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Update on Geant4 Simulation of Scintillating Glass

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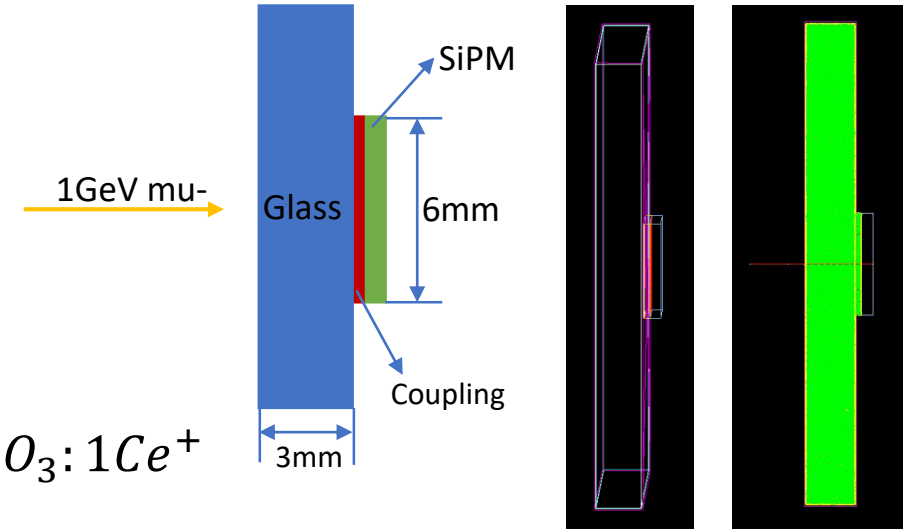
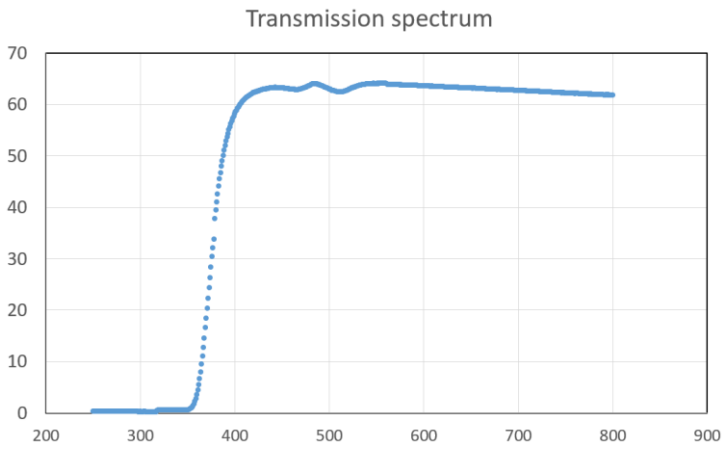
March 23, 2022

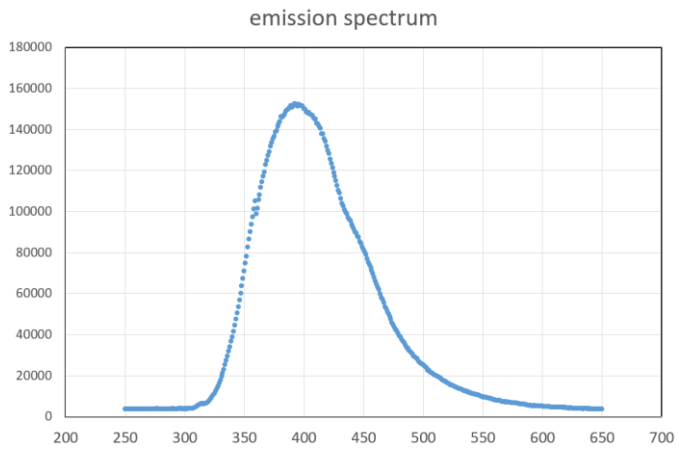
Optical simulation: setup in Geant4

- Geometry setup
  - Scintillating glass(ESR wrapping)
  - Coupling agent: Air
  - SiPM(6×6 mm^2)
- Properties of scintillating glass
  - Component: $25SiO_2 - 30B_2O_3 - 10Al_2O_3 - 34Gd_2O_3 : 1Ce^+$
  - Density: 4.94 g/cm^3
  - Refractive index: 1.67
  - Transmission: 63%
  - Emission peak: 394 nm
  - Light yield: 881 ph/MeV

  (Based on the data of the measurements by Zhehao Hua)



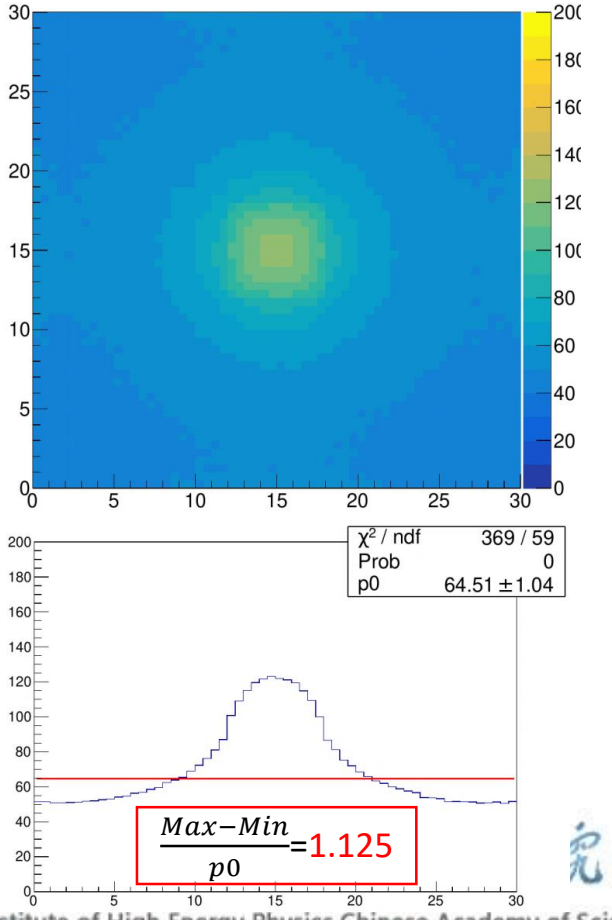




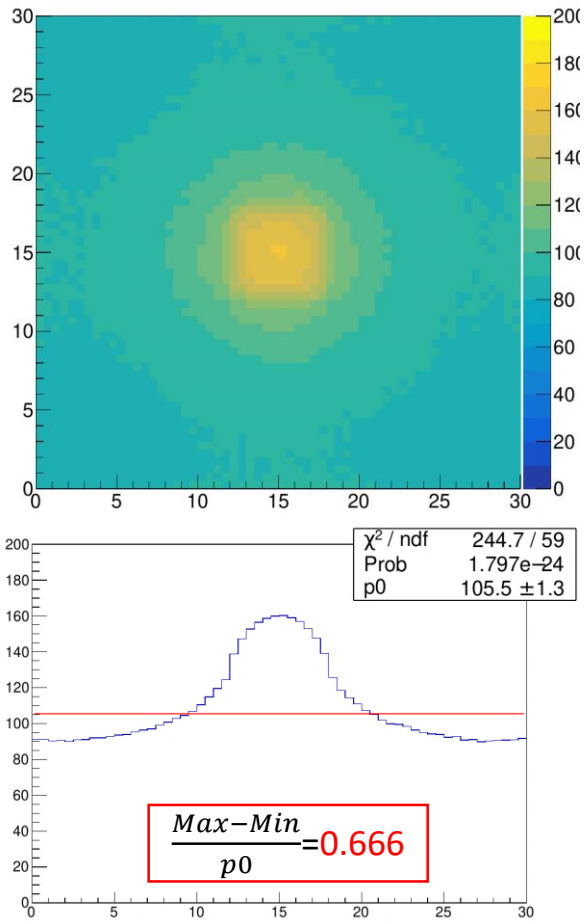
Uniformity: impact of tile thickness

- Vary tile thickness: 3, 5, 23 mm
- Fixed transverse size: 30×30 mm^2
- Incident particle: 1 GeV mu-

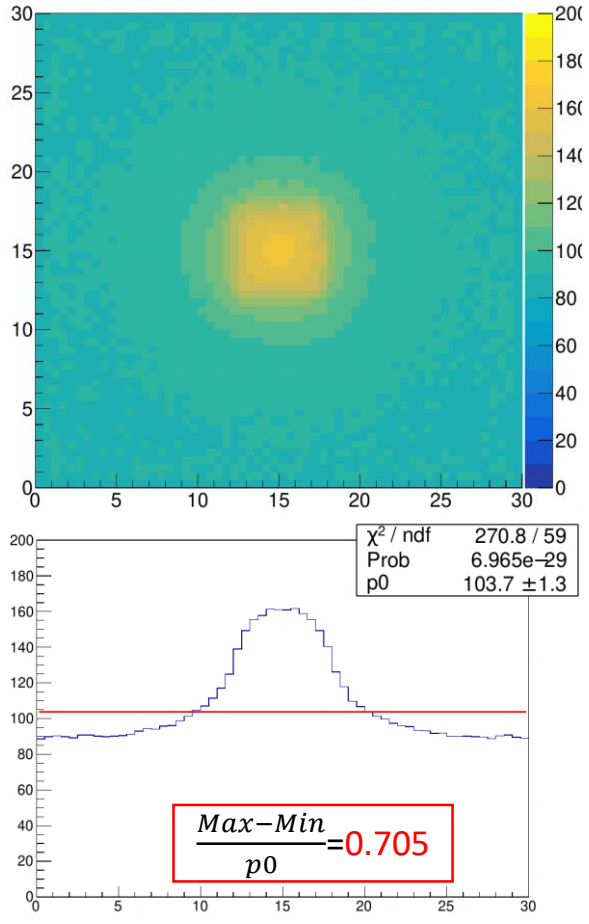
$30\times30\times3\ mm^3$



$30\times30\times5\ mm^3$



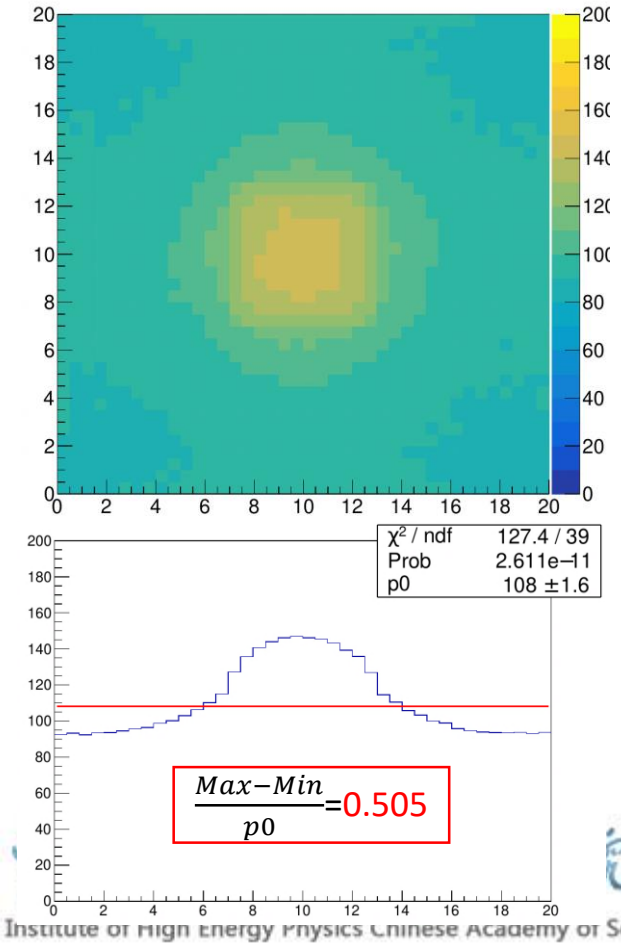
$30\times30\times23\ mm^3$



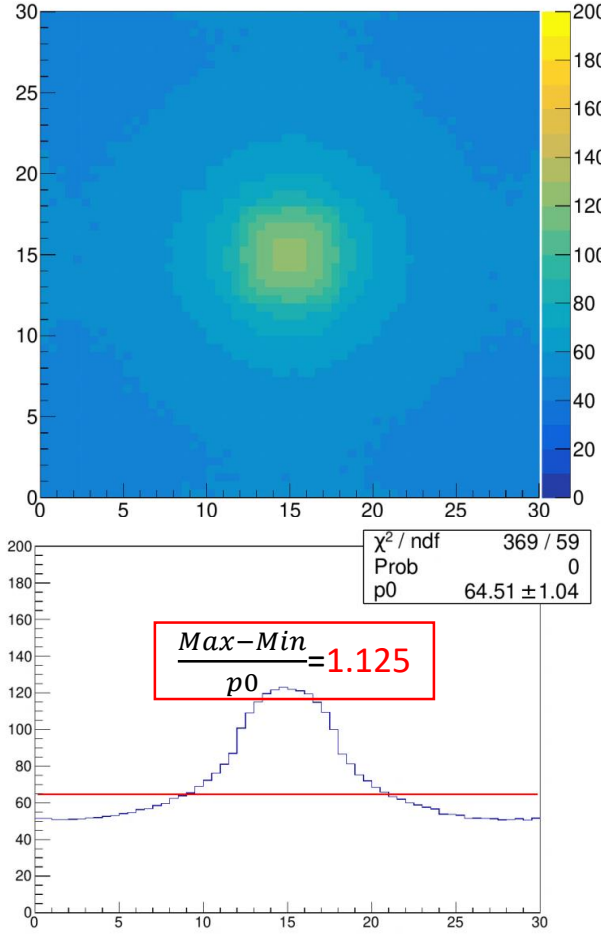
Uniformity: impact of transverse size

- Vary transverse size: 20×20, 30×30, 40×40 mm^2
- Fixed tile thickness: 3 mm
- Incident particle: 1 GeV mu-

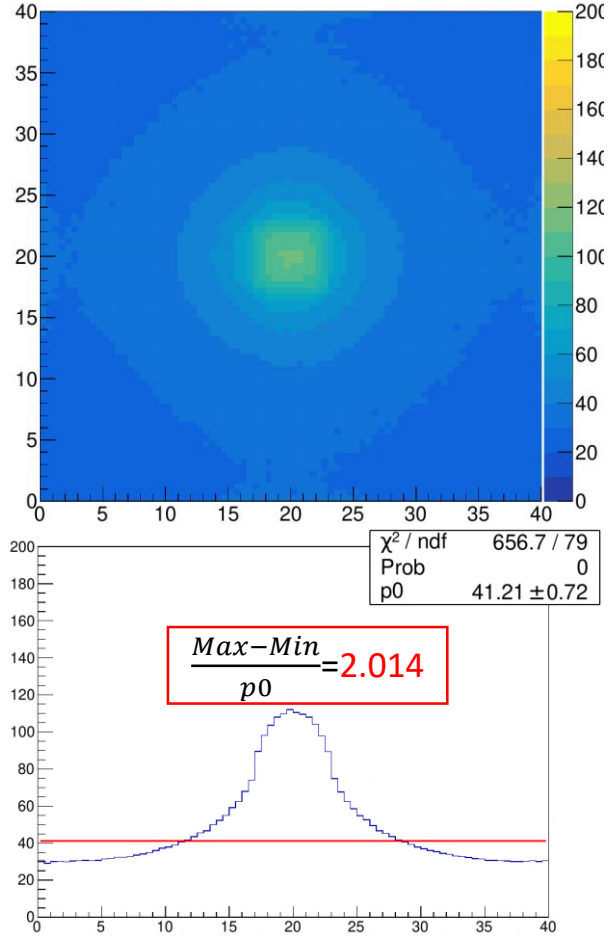
$20\times20\times3\ mm^3$



$30\times30\times3\ mm^3$



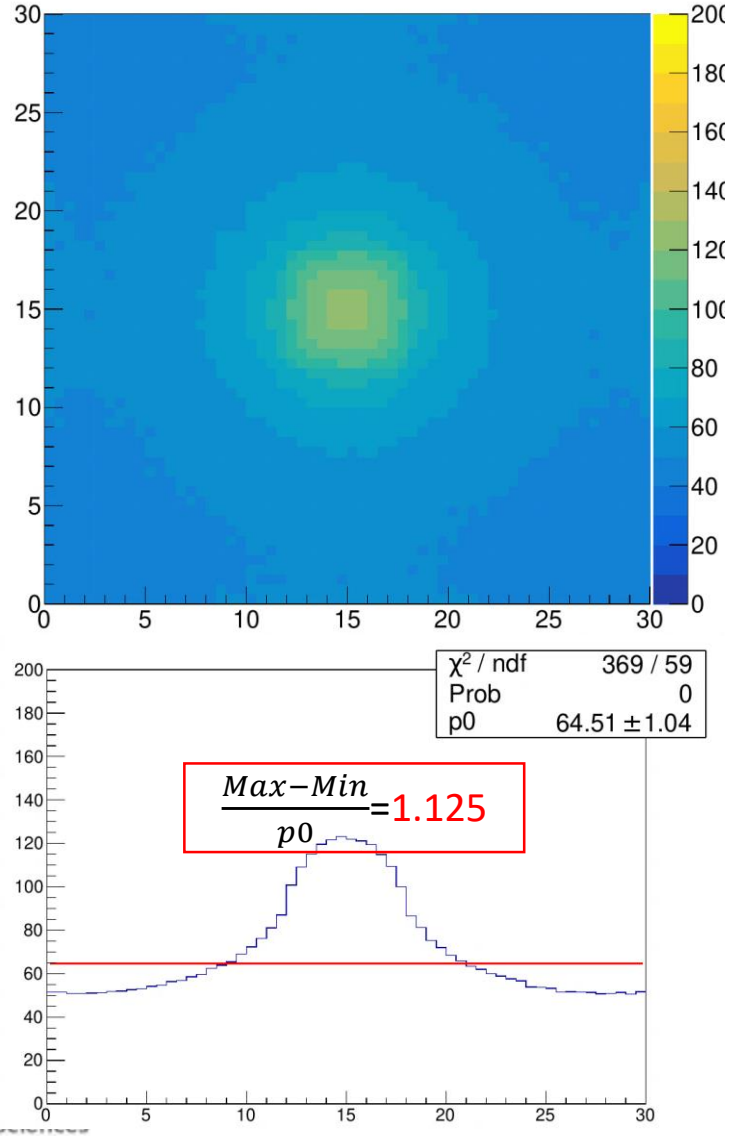
$40\times40\times3\ mm^3$



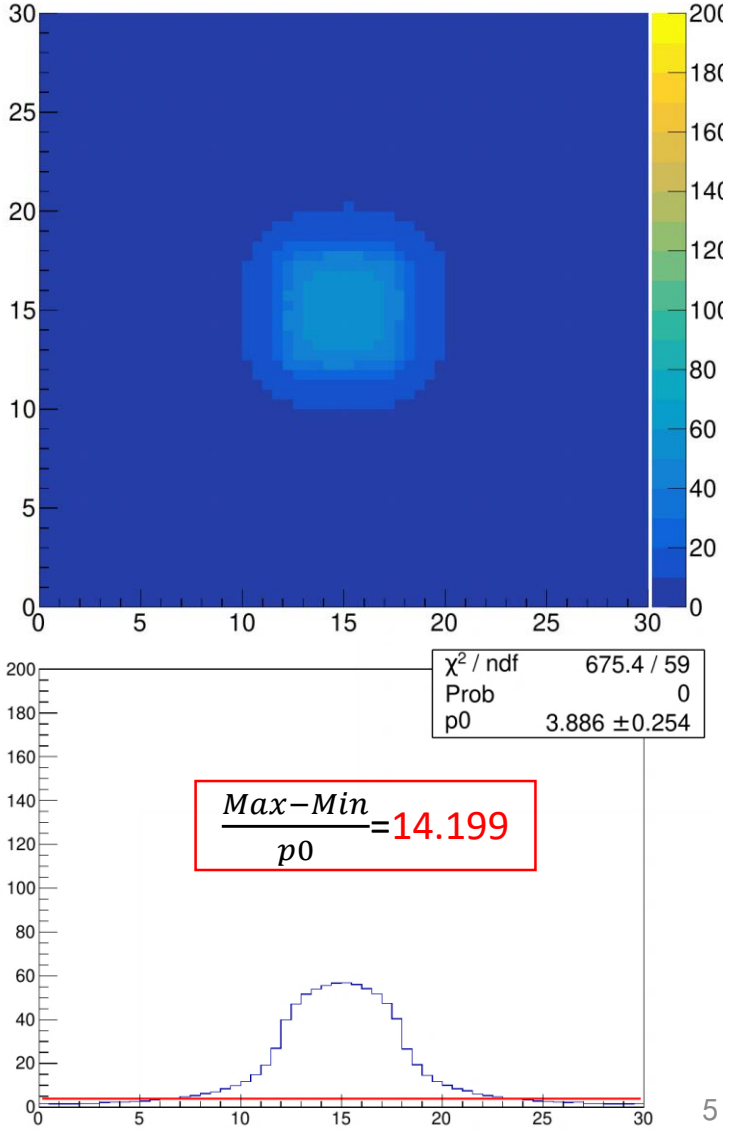
Uniformity: impact of wrapping material

- Vary wrapping material: ESR, Tyvek
- Tile size: 30×30×3 mm^3
- Incident particle: 1 GeV mu-

ESR

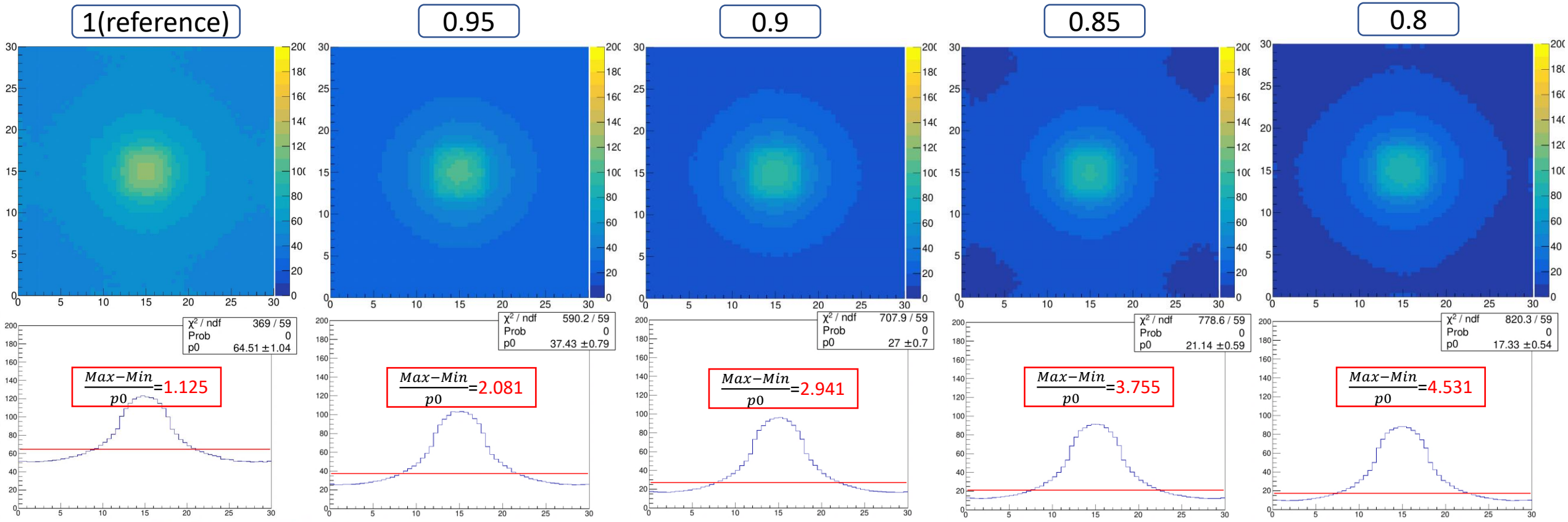


Tyvek



Uniformity: impact of ESR reflectivity

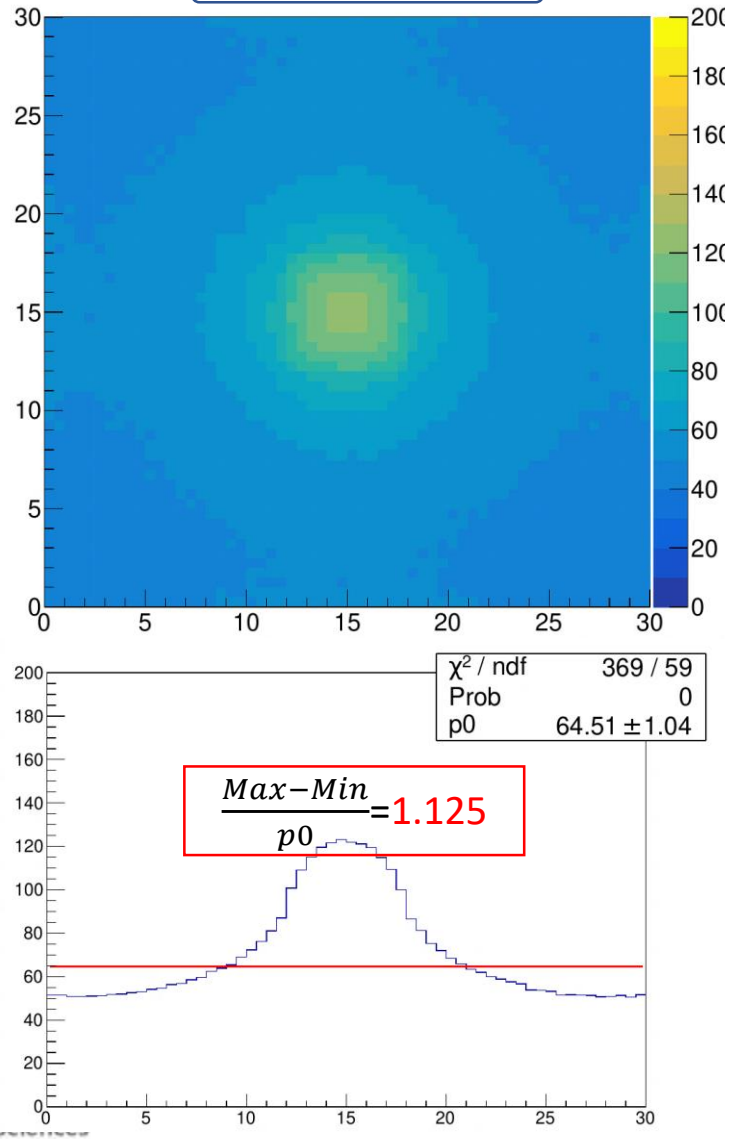
- Vary ESR reflectivity: 1(refernce~98%), 0.95, 0.9, 0.85, 0.8
- Tile size: 30×30×3 mm^3
- Incident particle: 1 GeV mu-



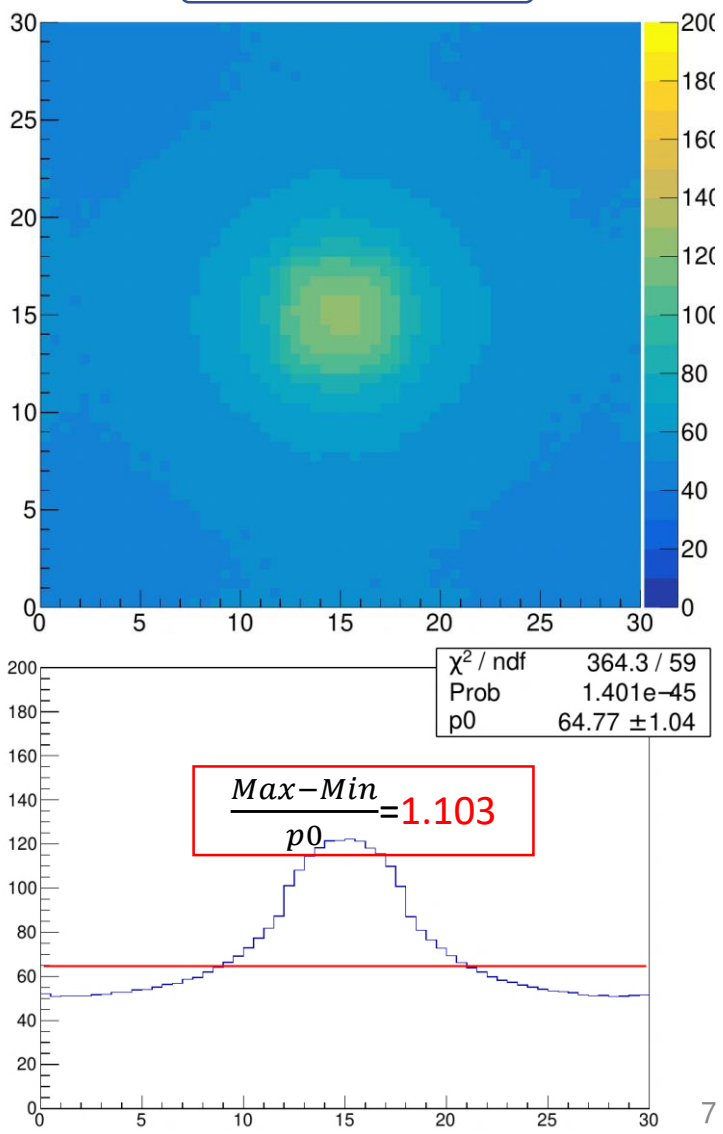
Uniformity: impact of bubbles

- Tile size: $30\times30\times3\ mm^3$
- Incident particle: 1 GeV mu-

Without bubbles

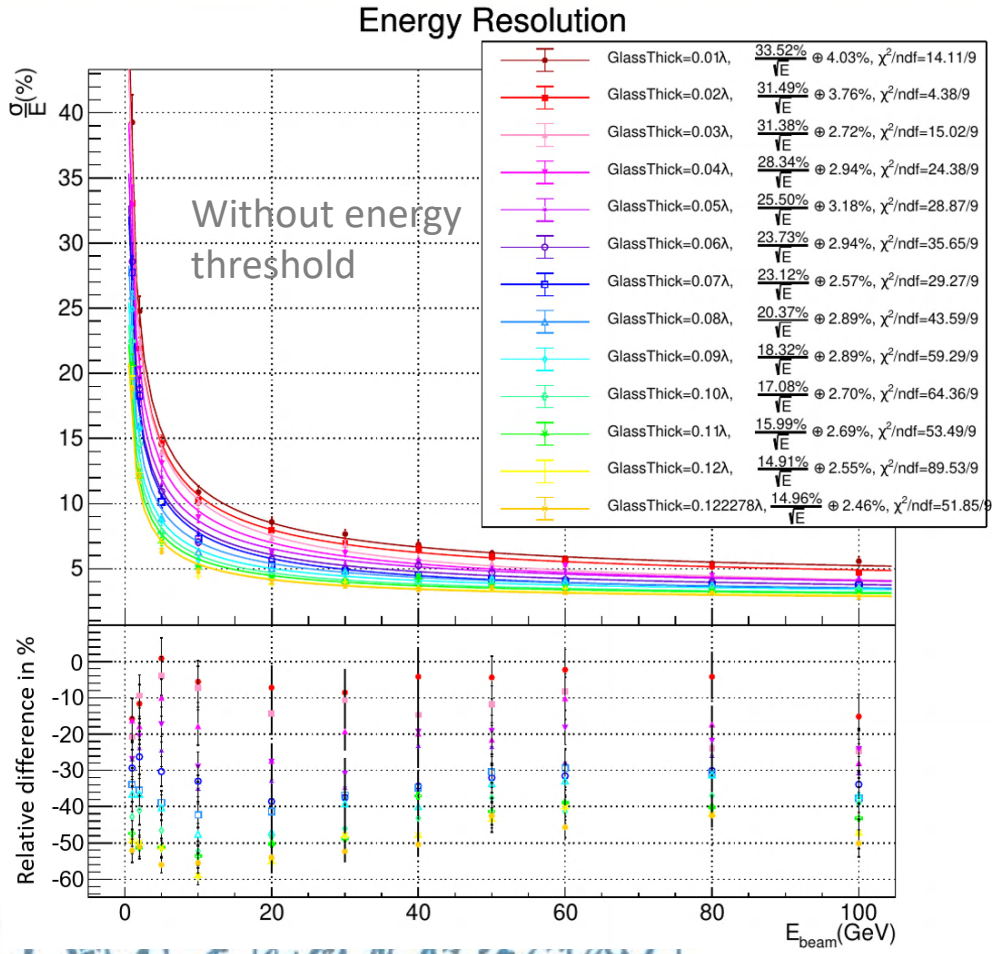


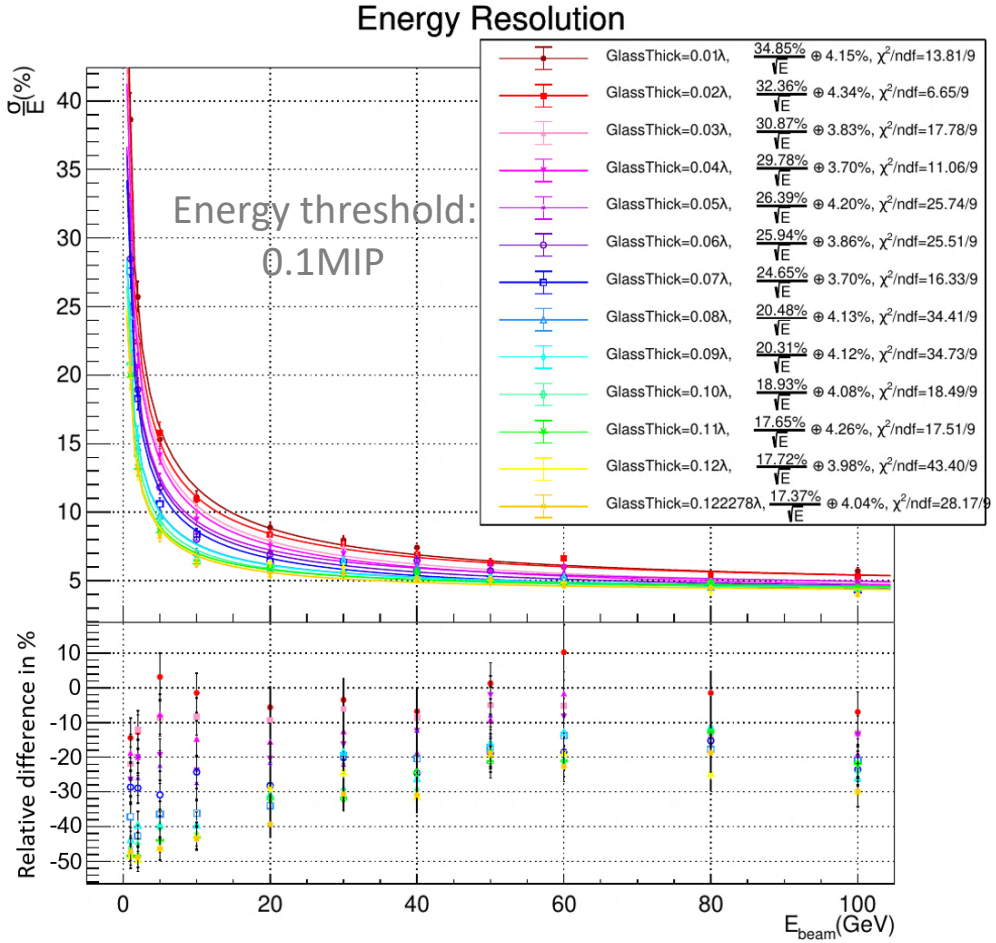
With bubbles



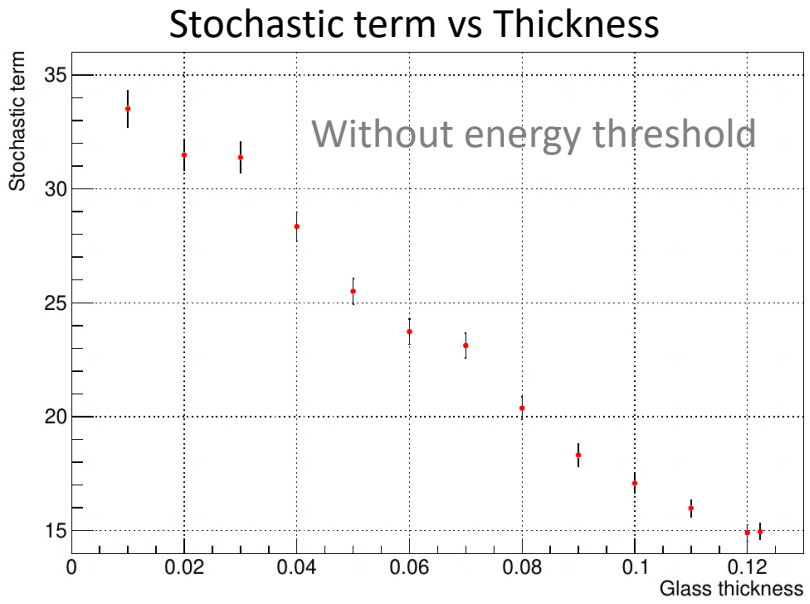
Impact of sampling ratio

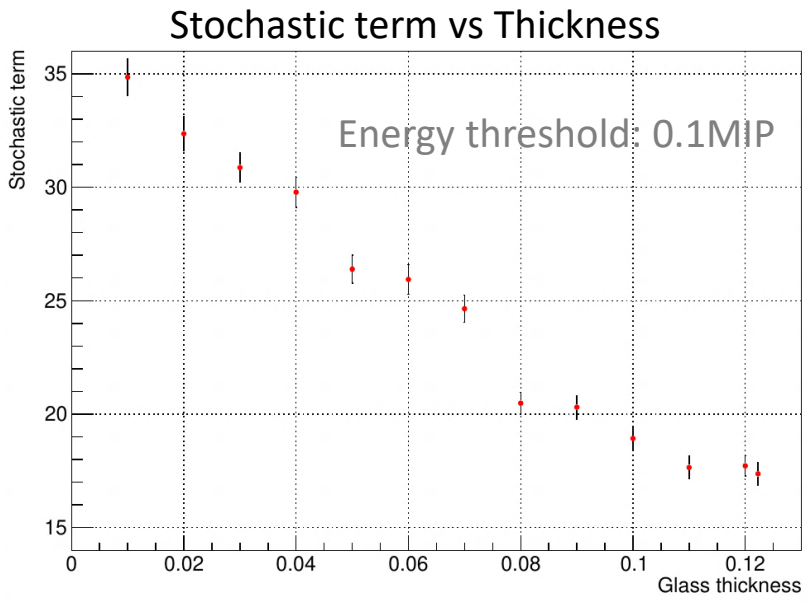
- Incident particle: kaon0L(1-100GeV)
- Fixed nuclear interaction length(0.122278 λ)
  - Scintillating Glass: λ=22.437cm, Steel: λ=16.945cm

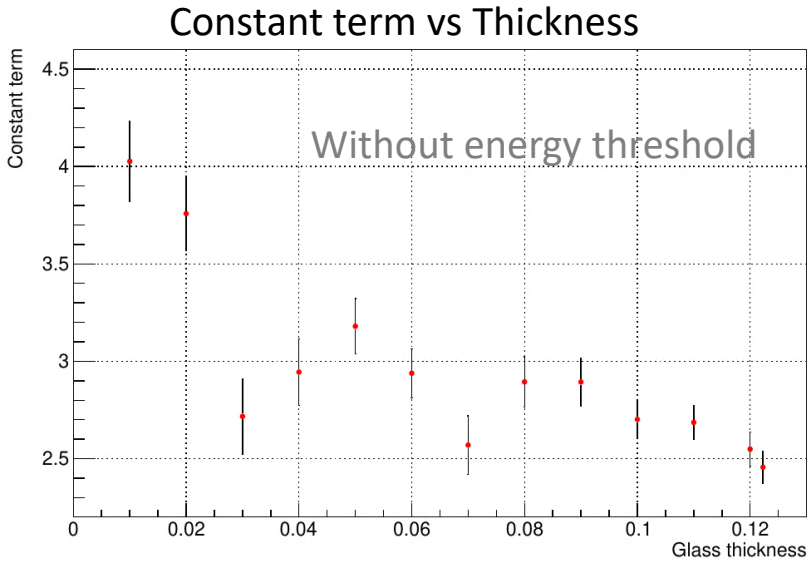


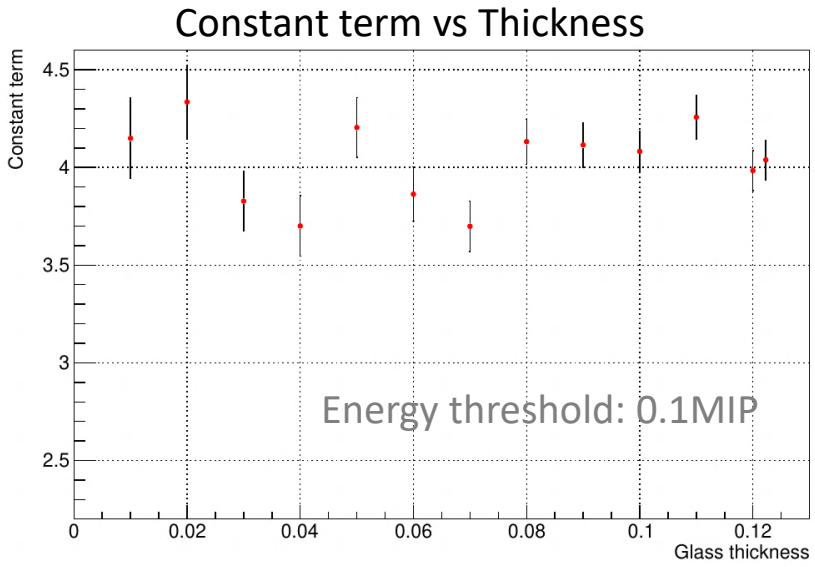


Impact of sampling ratio









Thanks