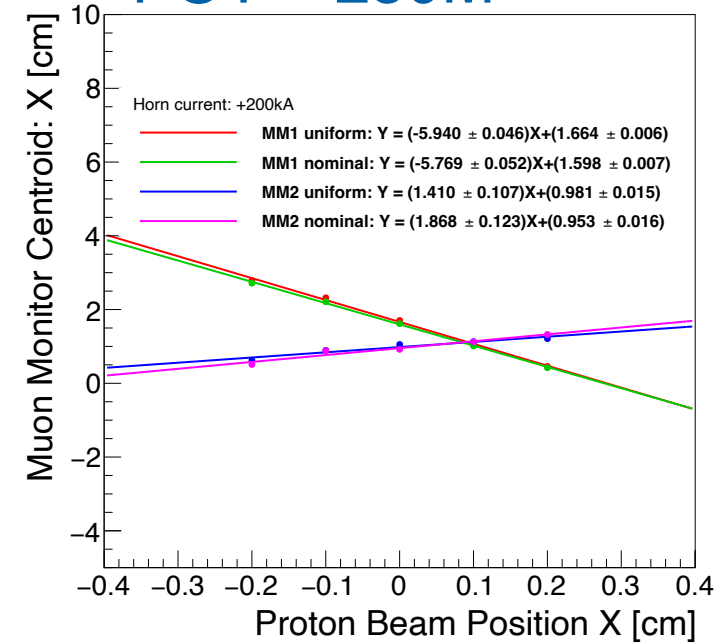
Nominal Simulation

POT = 50M^{nominal}



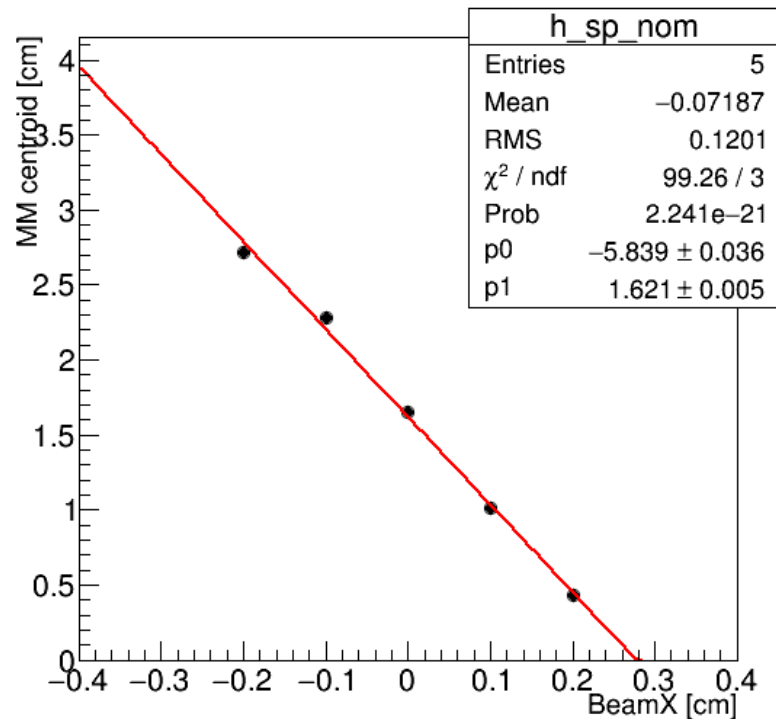
<https://nova-docdb.fnal.gov/cgi-bin/private/ShowDocument?docid=55447>

POT = 250M



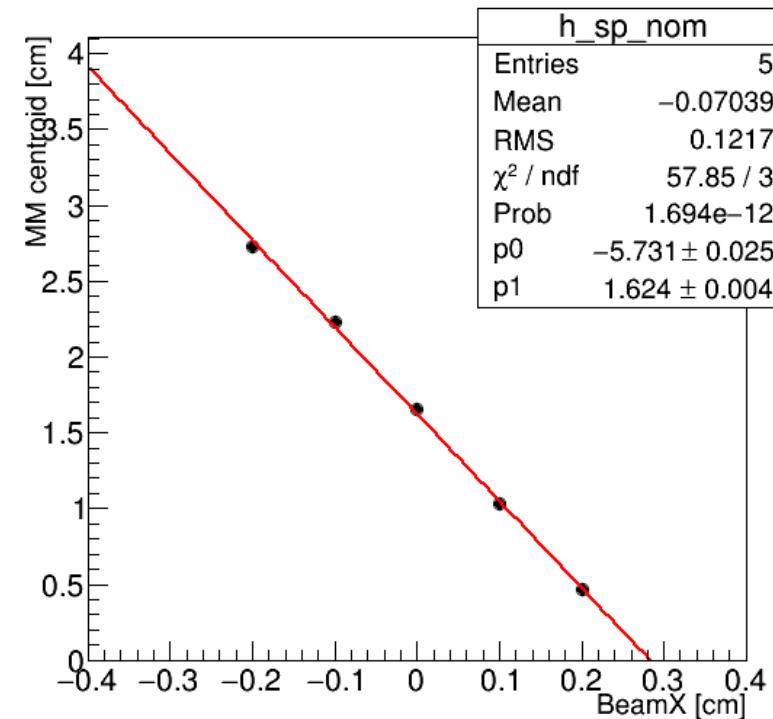
POT = 400M

Nominal

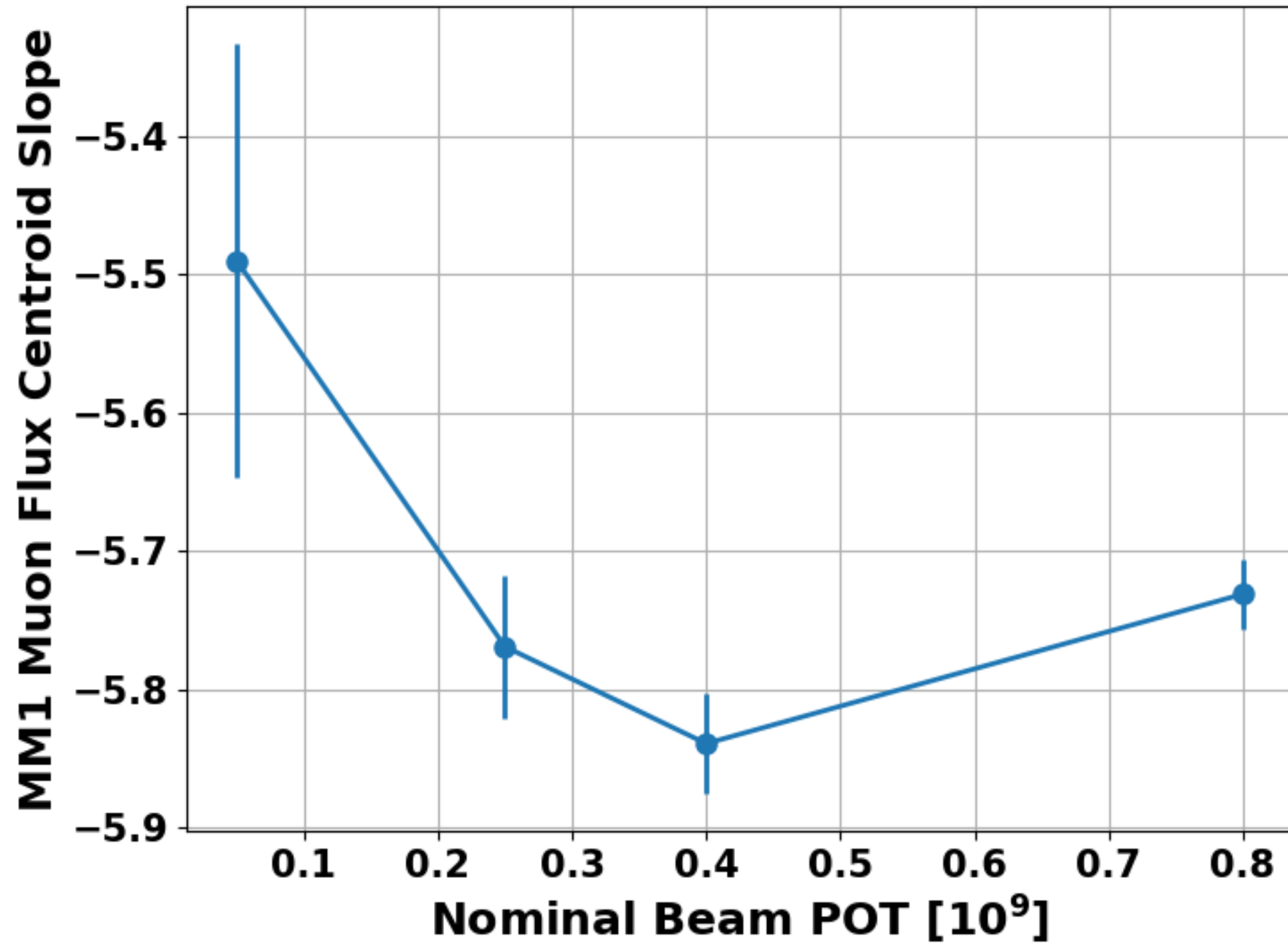


POT = 800M

Nominal



Nominal Simulation Slope vs POT

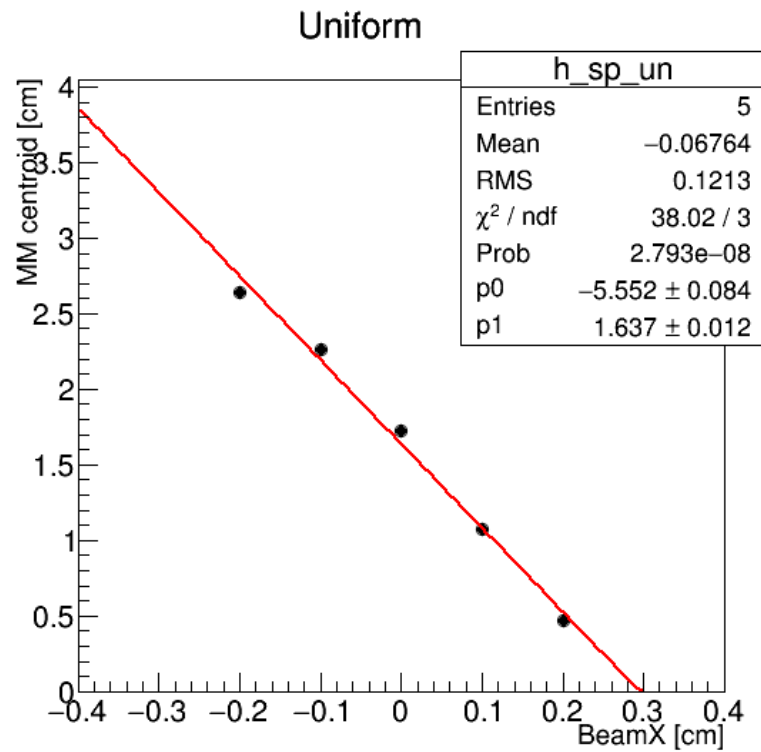


Nominal Simulation

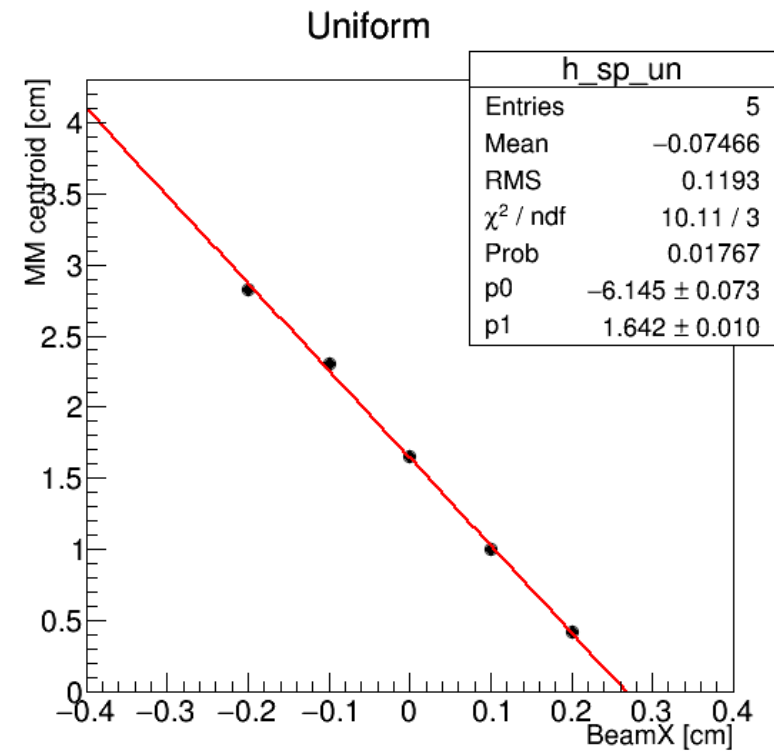
- **Nominal simulation data points are not scattered but aligned with the fitting curve.**
 - **This is a scientific way to conclude something based on evidences!**
- **How do you conclude that 50M POT is enough for simulation studies? Based on what study results?**

Uniform Simulation

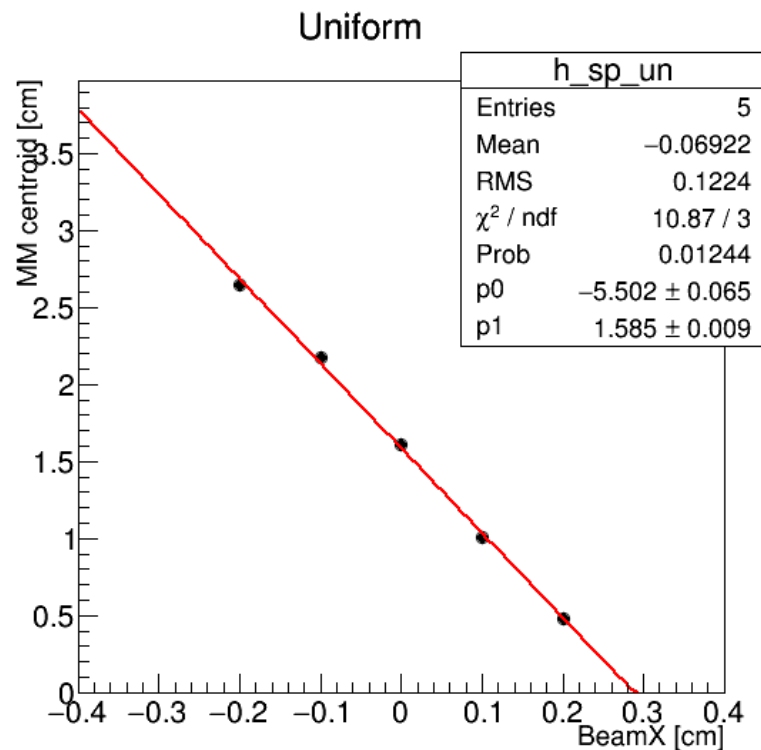
POT = 300M (~75M Nominal)



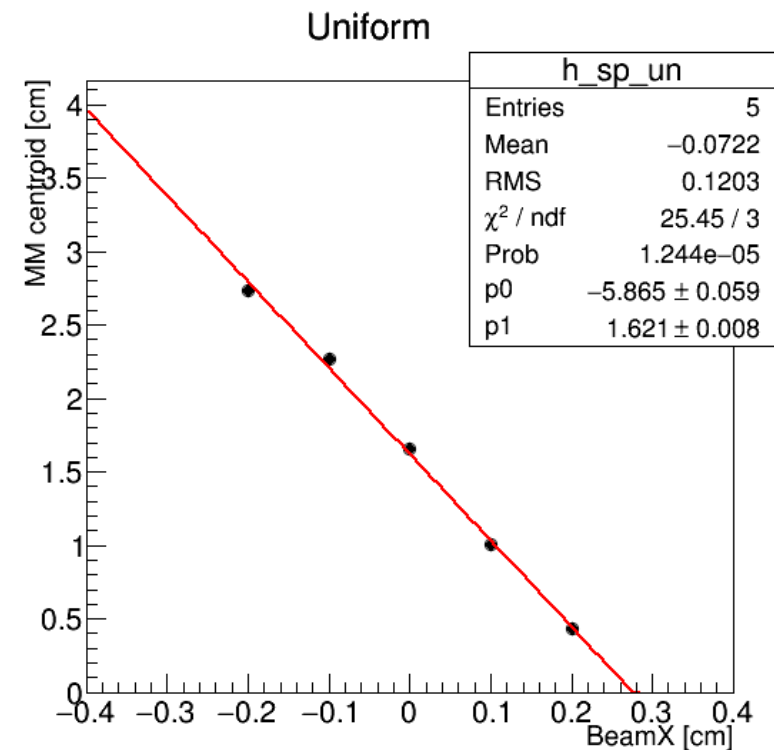
POT = 400M (~100M Nominal)



POT = 500M (~125M Nominal)



POT = 600M (~150M Nominal)

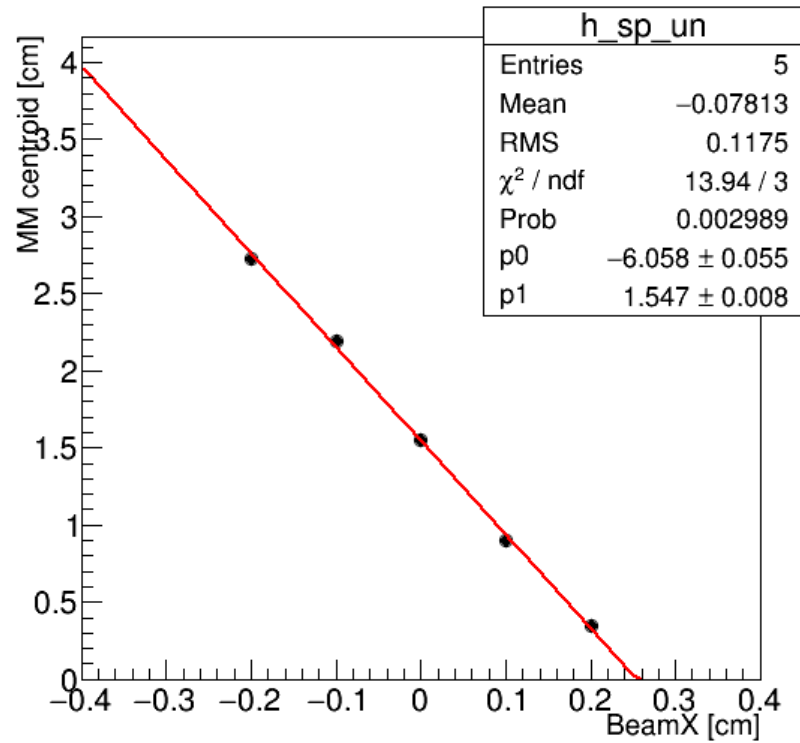


Beam Simulation

Uniform Simulation

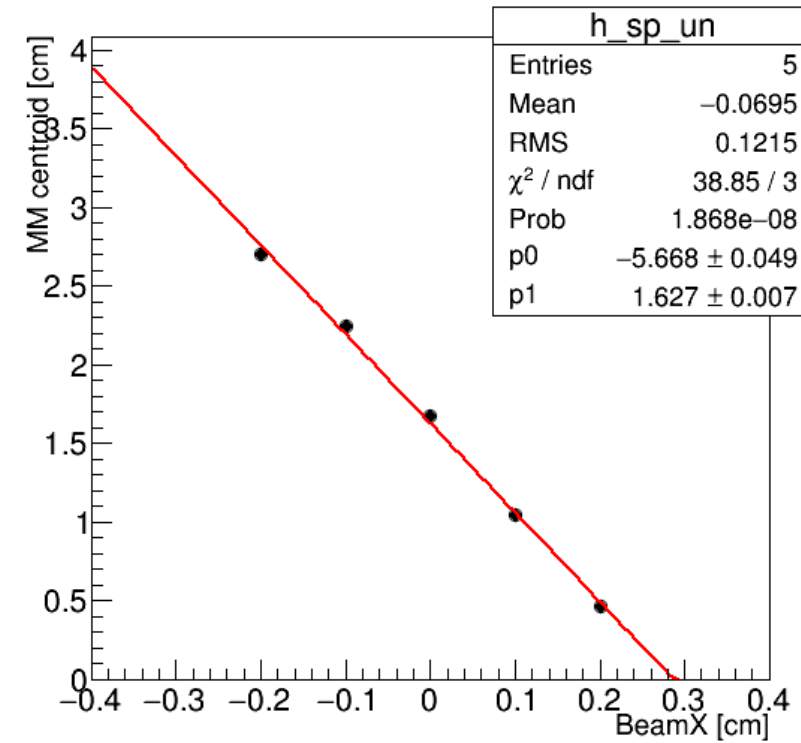
POT = 700M (~175M Nominal)

Uniform

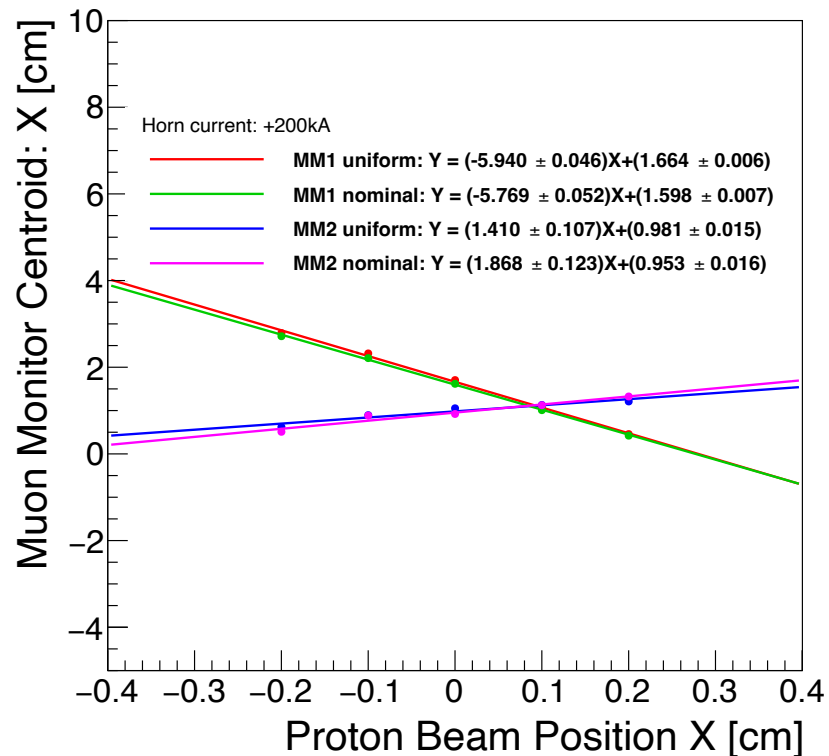


POT = 900M (~225M Nominal)

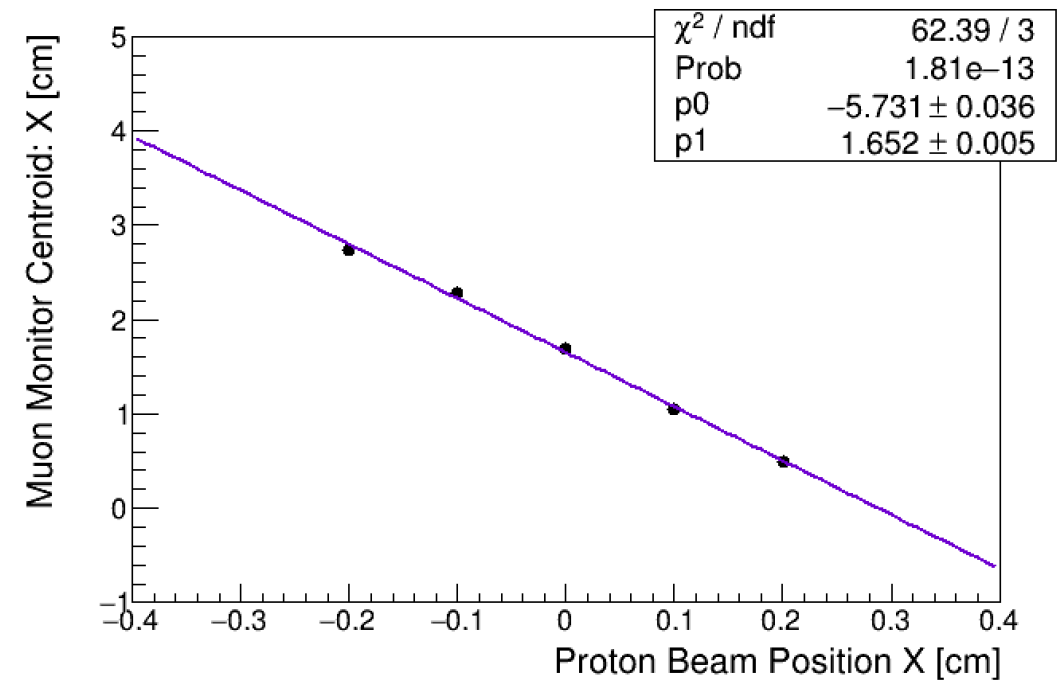
Uniform



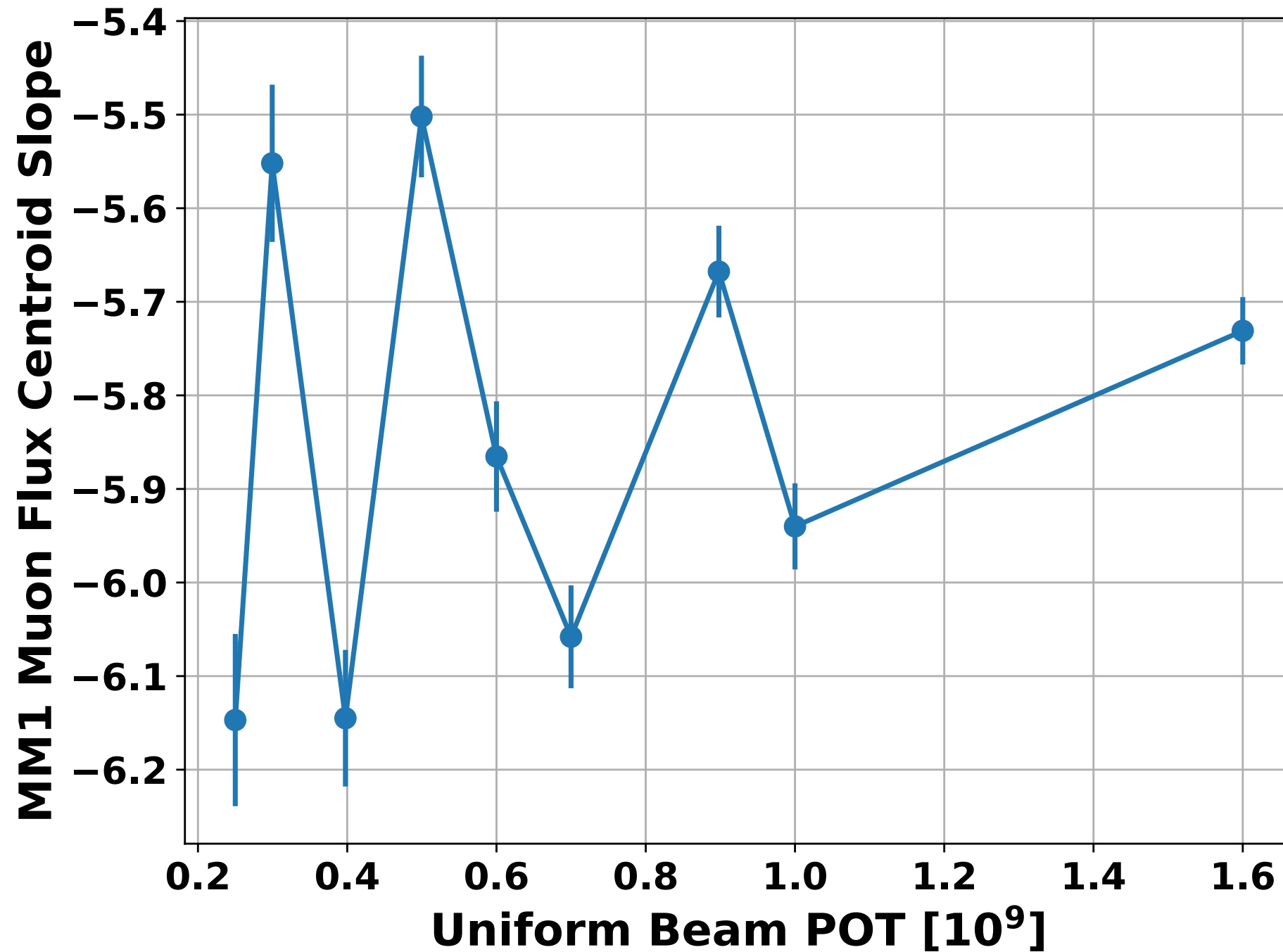
POT = 1000M (~250M Nominal)



POT = 1600M (~400M Nominal)

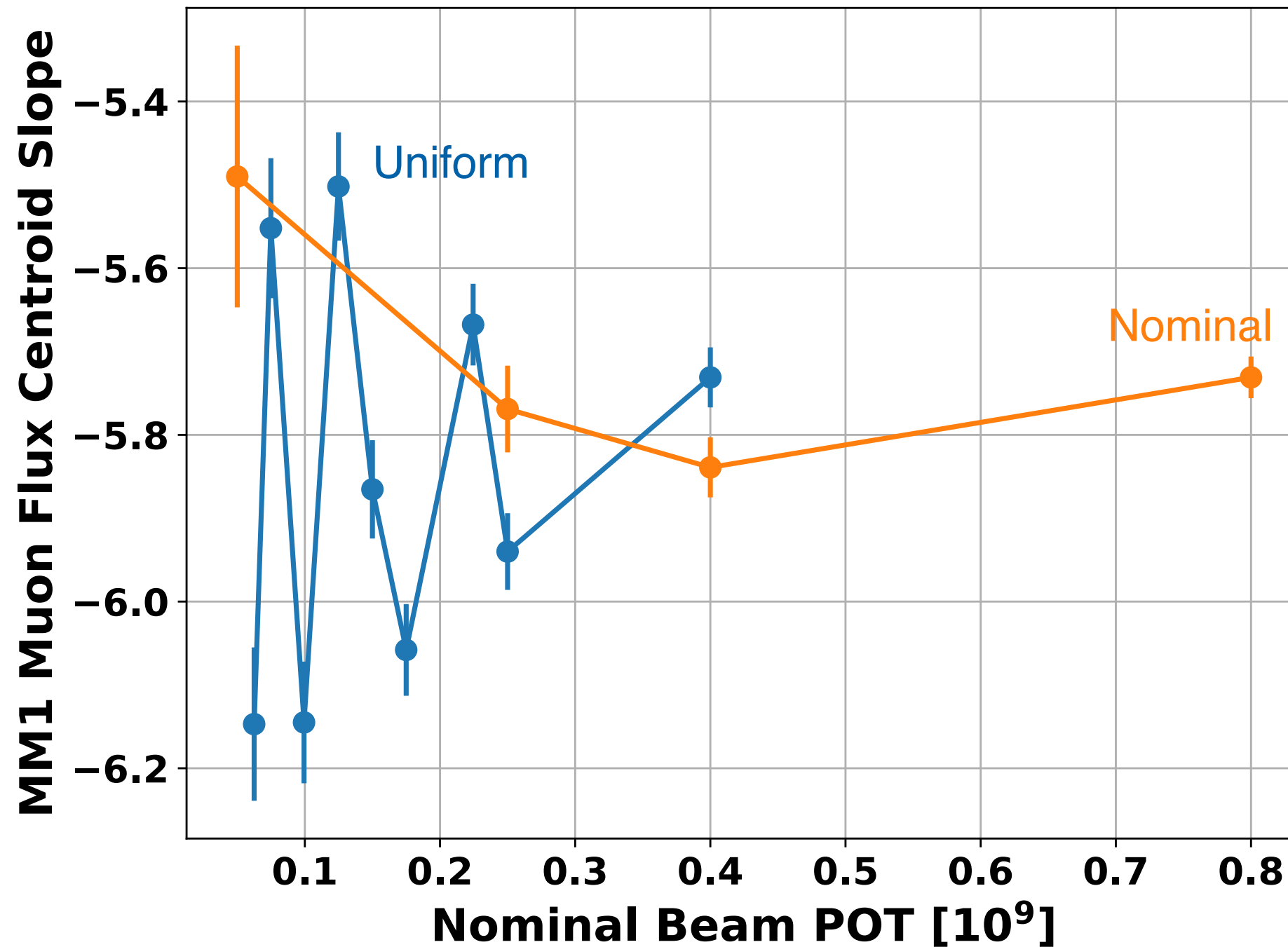


Uniform Simulation



Note: Used totally different random seeds on this study.

Nominal + Uniform Simulation Slope vs POT



Note: Total Uniform POT/4.0 ~ One Gaussian beam POT