

Forward Spectrometer Update

10/11/20

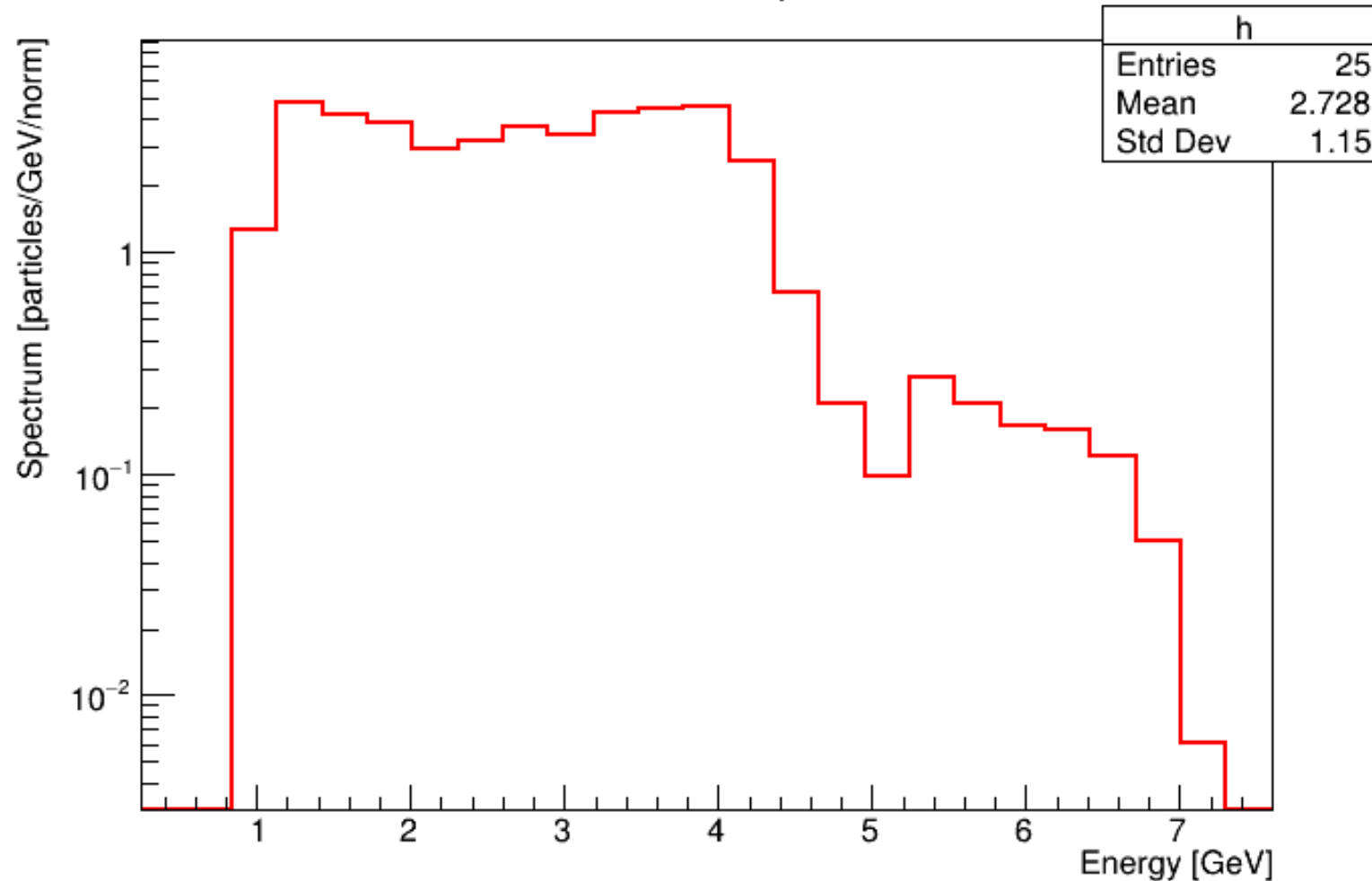
Kyle Fleck and Dr. Gianluca Sarri

Contents

- Edge finding with FIR filters
- Deconvolution of high xi signal
- Energy deposition in LANEX screen

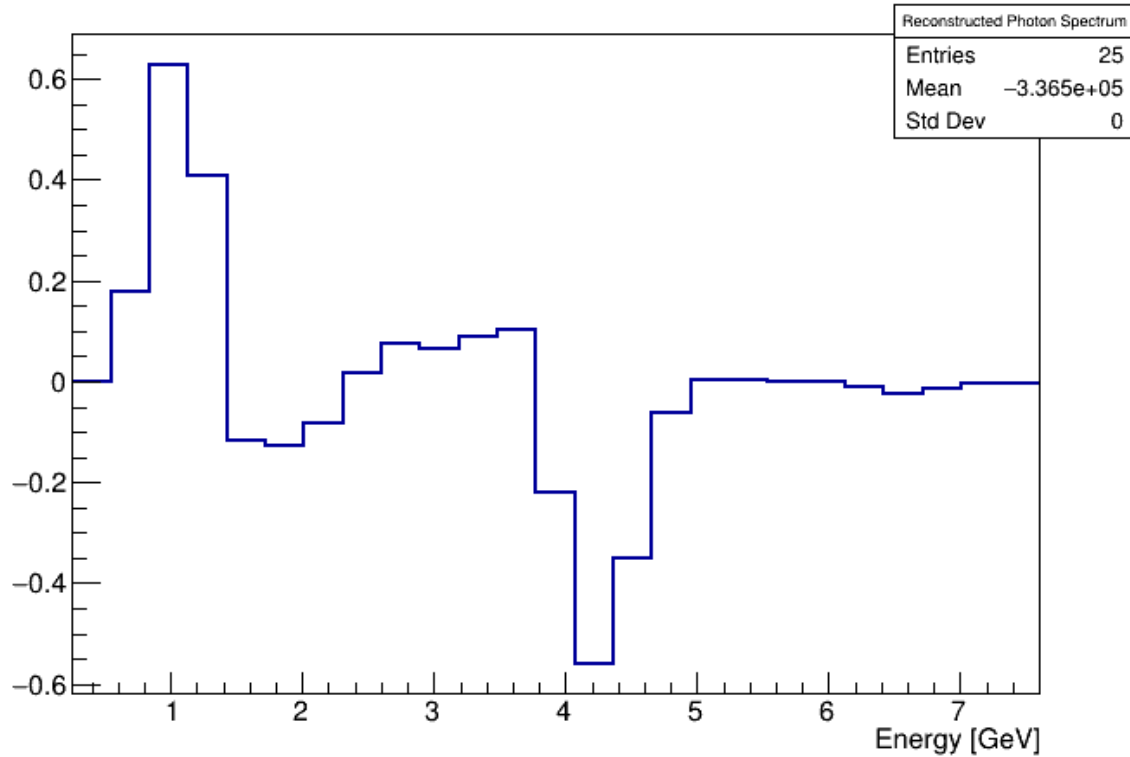
Deconvolved Spectrum – $\xi = 0.31$

HICS 16.5 GeV 50 μm - 25 bins



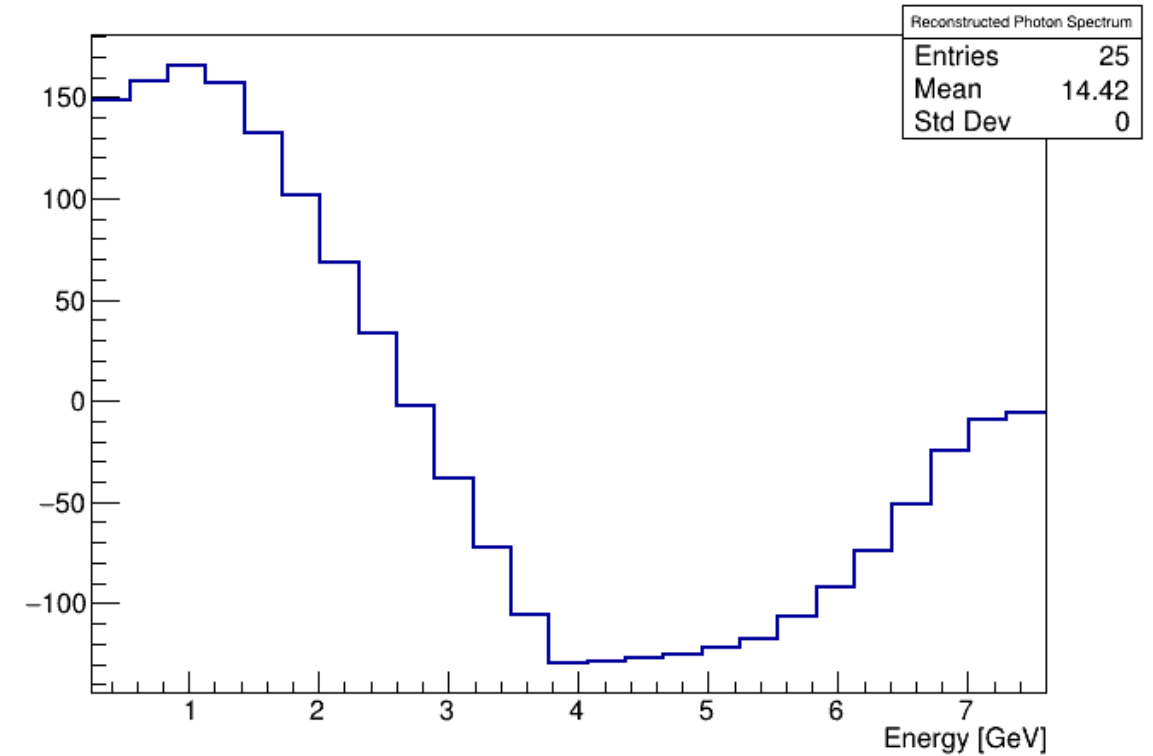
FIR Filter – First Derivative of Gaussian

FIR - FDOG $\sigma = 0.5$, $N = 10$



Edge = 4.22 ± 0.29 GeV

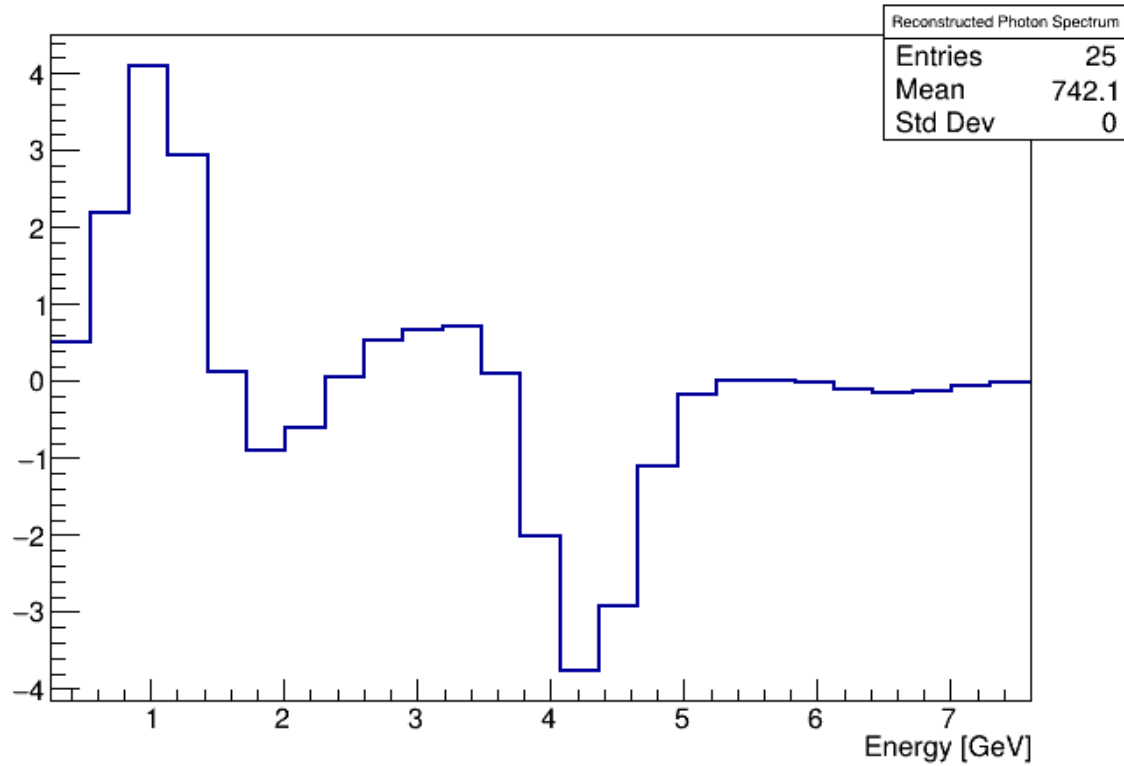
FIR - FDOG $\sigma = 10.0$, $N = 10$



Edge = 3.92 ± 0.29 GeV

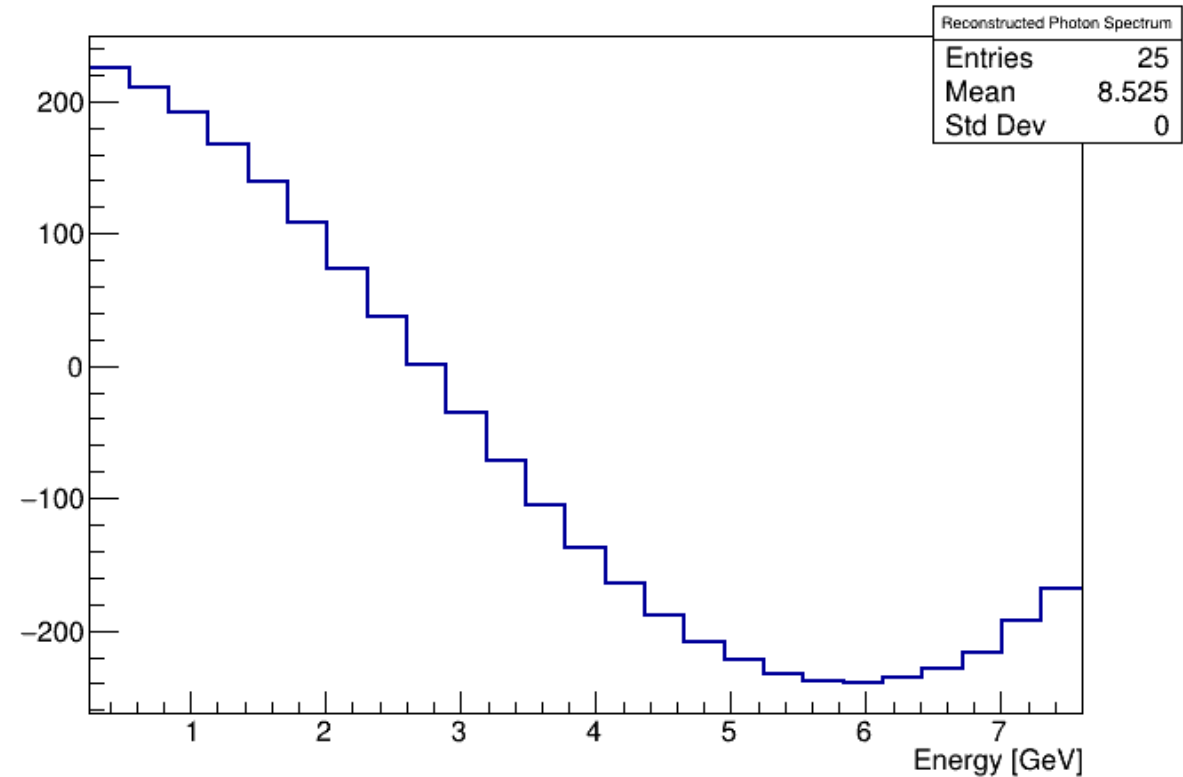
FIR Filter – First Derivative of Gaussian

FIR - FDOG $\sigma = 1.0$, $N = 20$



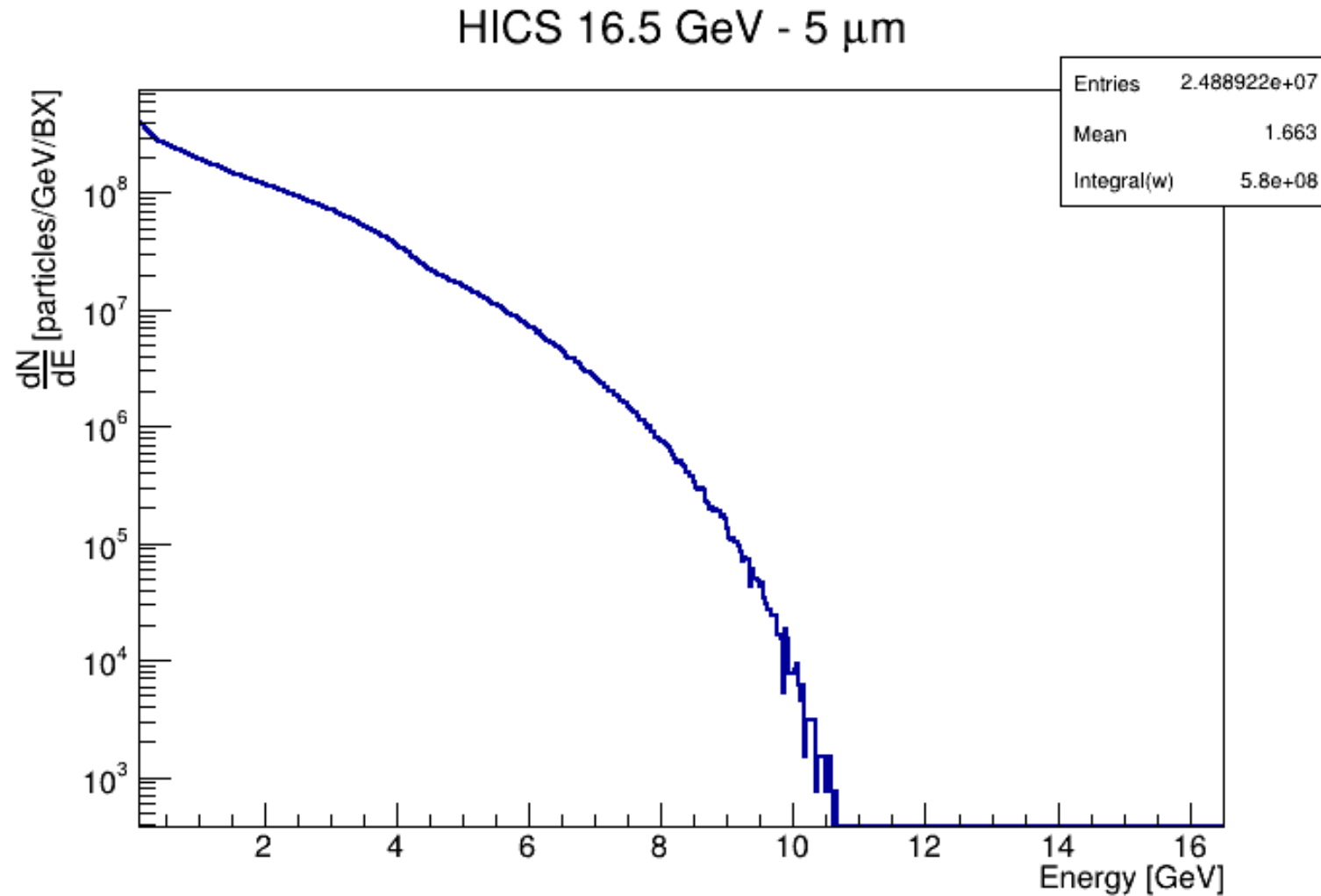
Edge = 4.22 ± 0.29 GeV

FIR - FDOG $\sigma = 10.0$, $N = 20$



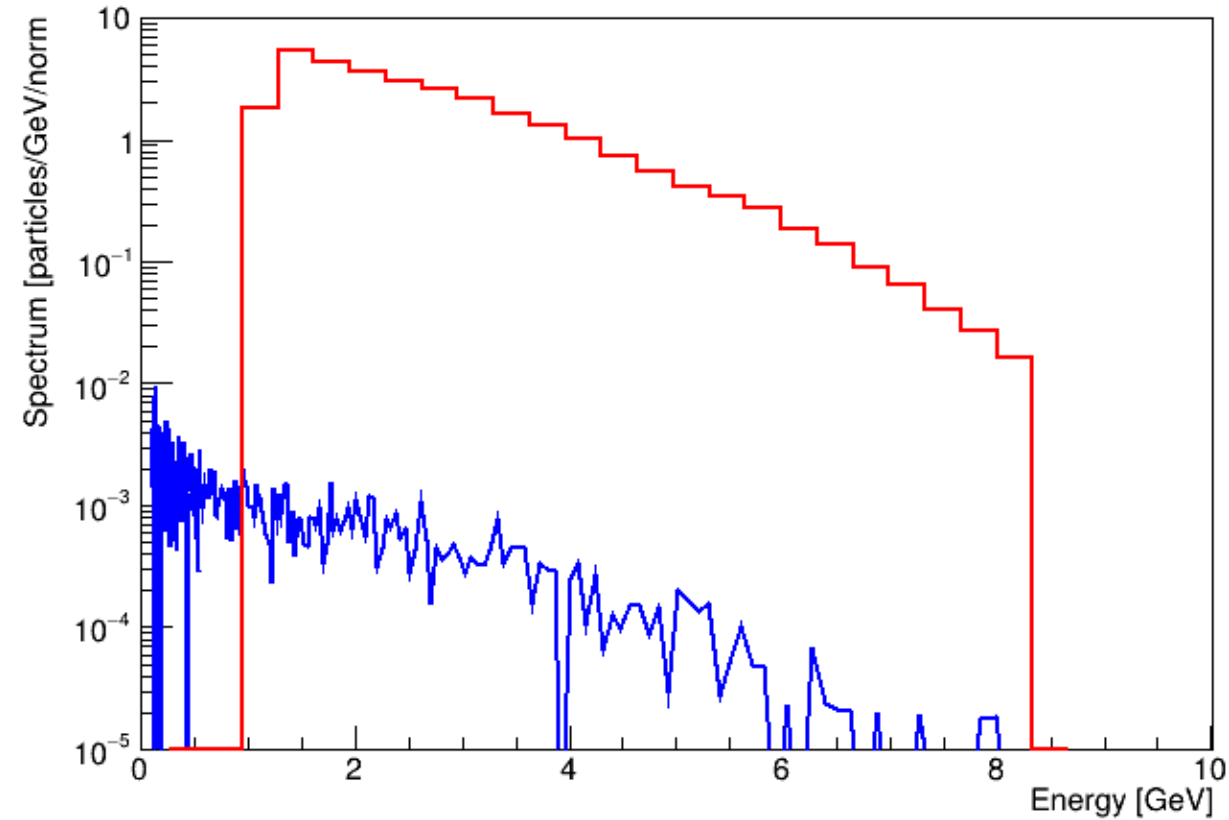
Edge = 5.98 ± 0.29 GeV

HICS $w_0 = 5000\text{nm}$, peak $\xi = 3.10$

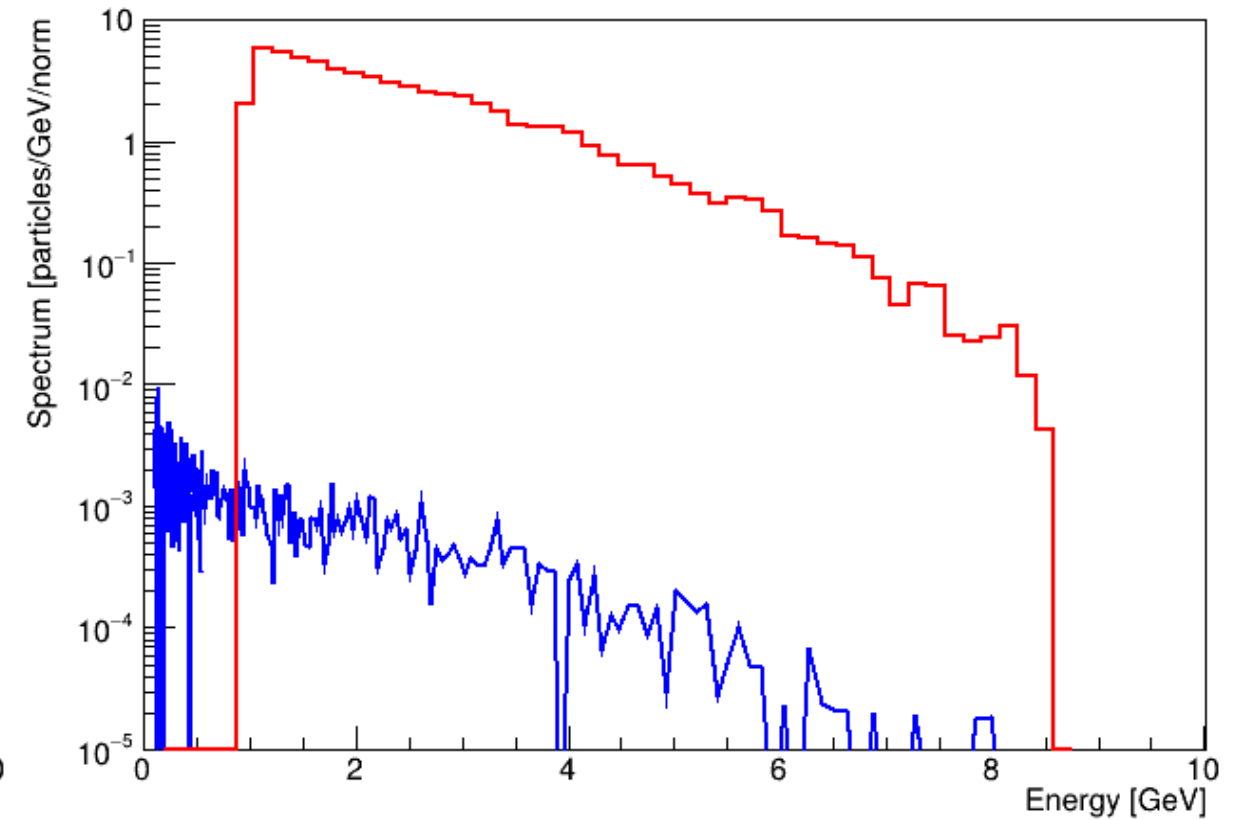


HICS 5000nm Deconvolution

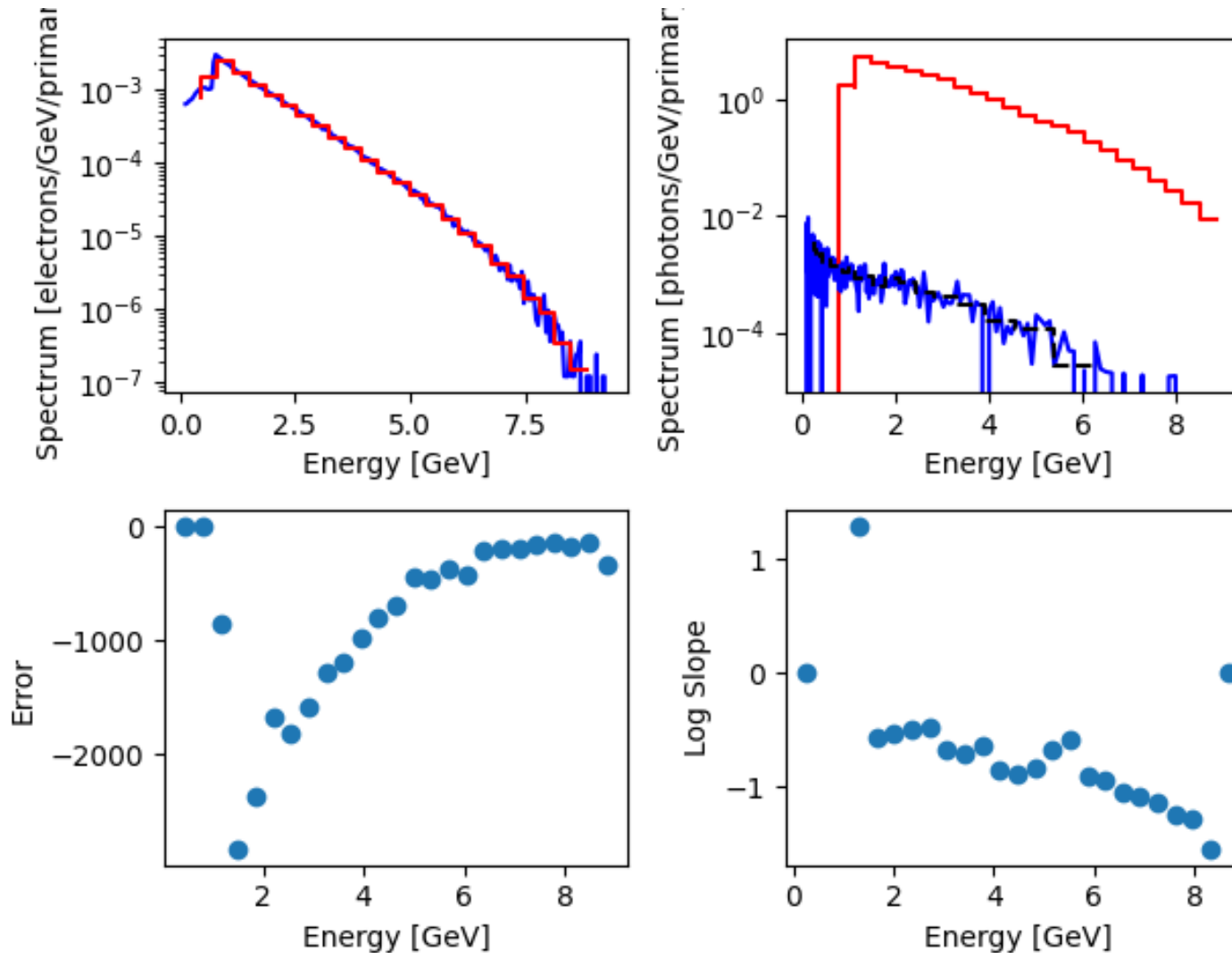
HICS 16.5 GeV 50 μm - 25 bins



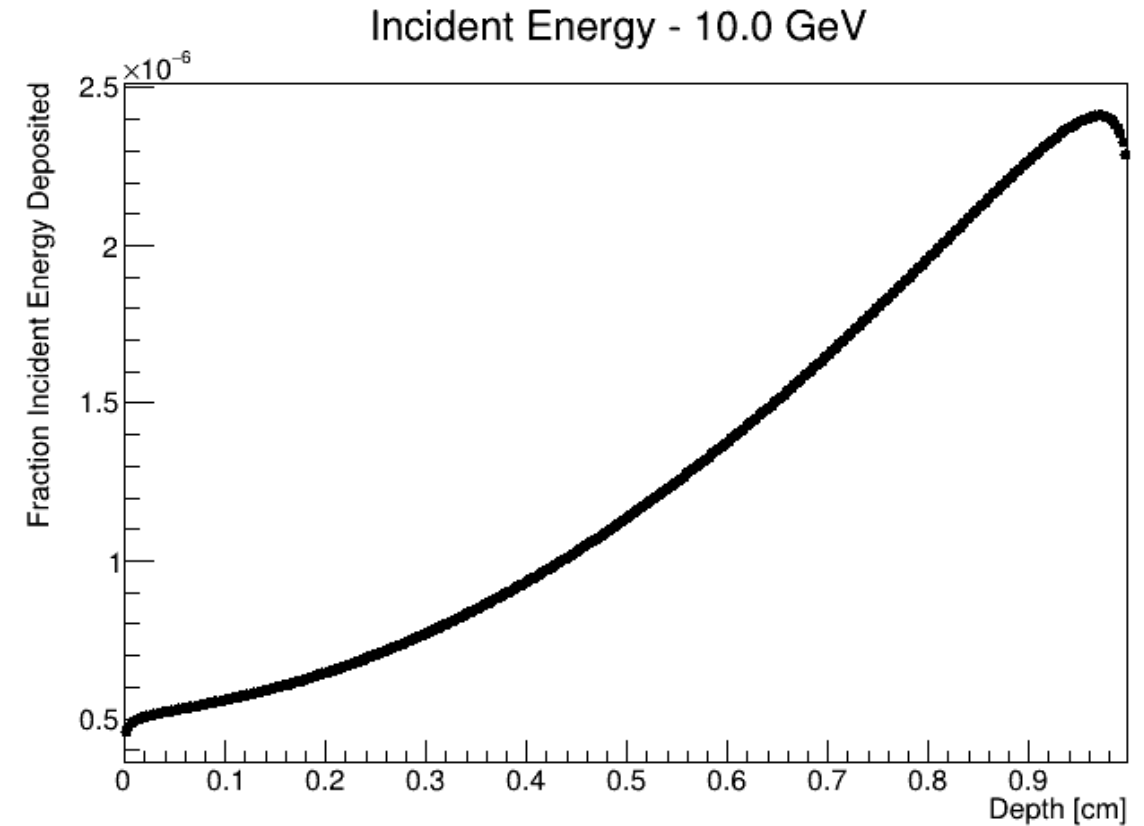
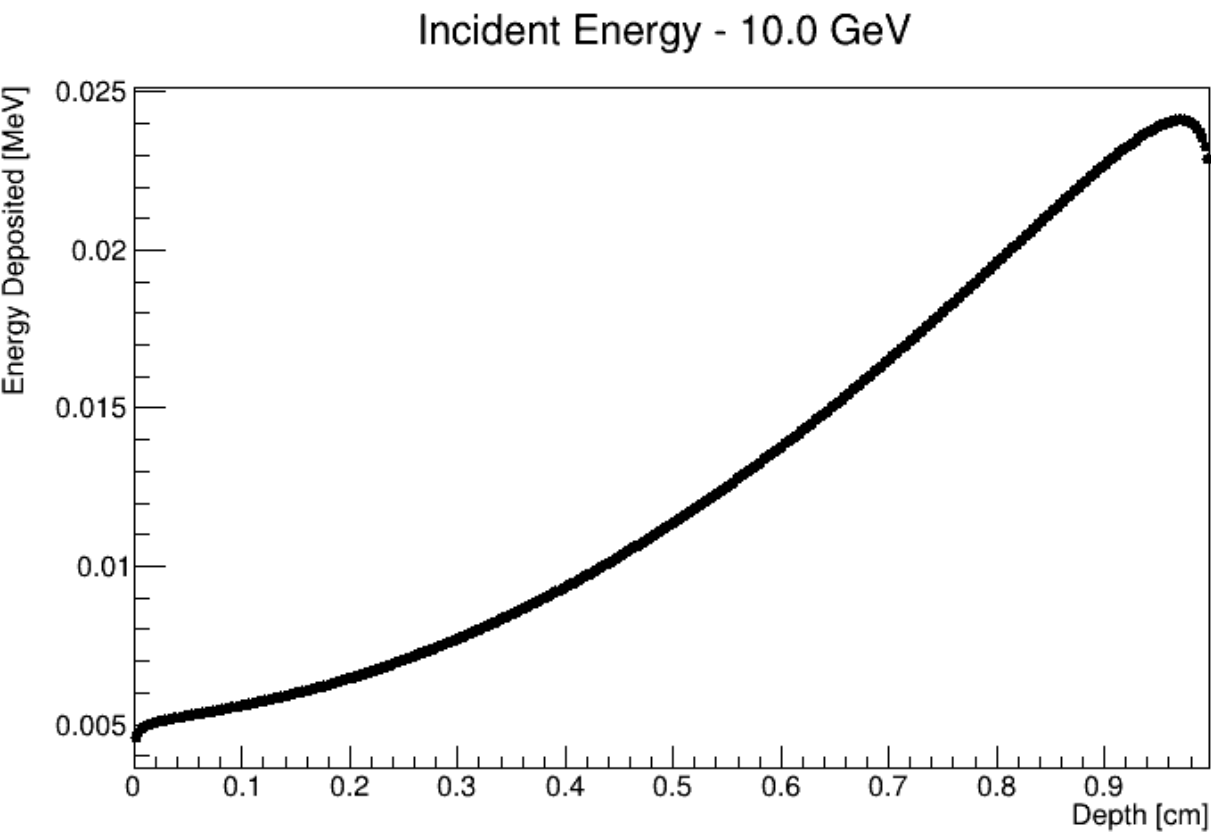
HICS 16.5 GeV 50 μm - 50 bins



Deconvolution – Extra Details , 25 Bins



Energy Deposition in LANEX screen



Summary

- FIR filters work well with deconvolved spectrum - can provide Compton edge value to within one energy bin for a good set of parameters
- Looking into determining how optimum parameters should be chosen
- Deconvolution method preserves the shape of the incident photon beam but there is a scaling issue – determining possible sources
- Energy deposition in LANEX screen not exponential in nature from FLUKA
- Working on testing for different incident energies and implementing in the estimation of the electron spectrum for deconvolution