Scintillation Light Production for sPHENIX calorimeters

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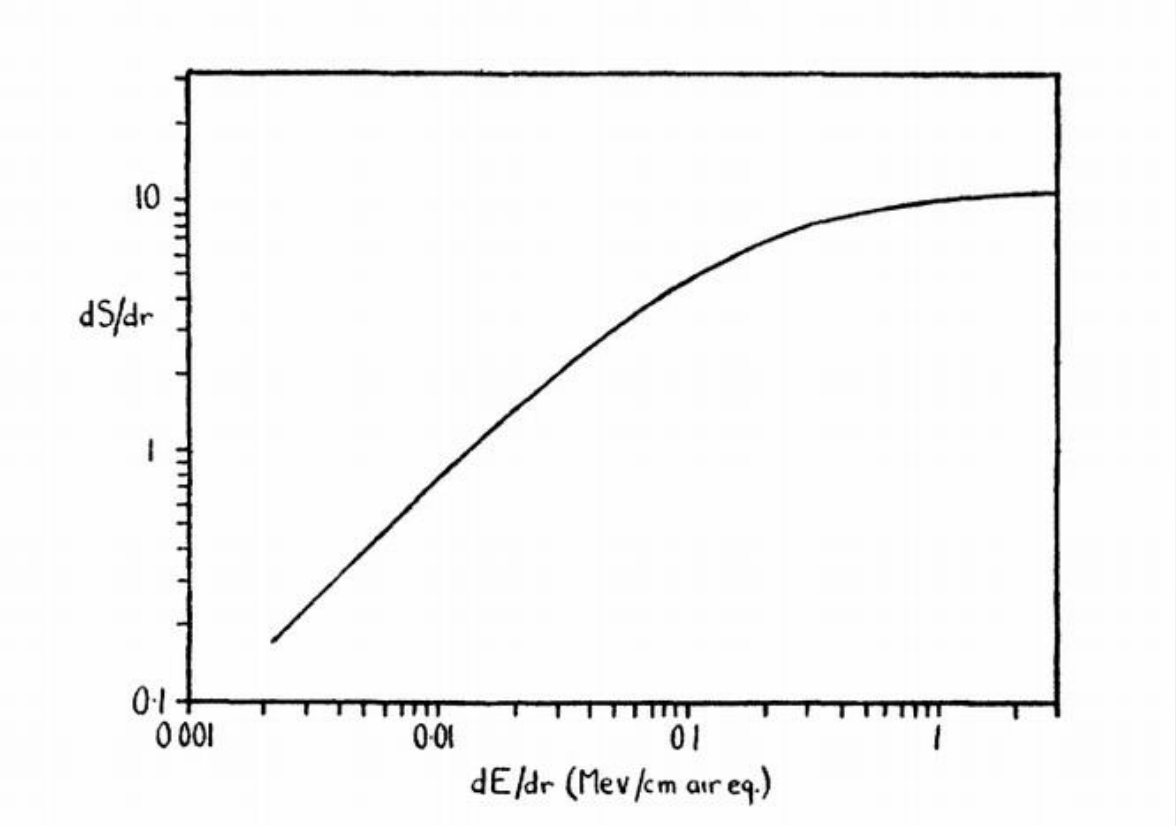
Introduction

- Motivation: To study the dependence of the energy deposition and the light yield on the maximum step size in Geant4.

Introduction – Birks Law

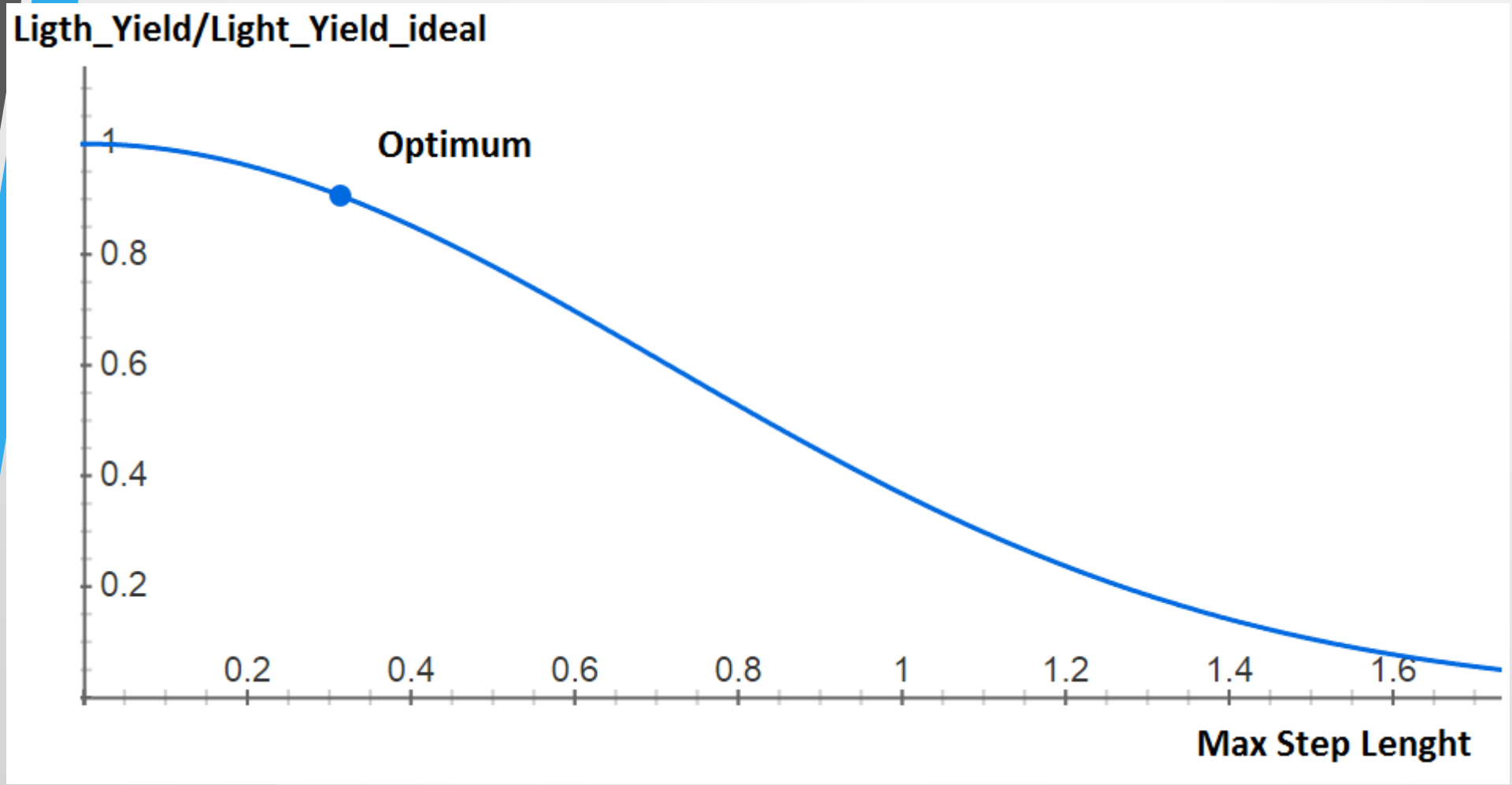


$$dS/dr = (A\ dE/dr)/(1 + kB\ dE/dr)$$

- Light yield in scintillator suffer a saturation effect

Hypothesis

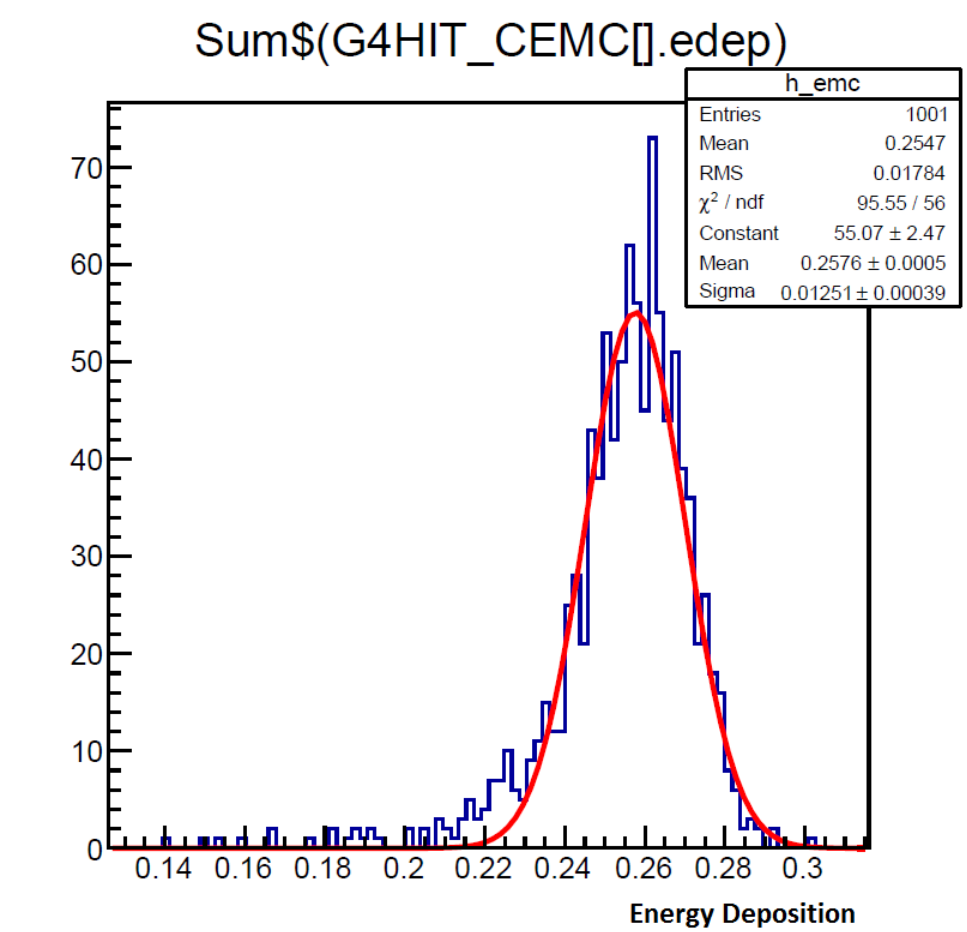
Sketch:

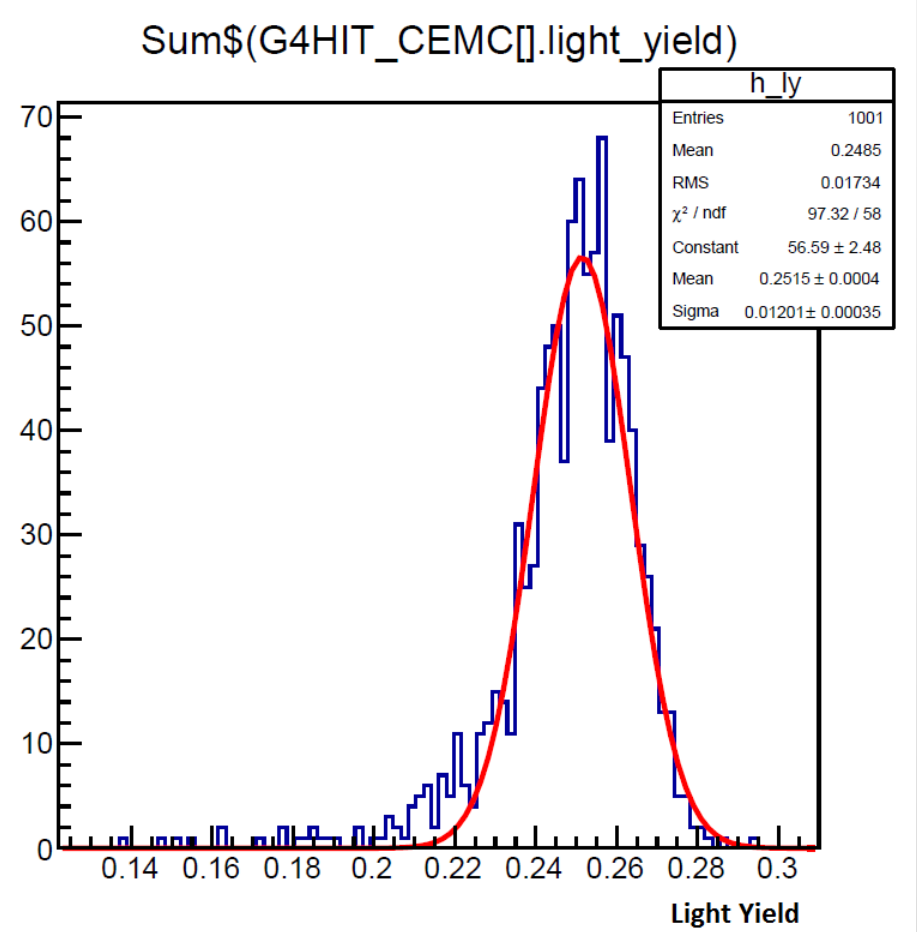


Electrons → dE/dx and Bremsstrahlung
Hadrons → dE/dx and Nuclear Interaction
Muons → dE/dx

Results for Electrons

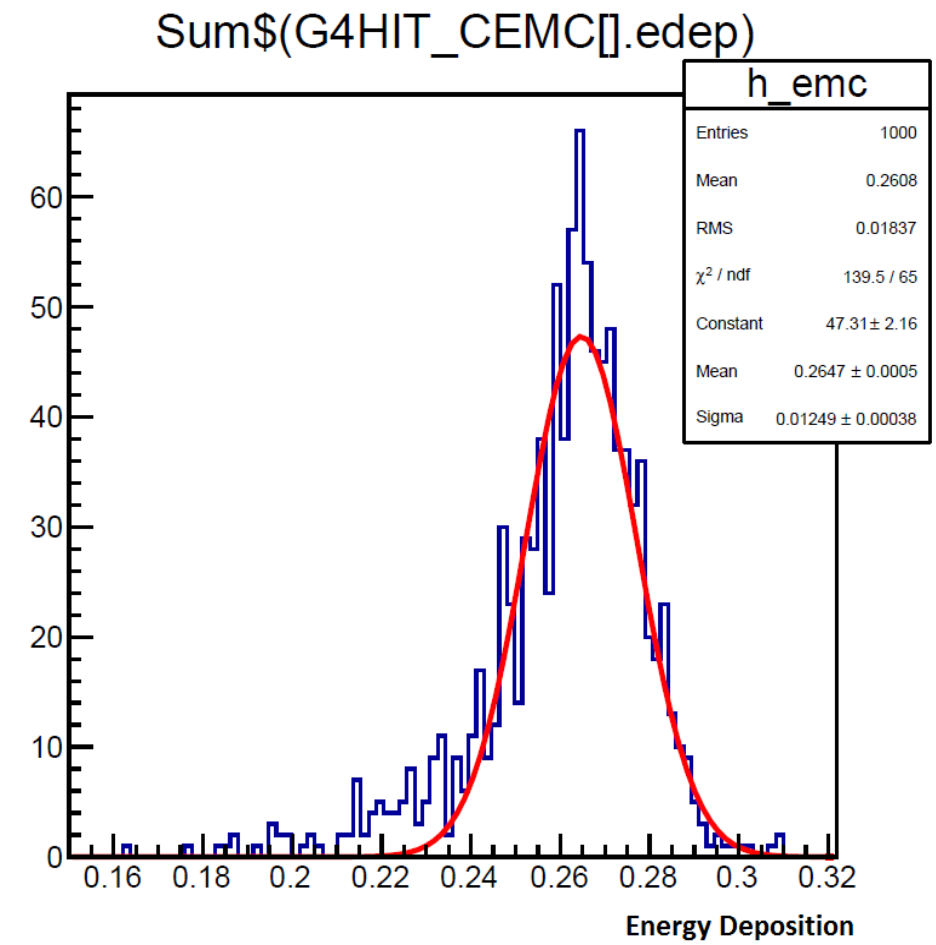
Maximum Step Length: 0.047 cm

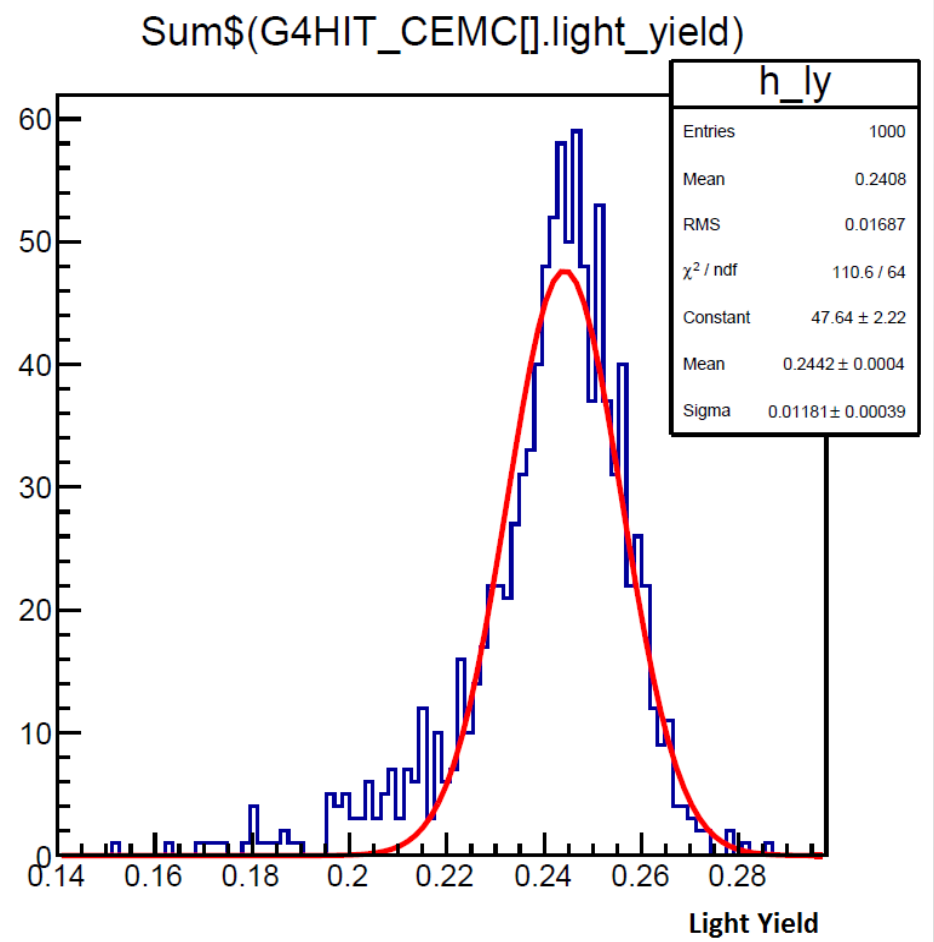




Results for Electrons

Maximum Step Length: 0.001 cm





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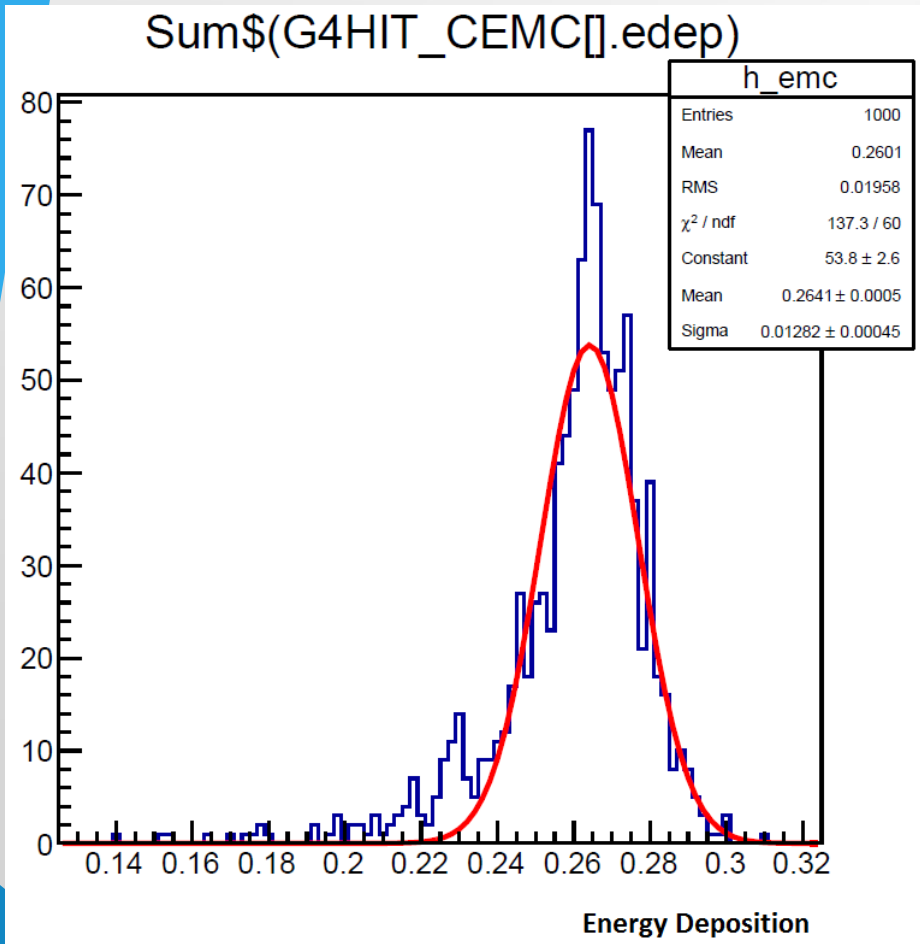

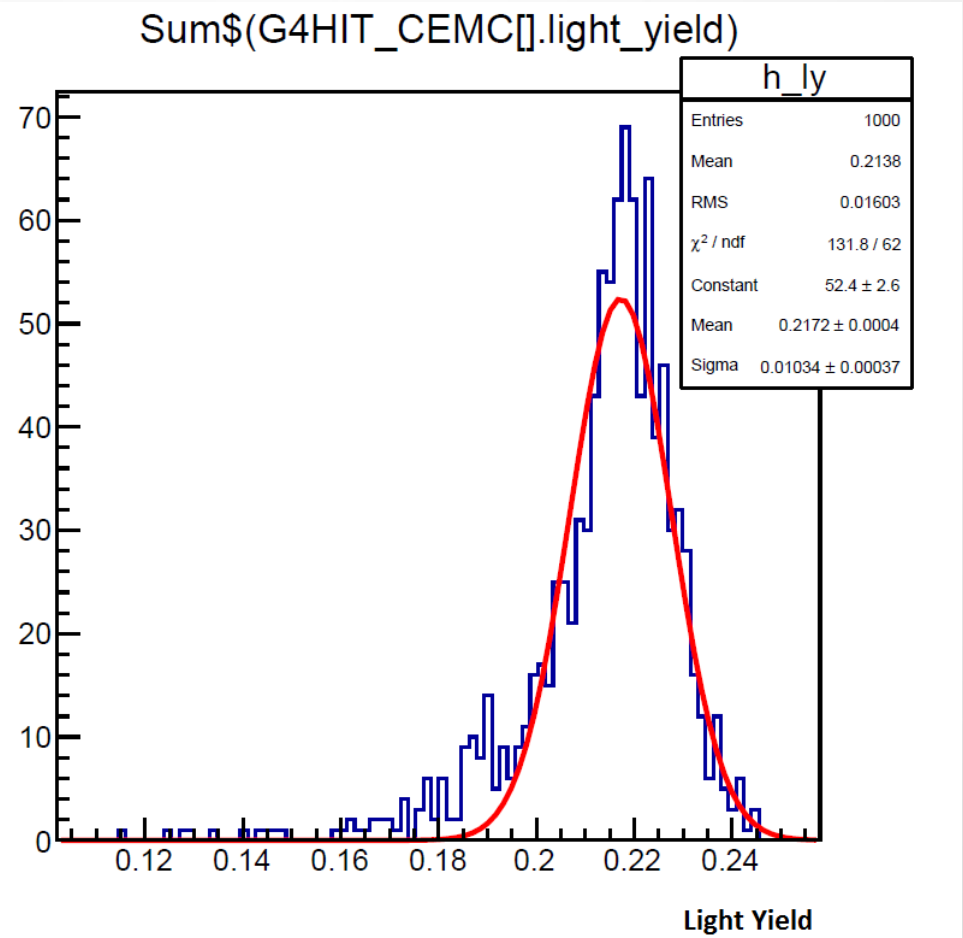

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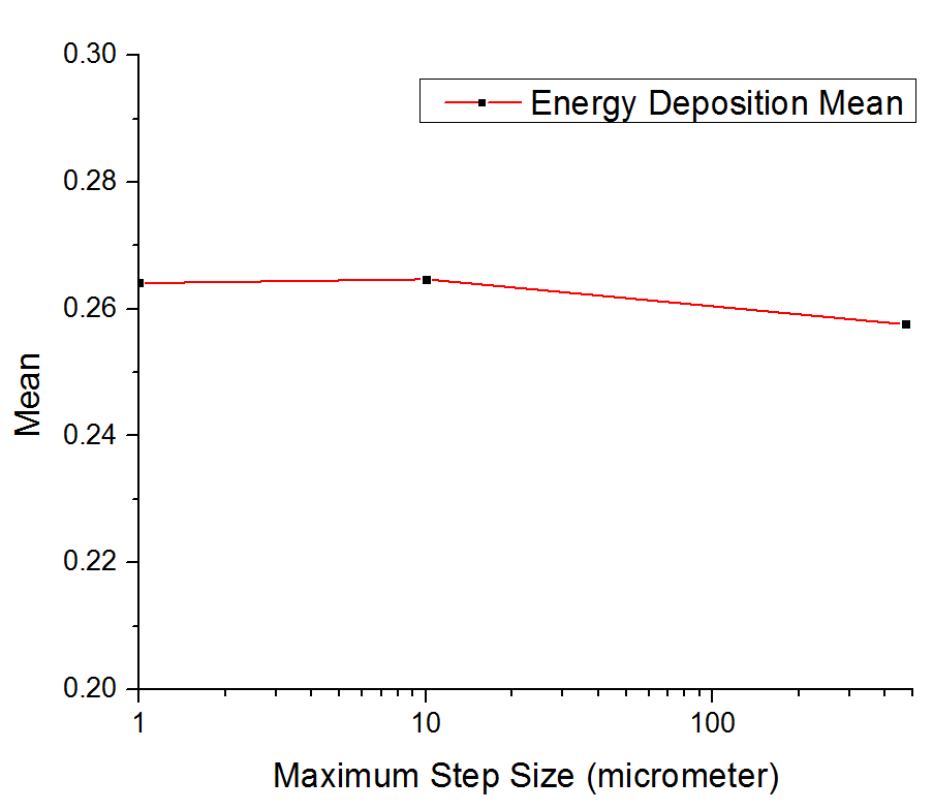
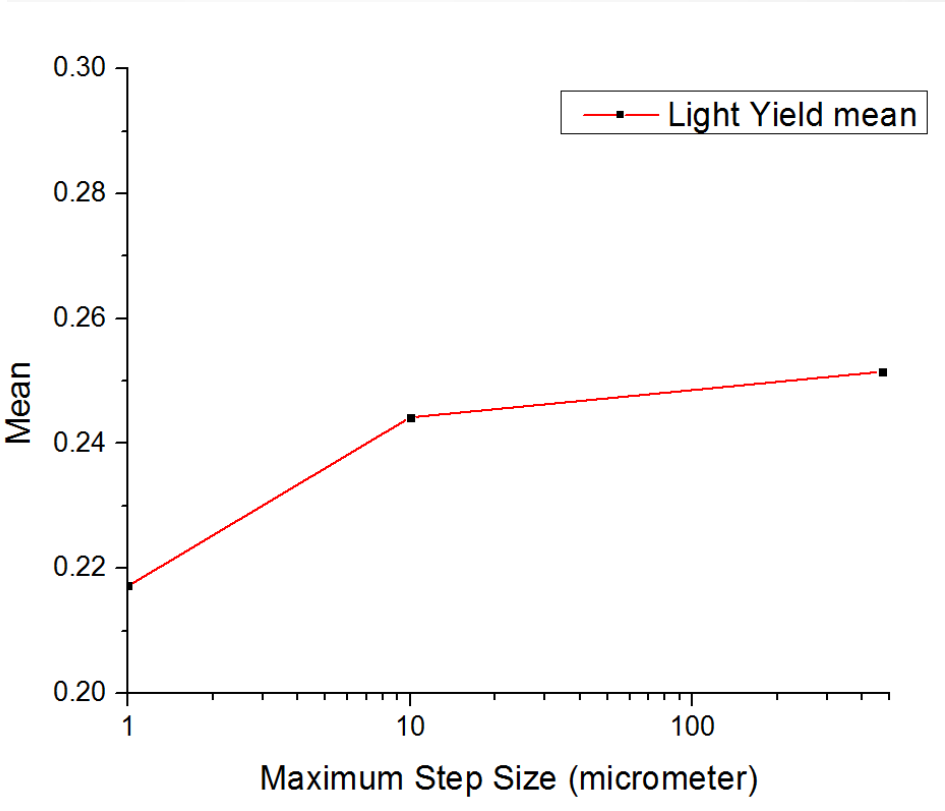
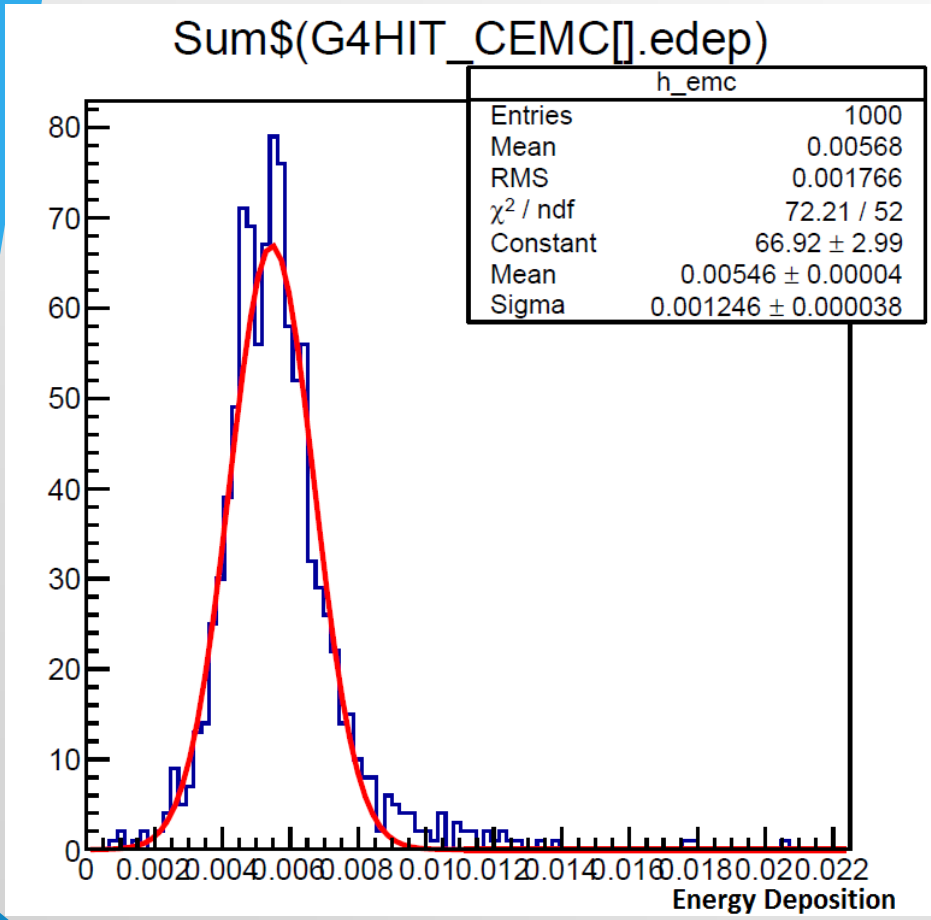


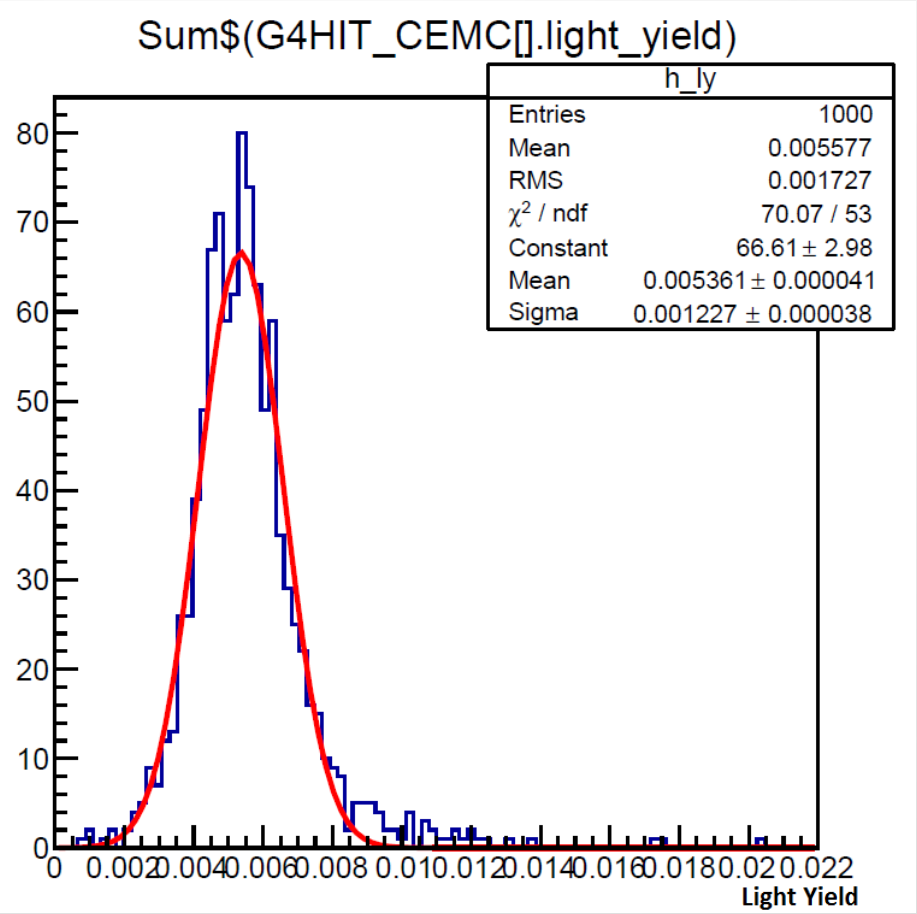


- It seems that Energy Deposition does not depend on Max Step Size
- The mean for light yield is unstable for small values of Max Step Size

Results for Muons

Maximum Step Length: 0.047 cm





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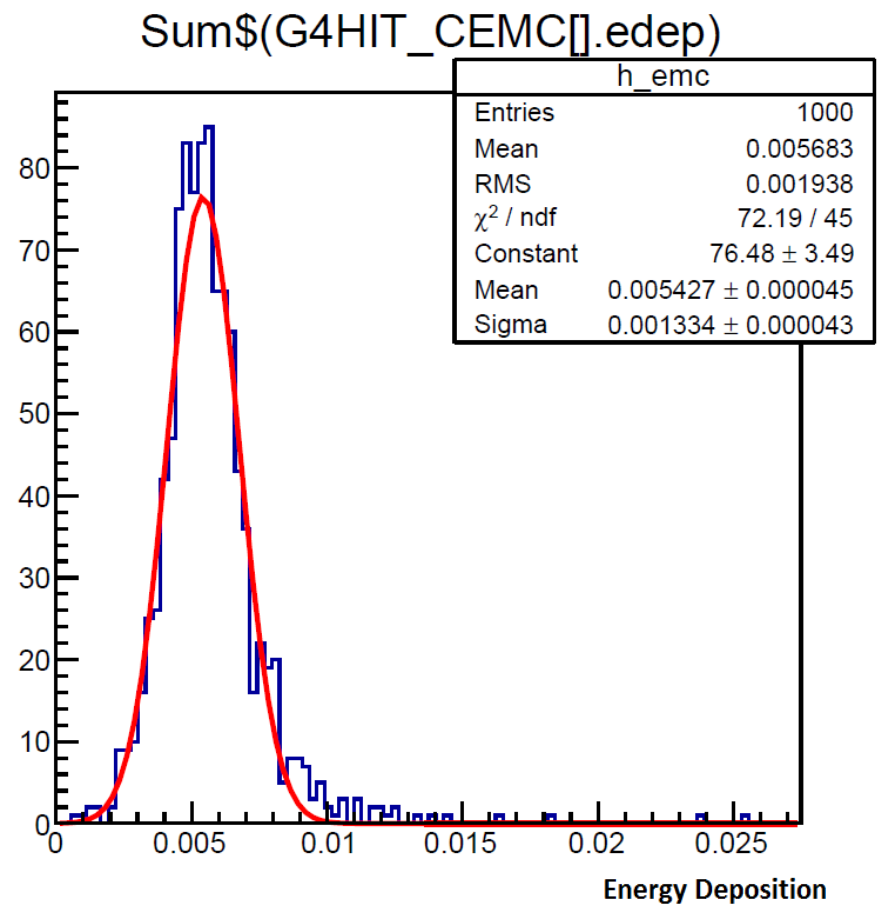

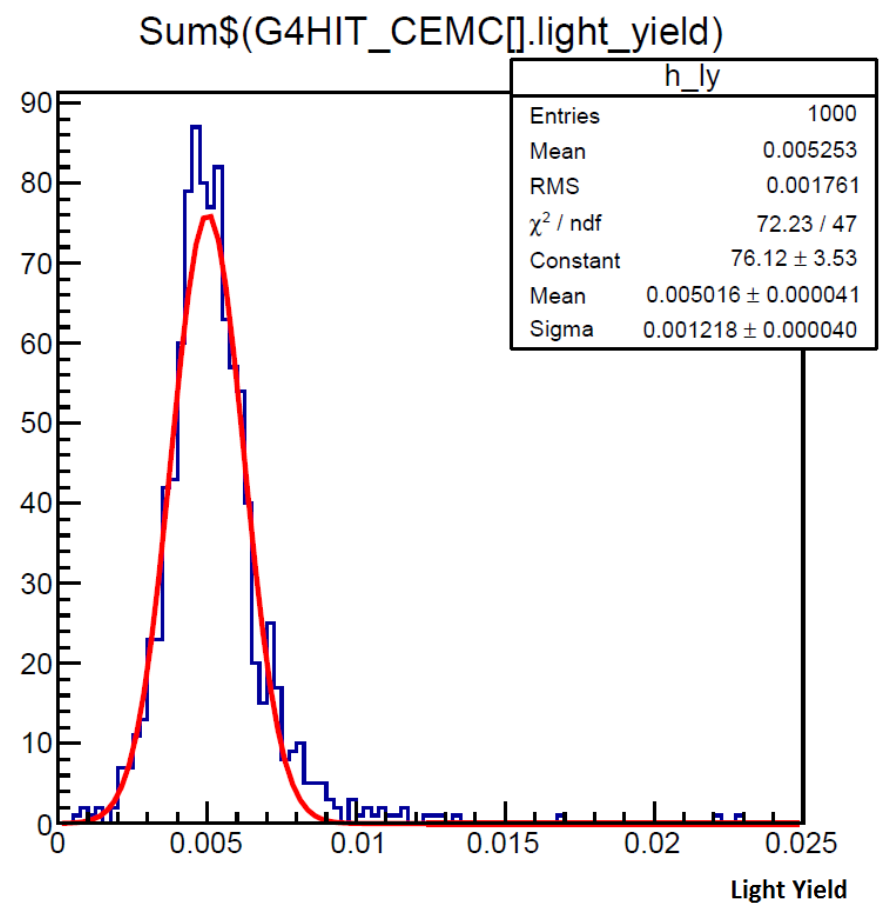

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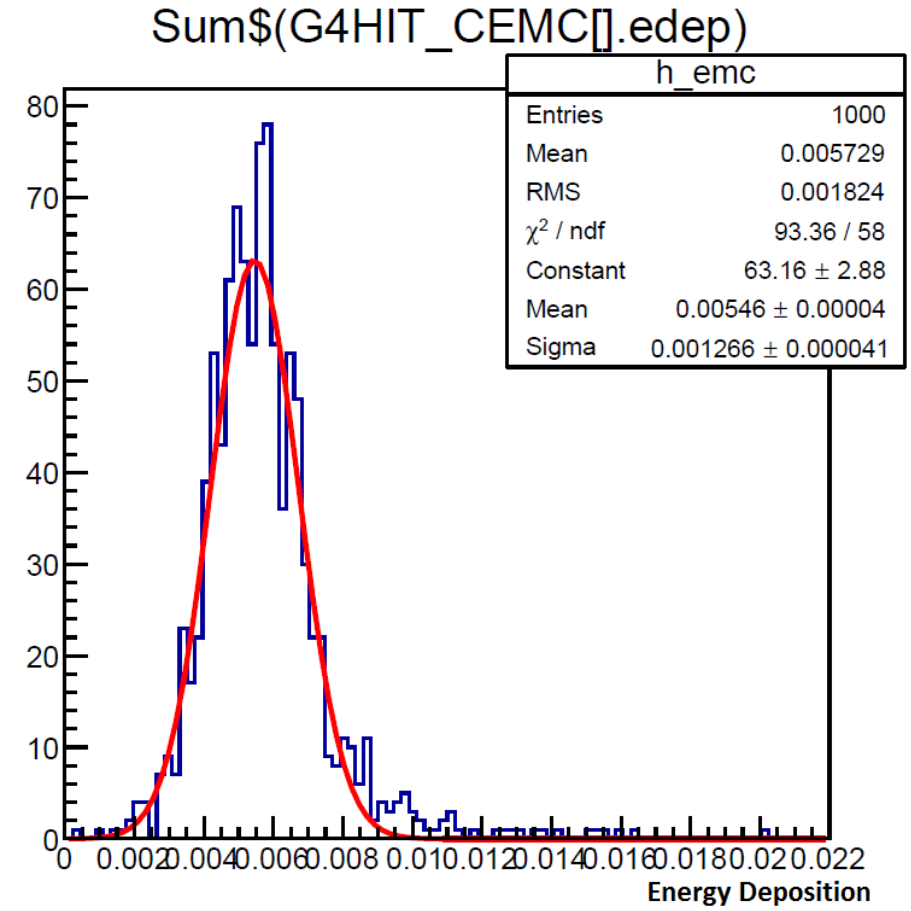

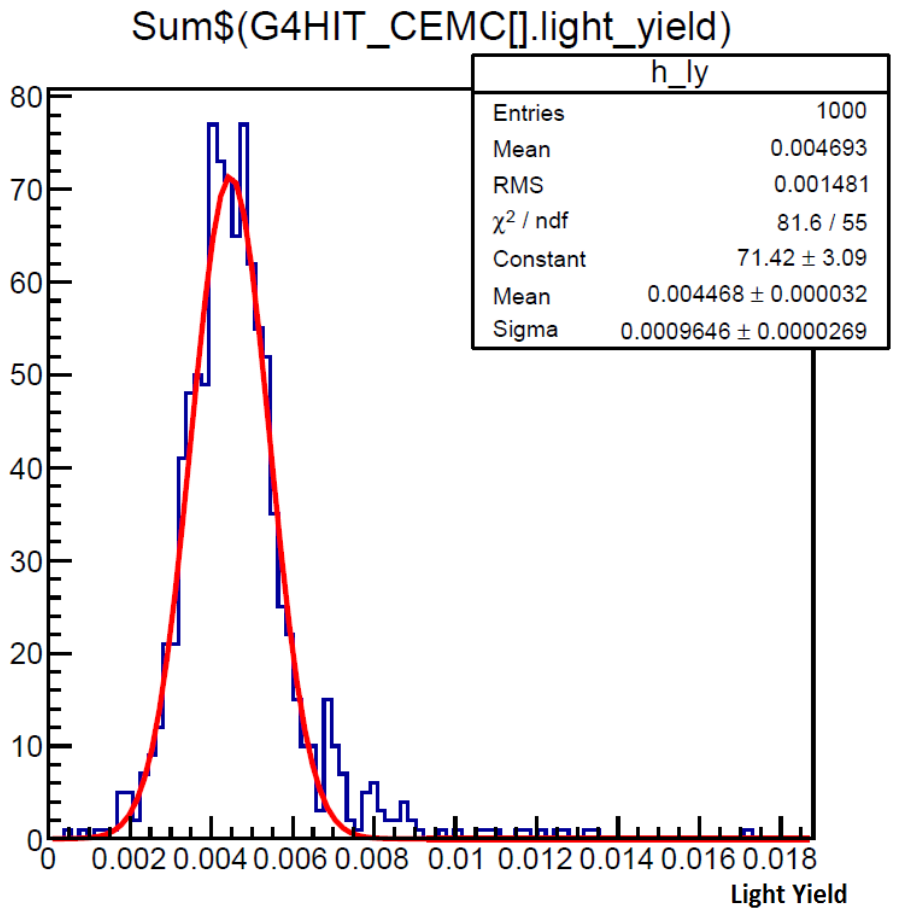

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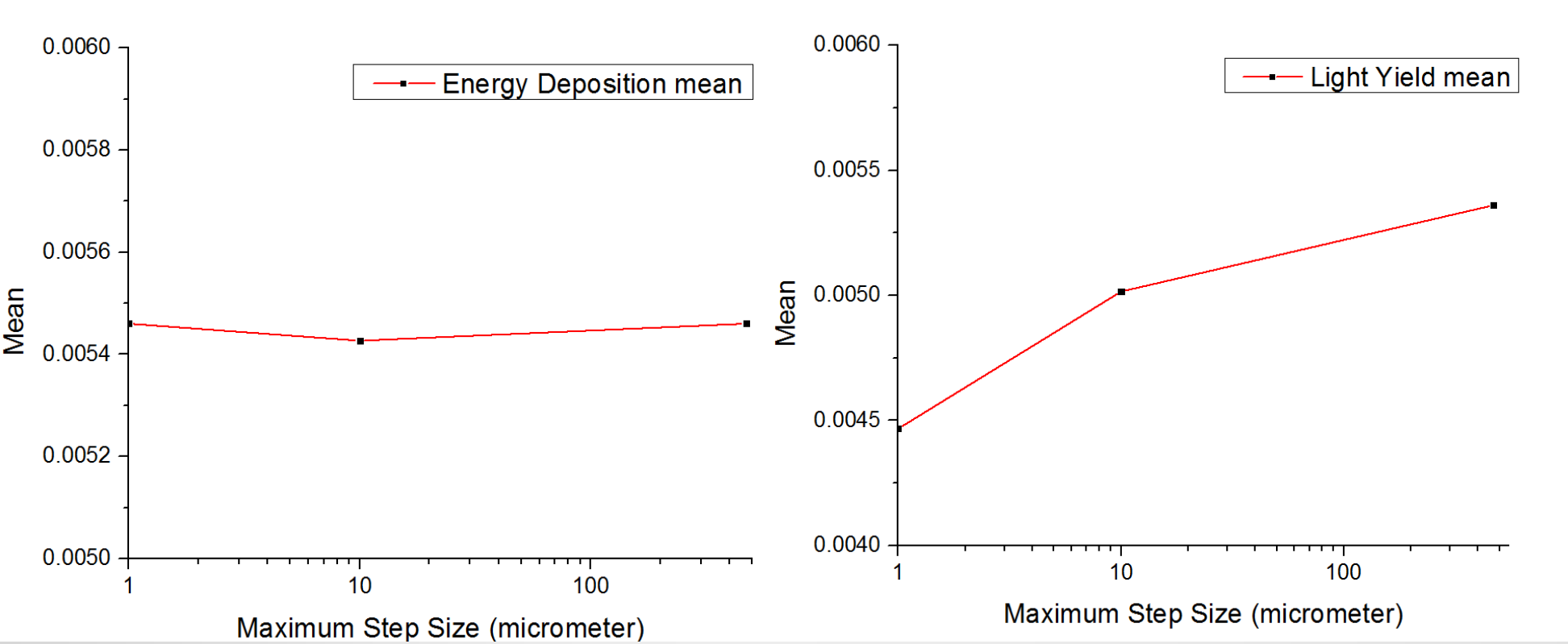

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Next Step

- Calculate the light yield by Birks Law explicitly by ourselves.
- Compare our value with the one that Geant4 calculates.