Weekly Updates On nu e Meeting

Flux Function Check Ups

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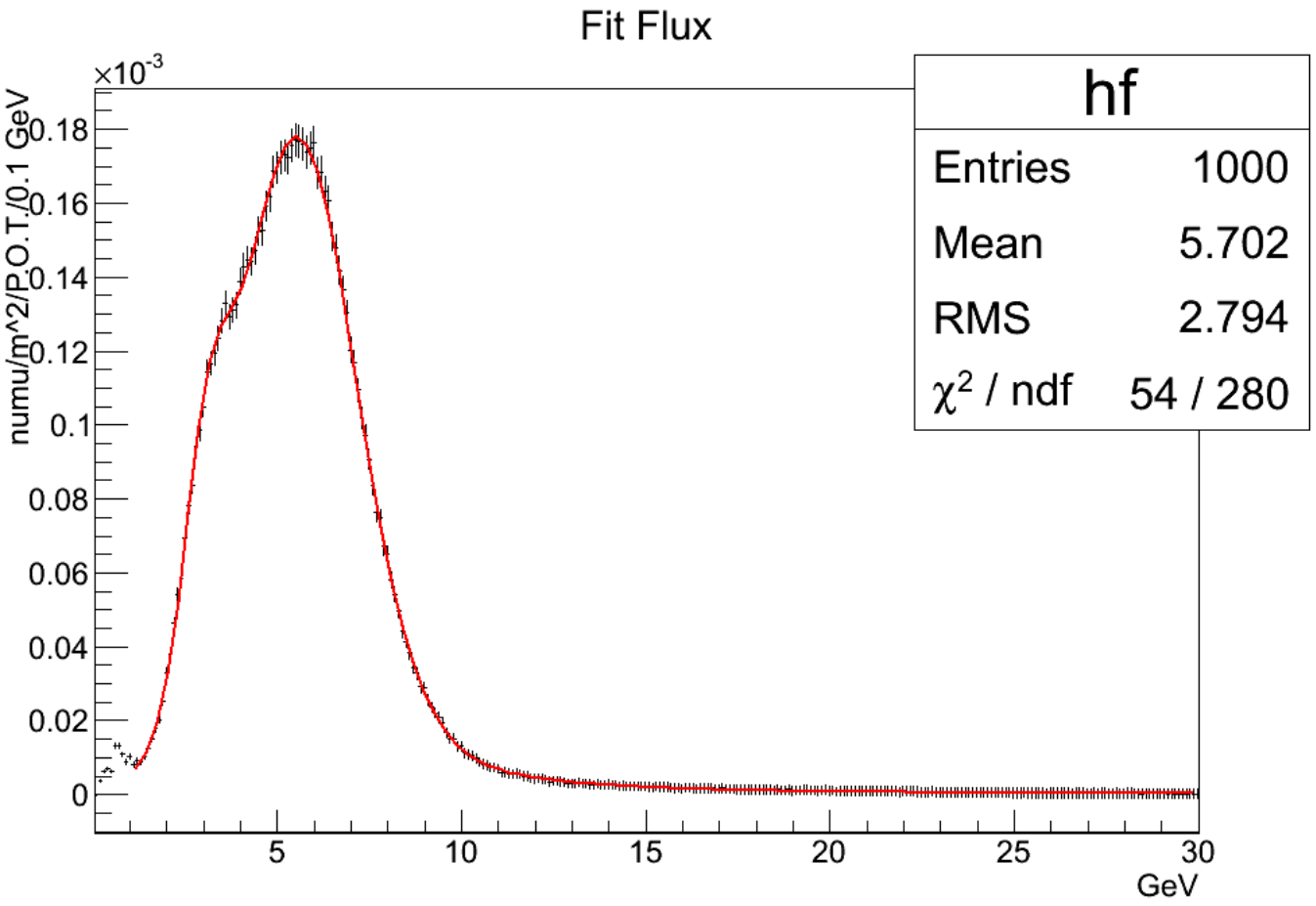
Two Parts Combine Fit on Flux



- Error band= $0.02 \times \text{Flux}(E_\nu) + 5 \times 10^{-7} \times E_\nu^{\frac{1}{3}}$
- 10 Pars(fit the flux over range 1-39 GeV):

1.78069e-04, 5.51708e+00, 1.69906e+00, 4.85202e-05, 3.08407e+00, 6.29148e-01, 2.46248e-09, 9.94031e+00, 1.01379e+00, 2.40831e+00

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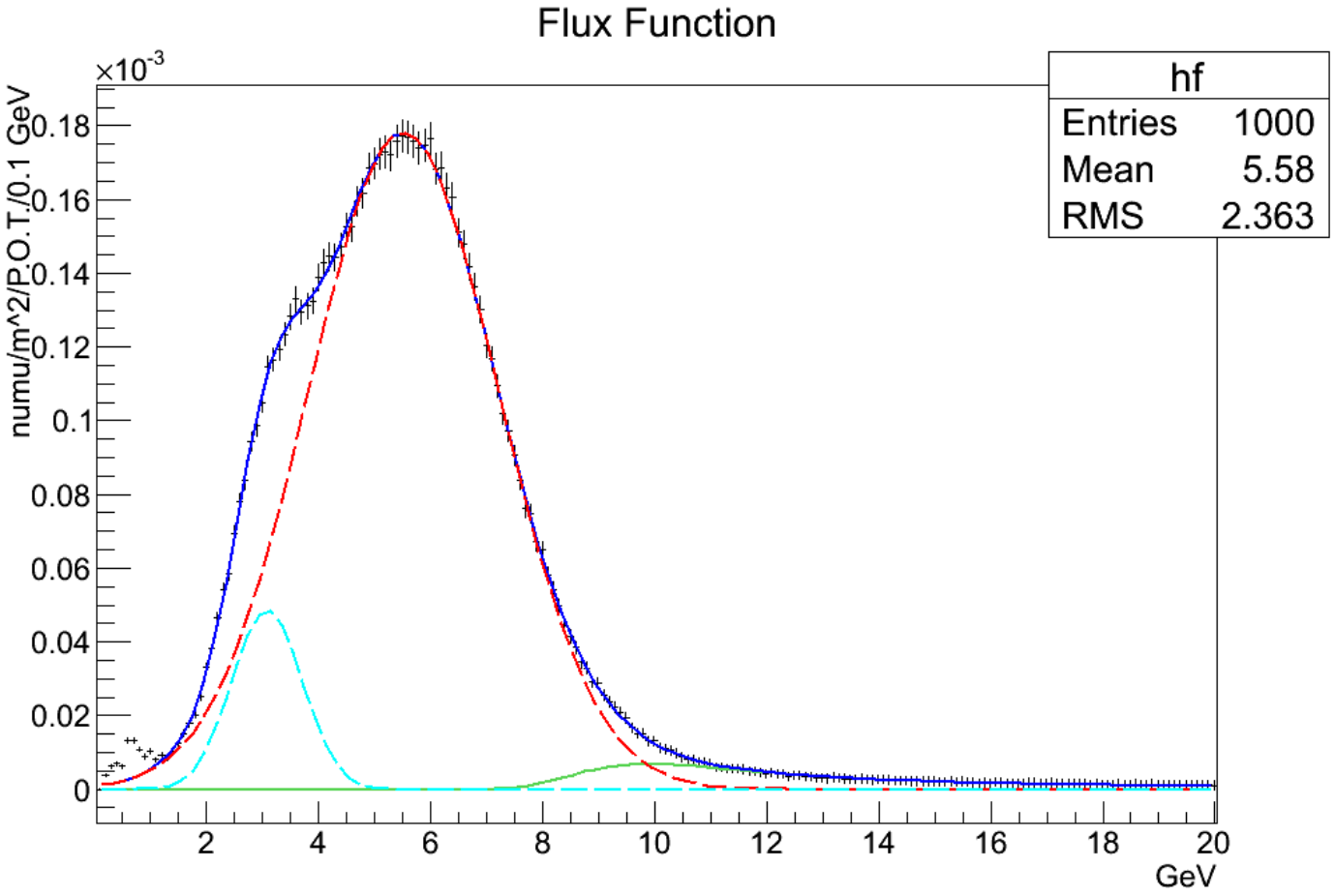
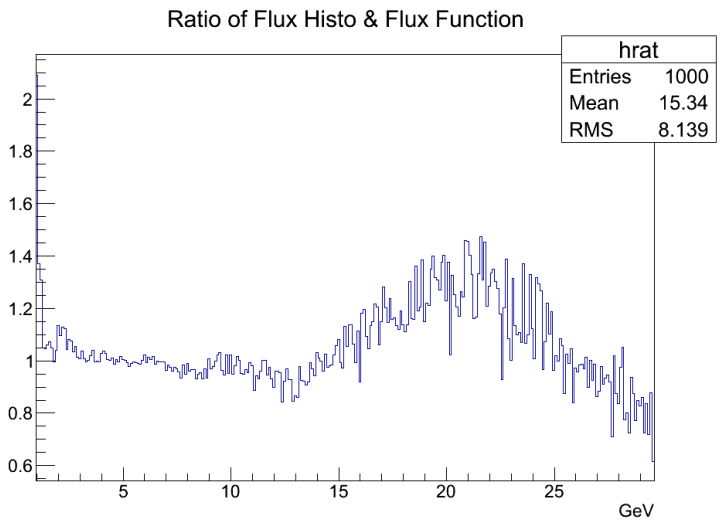
Whole Flux Function & Components

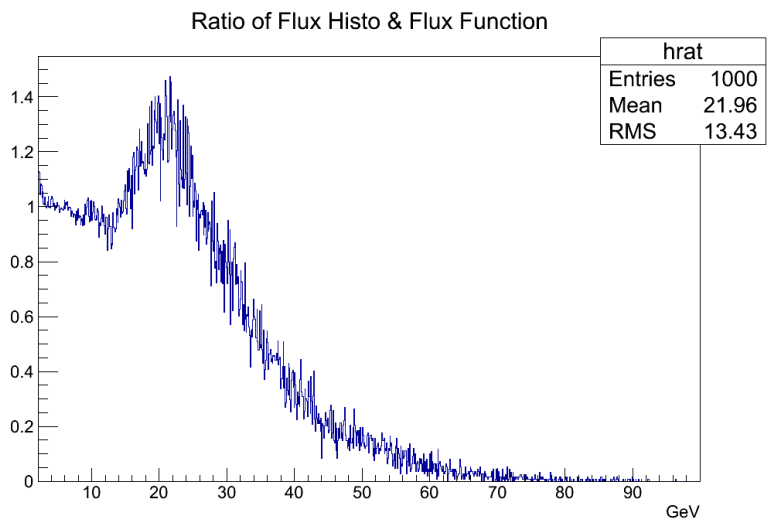


$$Flux = a1 \times e^{-\frac{1}{2}\left(\frac{E_\nu - m1}{s1}\right)^2} + a2 \times e^{-\frac{1}{2}\left(\frac{E_\nu - m2}{s2}\right)^2} + Landau\,(3) \times 3 \times (E_\nu + 25)^{[3]}$$

$$\vdots$$

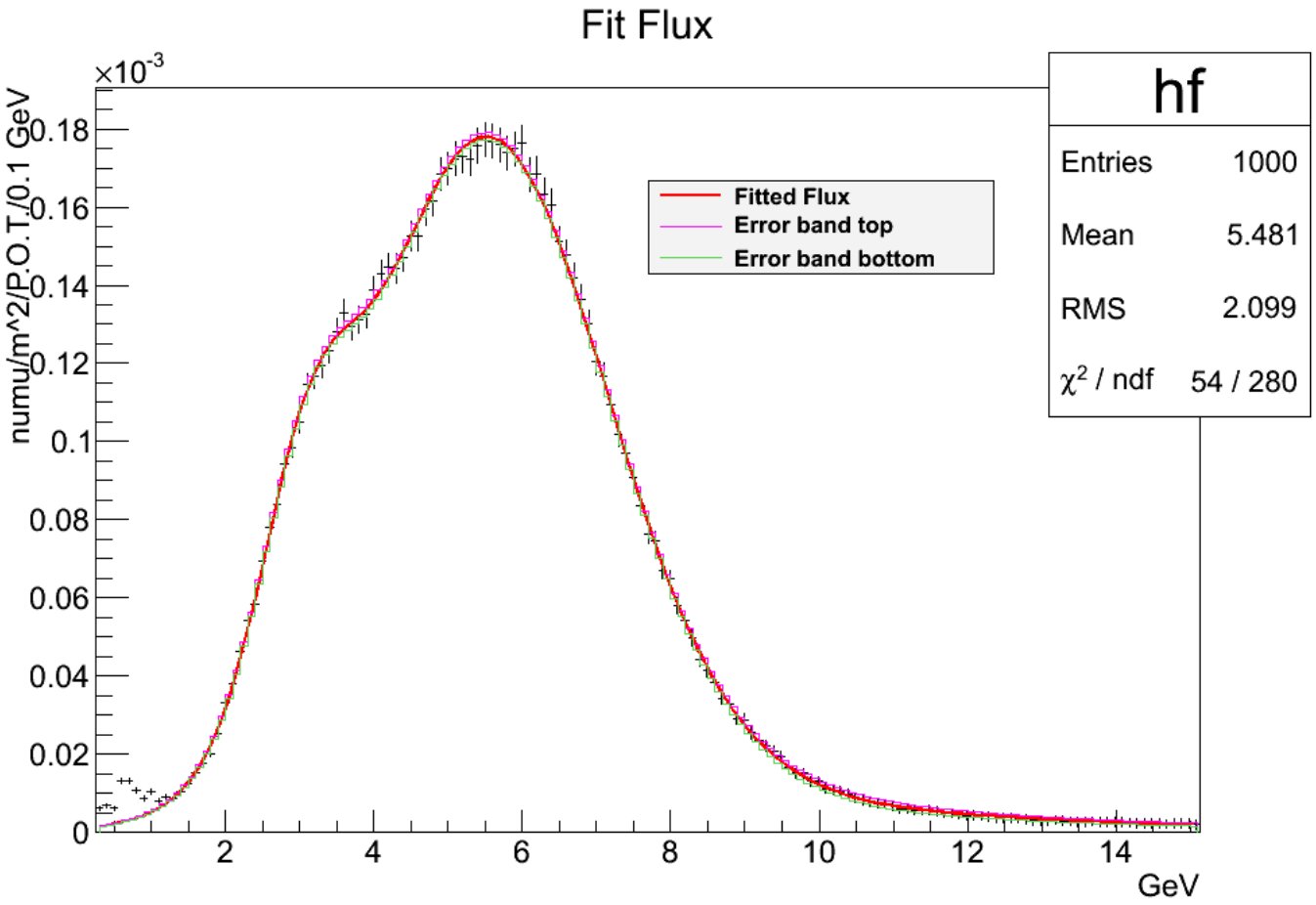
Flux Histogram - Flux Function Ratio





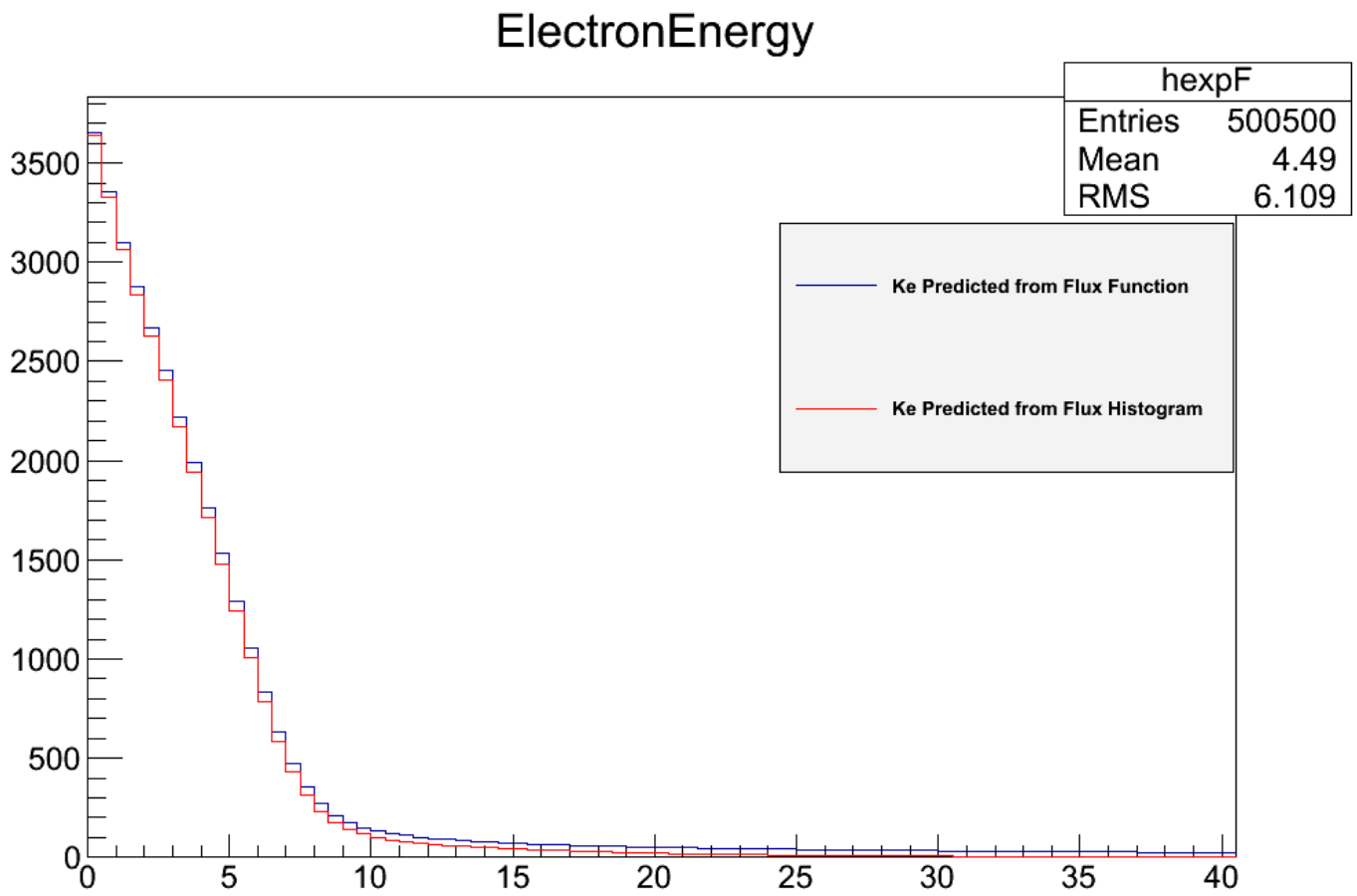
Ratio: $\frac{FluxHistogram}{FluxFunction}$

Whole Flux Function With Error Bands



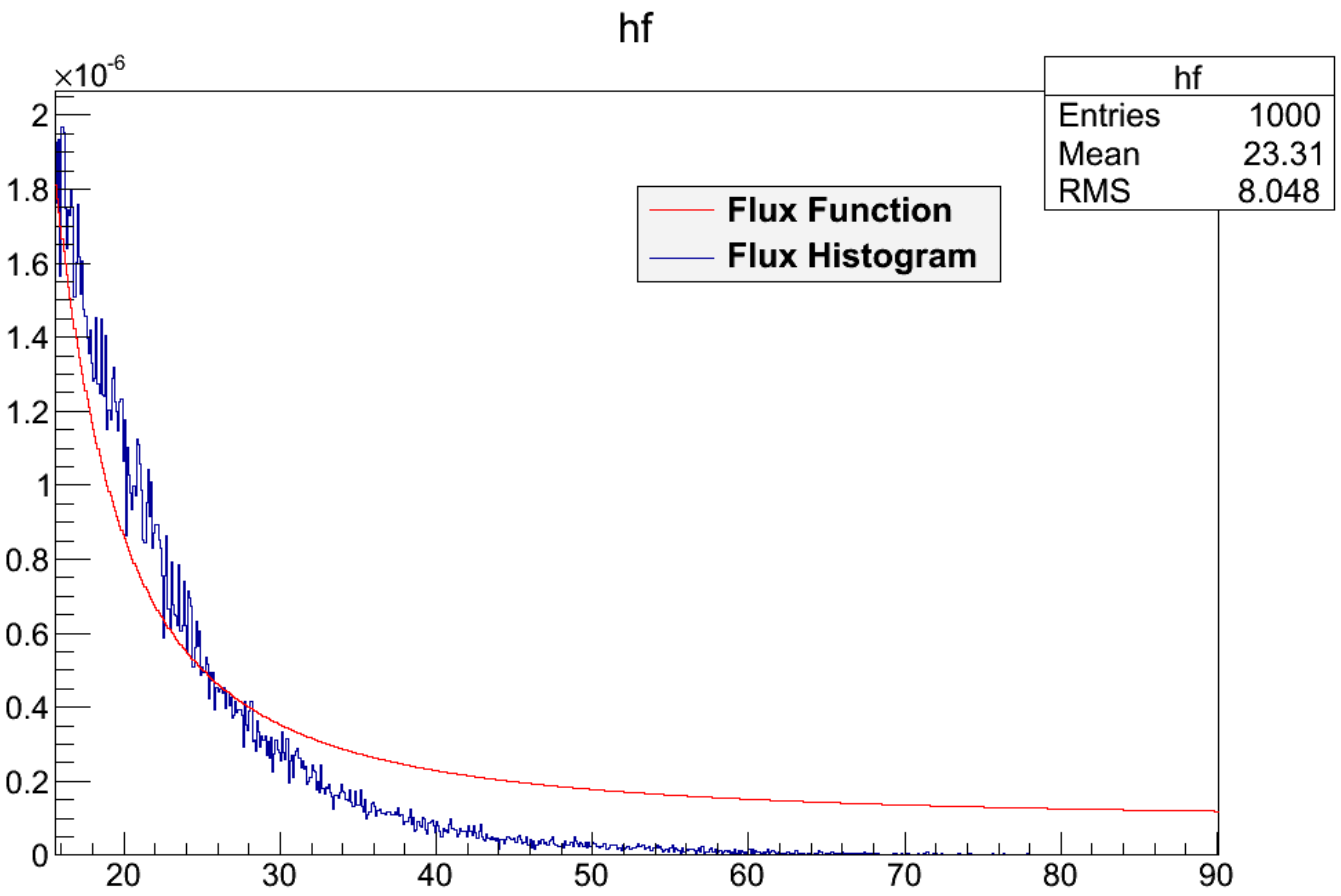
Ke Predictions Comparison

Ke From Flux Histogram and Flux Parameterized Function(0-100 GeV whole range)



Discrepancy comes from high energy tail. (>50 GeV)

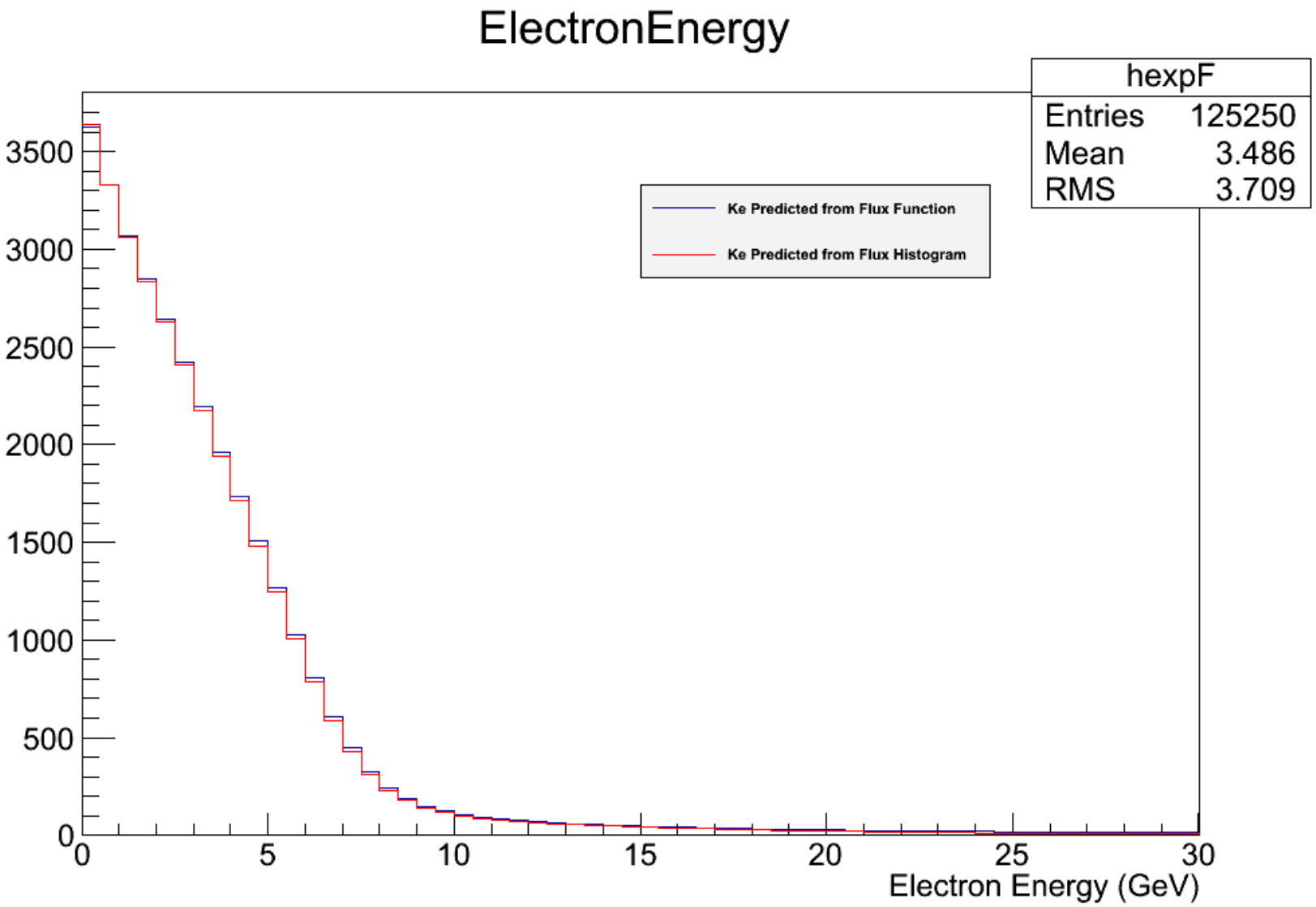
Look back at the Flux Function and Flux Histogram plot :



Zoom in on the high energy tail, Flux histogram (blue curve) is almost zero after 50 GeV. Flux Function is higher, that makes the discrepancy on the Ke Predictions.

Solution: Cut the high energy tail (>50 GeV) on the flux function, re-do the comparison of Ke plots.

Clear Plot of Ke Predictions Comparison of <50 GeV Cut on Flux Function



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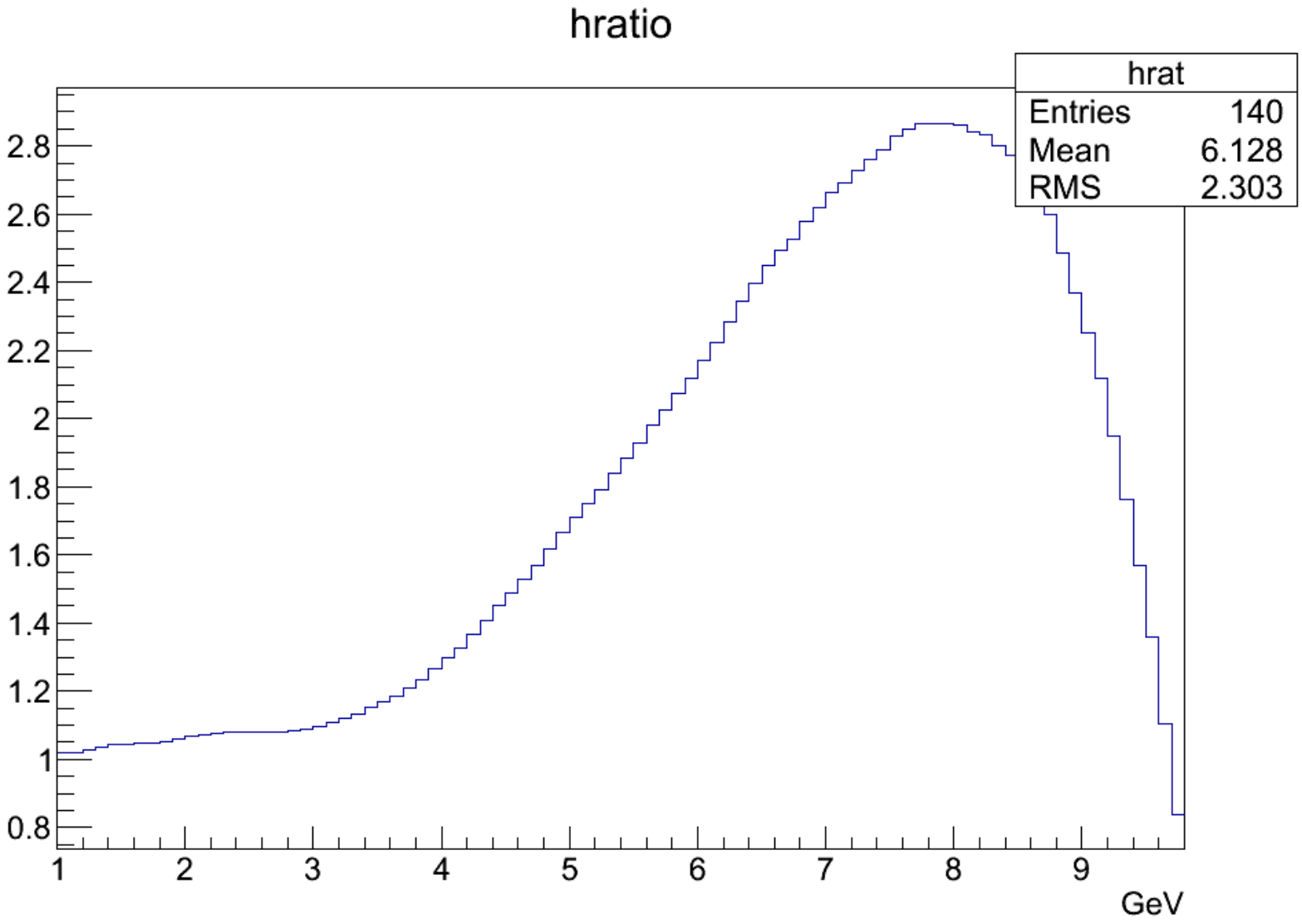
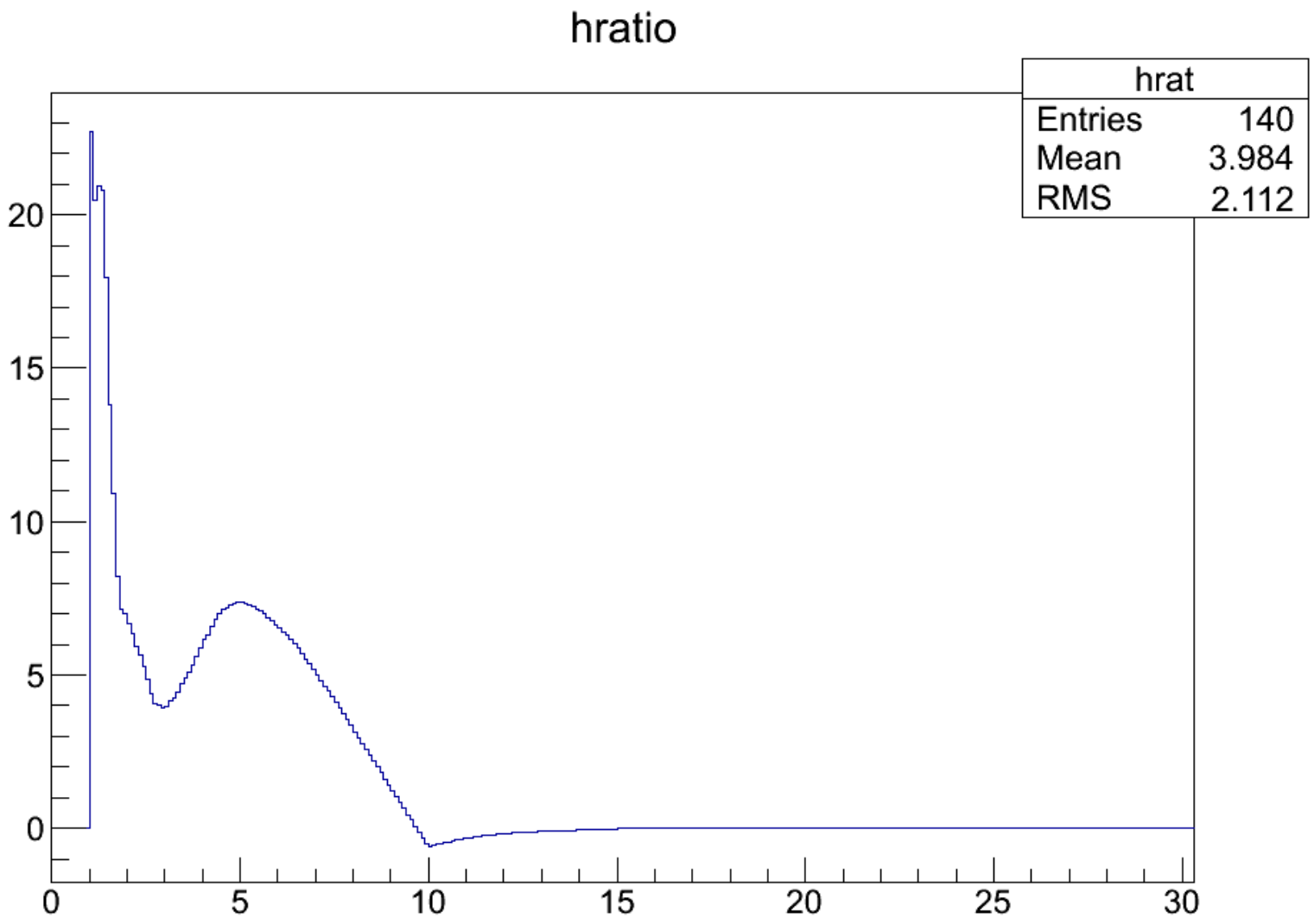


Residual Plot

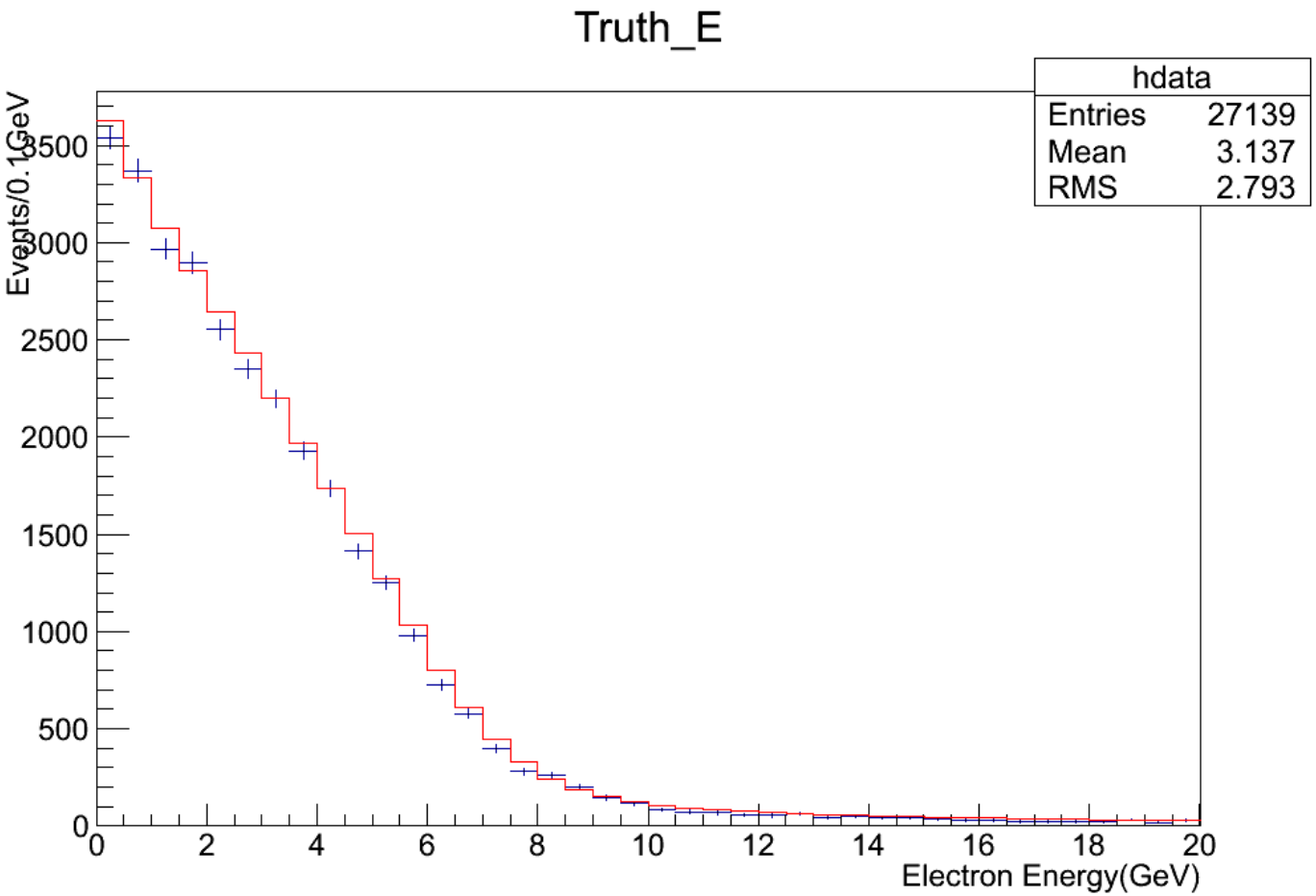


flat tail up to 100 GeV

x

Flux Function Ke Prediction vs Genie Sample

200E20 POT



Flux Histogram may not be the same as which Genie really uses.

Next Steps

- Sample a sudo data using the flux histogram and the model.
- Fix the shape of high energy tail of flux(fix 3 pars of Landau part respect to the shape), TMinuit fit the 6 parameters of the double Gaussian part and 1 scale par of the Landau tail.
- Compare result with the flux function parameters.

(Do not use Genie samples any more?)

Backups

Error Matrix TMinuit Fitting 10 Pars

M[i,j]

```
9.54591e-13 -5.27965e-09 -3.16469e-09 -3.82927e-13 -8.5315e-09 -5.49413e-09 -5.66433e-18
-4.39439e-08 -5.32942e-09 5.74736e-09
-5.27965e-09 0.000240561 -6.67545e-05 1.68881e-08 0.000137738 0.000241377 3.80291e-13
0.000774725 -8.23981e-05 -8.15931e-05
-3.16469e-09 -6.67545e-05 0.000149141 -1.09345e-08 -7.14919e-06 -0.000161727 1.06434e-12
0.00142579 0.000157234 -0.00027473
-3.82927e-13 1.68881e-08 -1.09345e-08 2.51614e-12 1.05834e-08 1.74432e-08 6.49047e-18
-3.49991e-08 -1.02313e-08 5.20831e-09
-8.5315e-09 0.000137738 -7.14919e-06 1.05834e-08 0.000345907 0.000234689 -6.02724e-13
0.000646852 -1.11179e-05 1.20512e-05
-5.49413e-09 0.000241377 -0.000161727 1.74432e-08 0.000234689 0.00046309 -1.59036e-12
-0.000566139 -0.000184152 0.000264656
-5.66433e-18 3.80291e-13 1.06434e-12 6.49047e-18 -6.02724e-13 -1.59036e-12 2.20739e-18
4.42379e-11 -7.49205e-13 -2.34029e-10
-4.39439e-08 0.000774725 0.00142579 -3.49991e-08 0.000646852 -0.000566139 4.42379e-11 0.0354264
0.00226258 -0.00763935
-5.32942e-09 -8.23981e-05 0.000157234 -1.02313e-08 -1.11179e-05 -0.000184152 -7.49205e-13
0.00226258 0.00273948 -0.000484391
5.74736e-09 -8.15931e-05 -0.00027473 5.20831e-09 1.20512e-05 0.000264656 -2.34029e-10
-0.00763935 -0.000484391 0.0252357
```