

$$\gamma p \rightarrow \eta p, \eta \rightarrow \gamma\gamma \text{ (39.4\%)}$$

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SRC/CT@GlueX Analysis Meeting

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η Properties & Analysis Details

$$\eta \approx \frac{1}{\sqrt{6}}(u\bar{u} + d\bar{d} - 2s\bar{s})$$

$$M_\eta = 548 \text{ MeV}$$

$$\Gamma_\eta = 1.3 \text{ keV}$$

$\eta \rightarrow \gamma\gamma$	39%
$\eta \rightarrow \pi^0\pi^0\pi^0$	33%
$\eta \rightarrow \pi^+\pi^-\pi^0$	23%
$\eta \rightarrow \pi^+\pi^-\gamma$	4%

◦ $\gamma p \rightarrow \gamma\gamma$ on D target (runs 090209-090227)

◦ Reaction Filter: 1_45__17_14_m13,

Decay: 17__1_1,

Flags: F4_B5

◦ Combo Selection:

1. Confidence Level > 0.05

2. $E_\gamma > 6 \text{ GeV}$

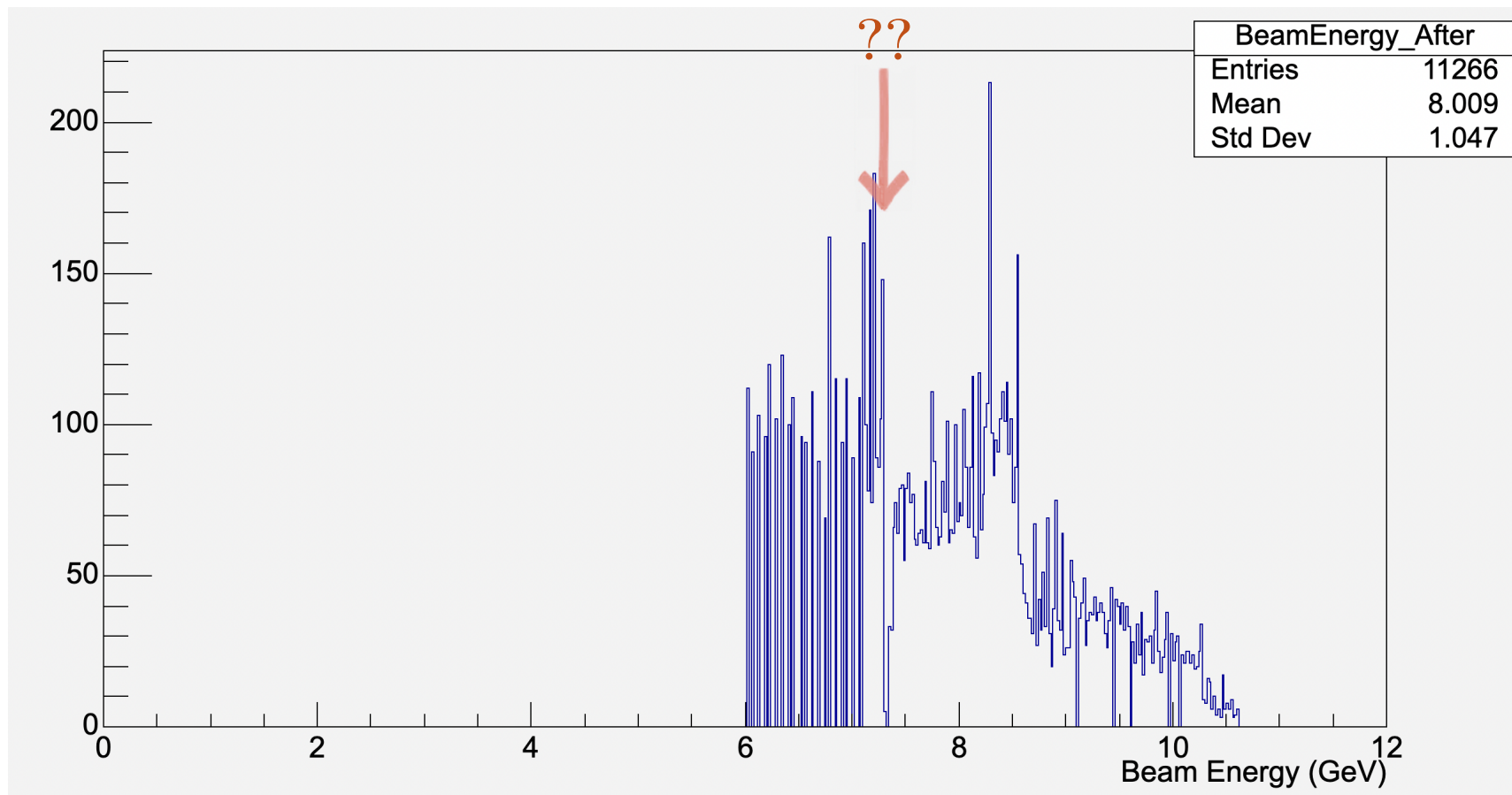
3. Vertex: 52 cm > z > 78 cm

4. $N_{\text{Unused Showers}} == 0$

5. $N_{\text{Unused Tracks}} == 0$

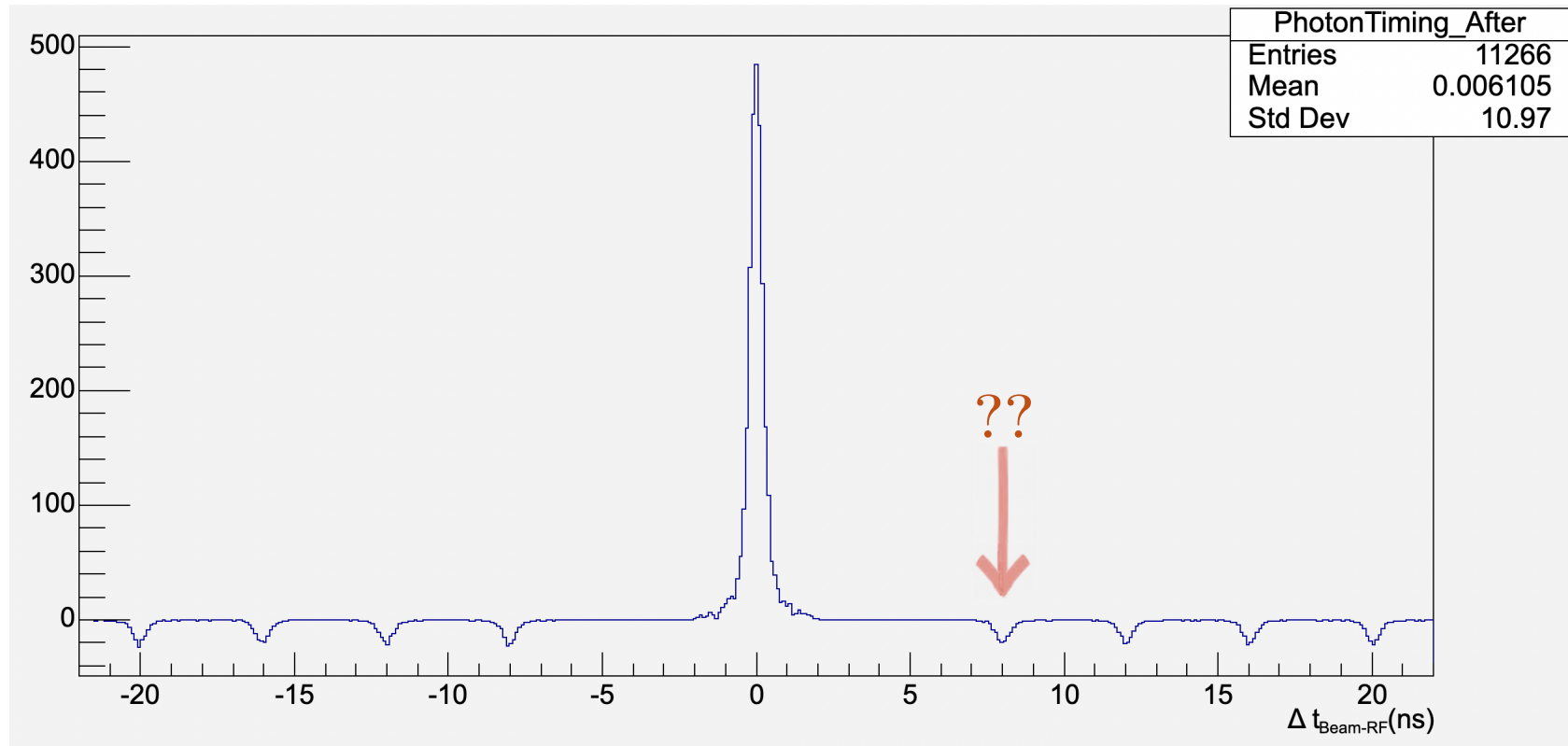
Analysis Details - Beam Energy

- E_γ after all cuts



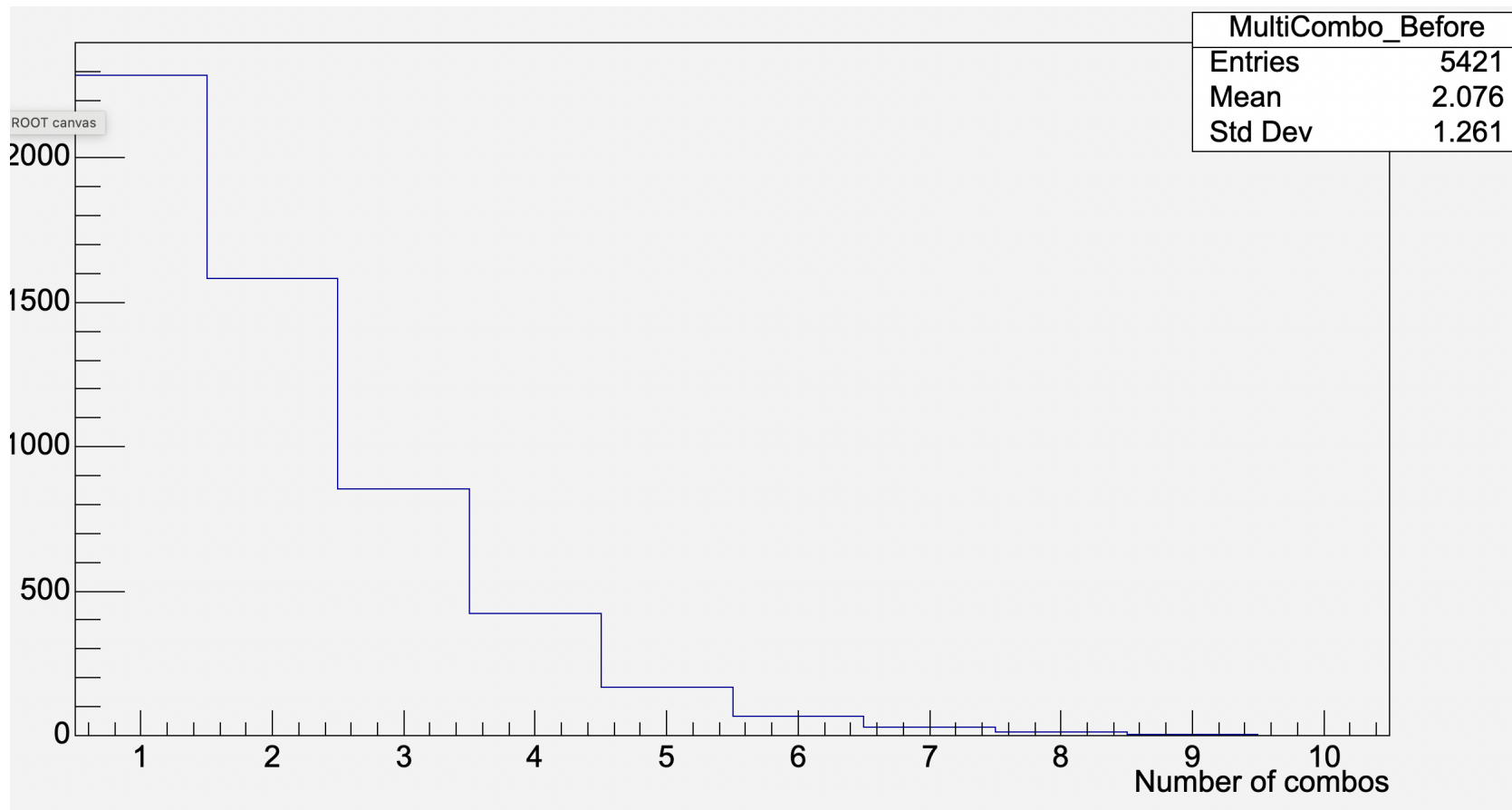
Analysis Details - Beam Photon Timing

- $\Delta t_{\text{Beam-RF}}$ after accidentals subtraction and all cuts



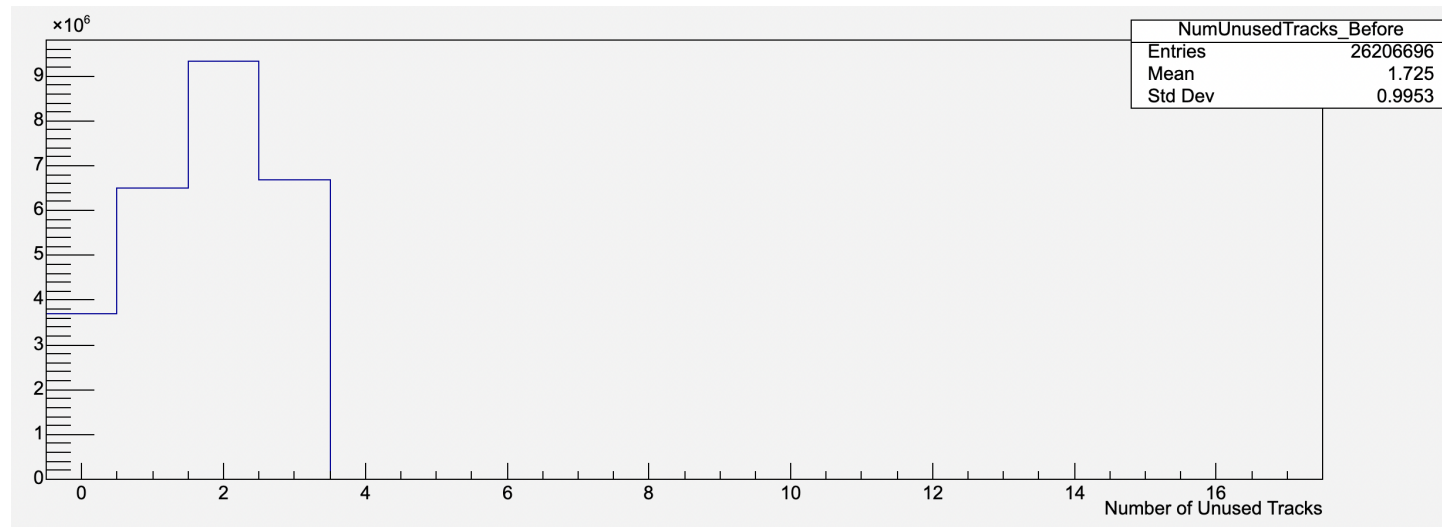
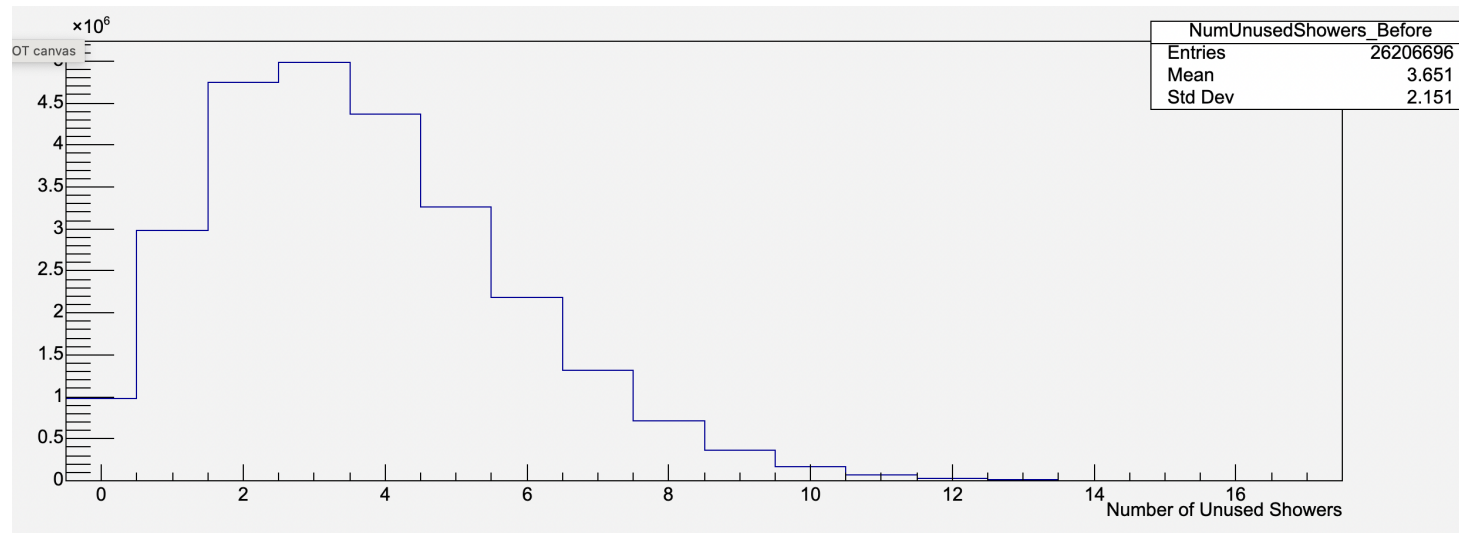
Analysis Details - Number of Combos

- Number of combos per event



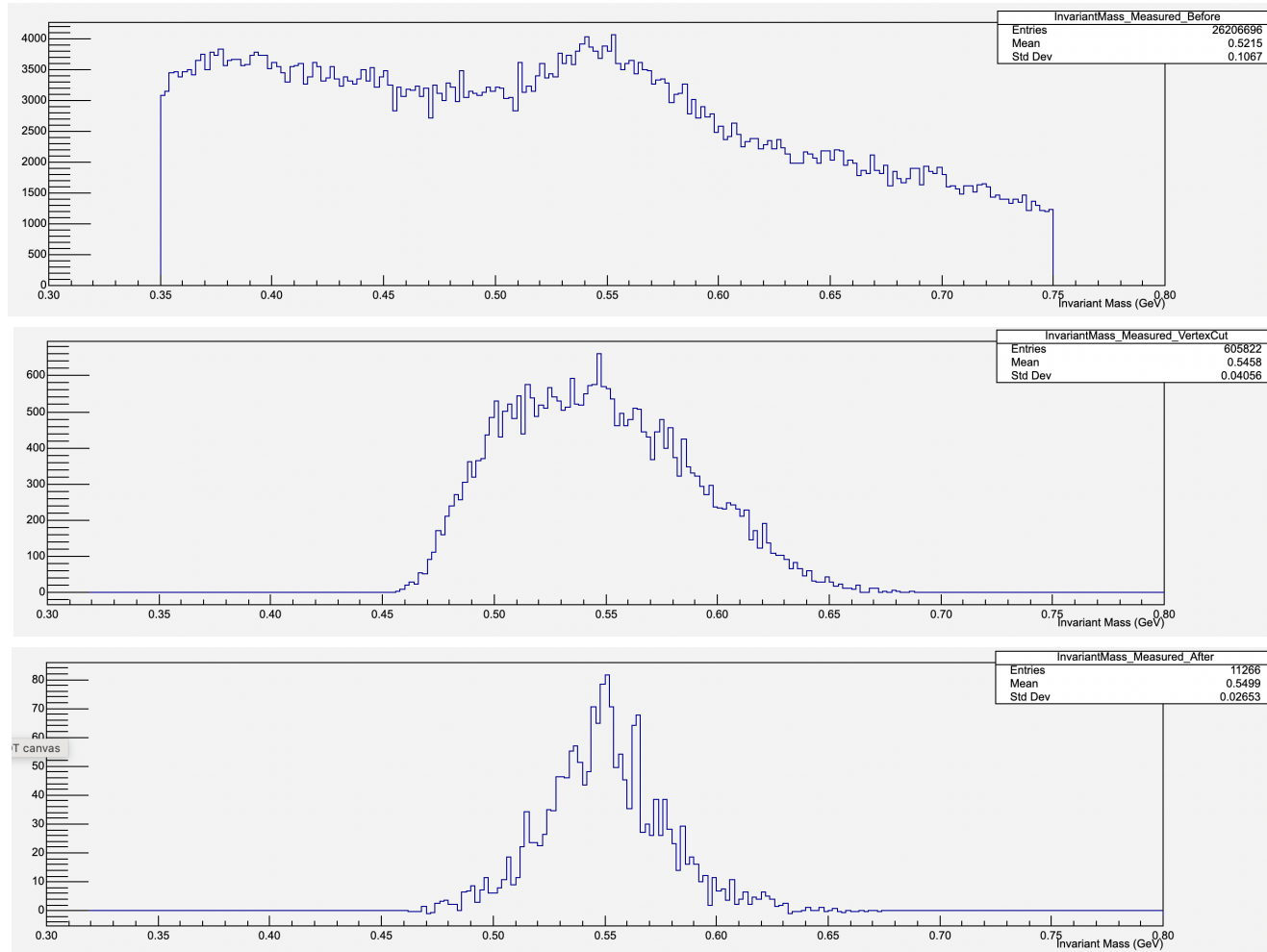
Analysis Details - Number of Unused Showers and Tracks

- Number of Unused Showers and Tracks before all cuts



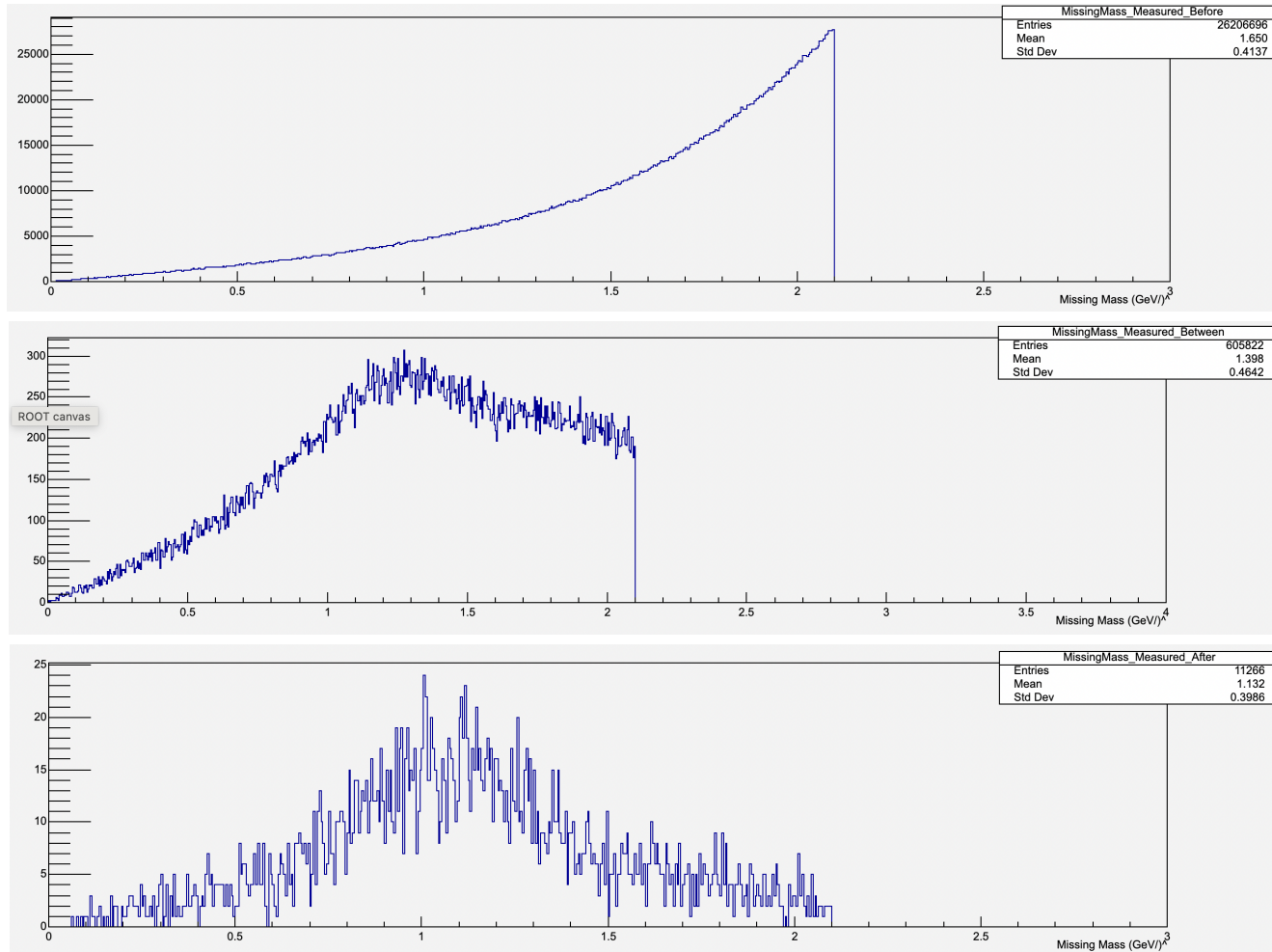
Analysis Results - Measured $\gamma\gamma$ Invariant Mass

- Measured $\gamma\gamma$ invariant mass before all cuts (top), before number of unused S&T (middle), after all cuts (bottom)



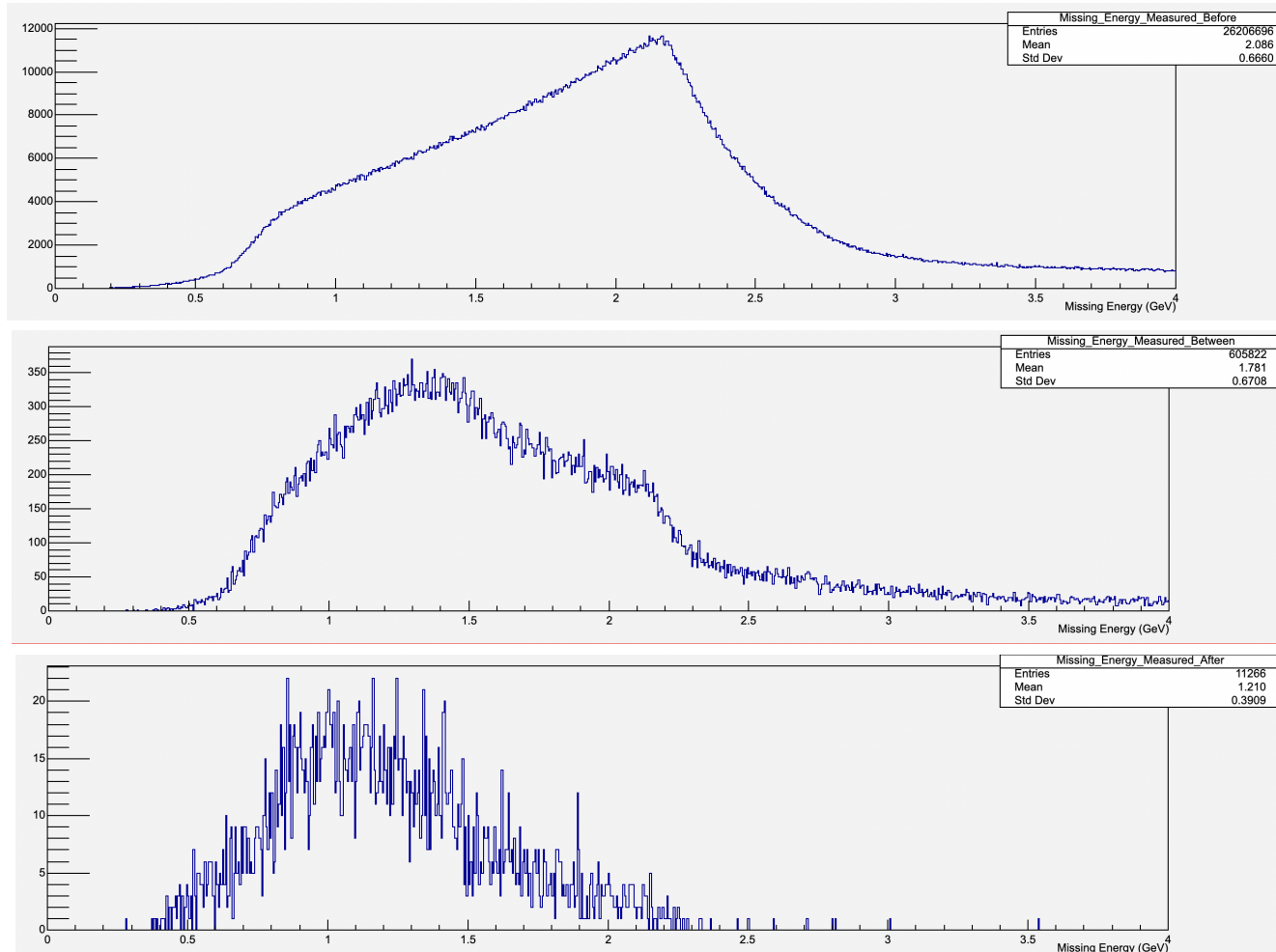
Analysis Results - Measured Missing Mass

- Measured missing mass before all cuts (top), before number of unused S&T (middle), after all cuts (bottom)



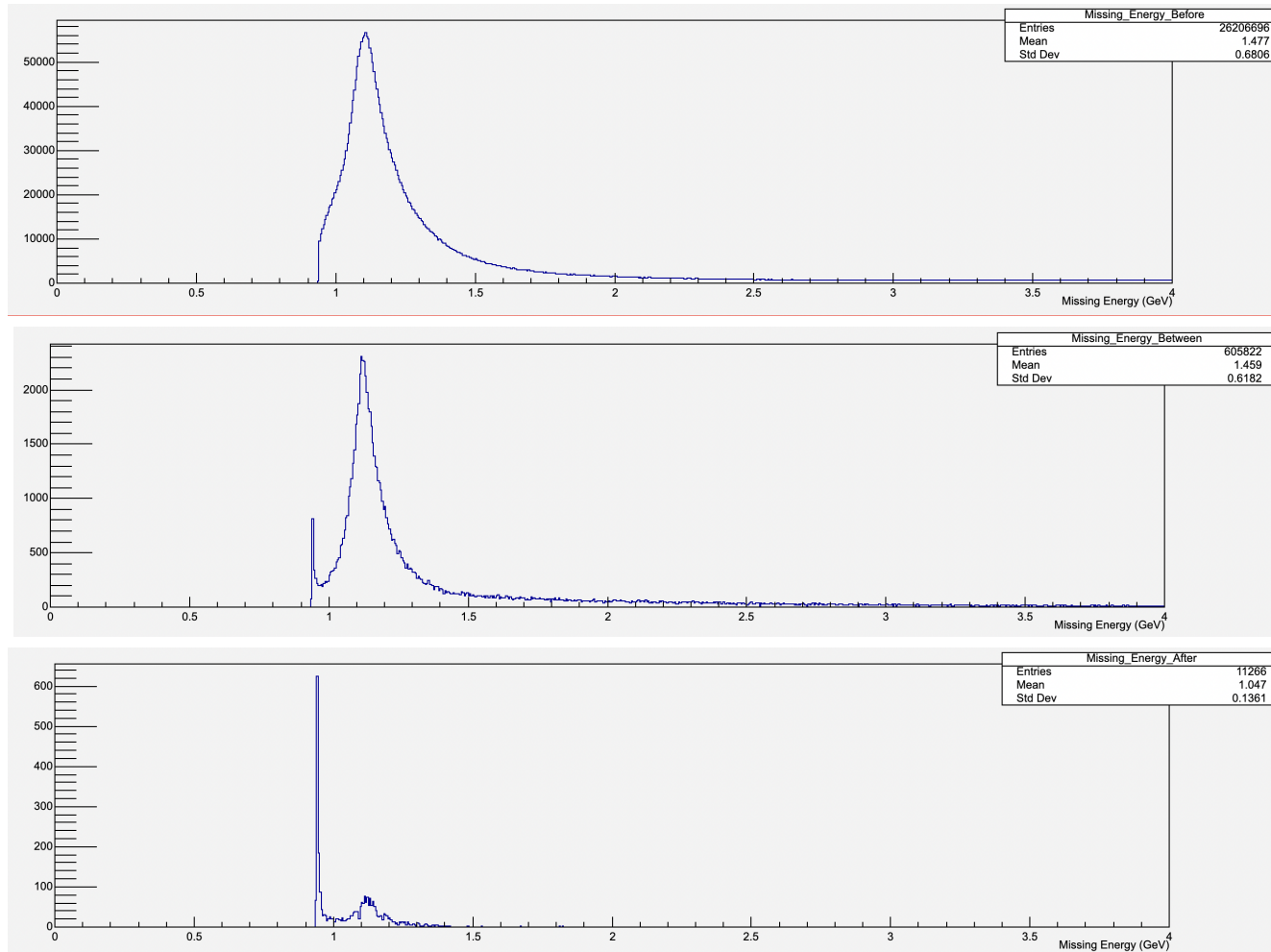
Analysis Results - Measured Missing Energy

- Measured missing energy before all cuts (top), before number of unused S&T (middle), after all cuts (bottom)



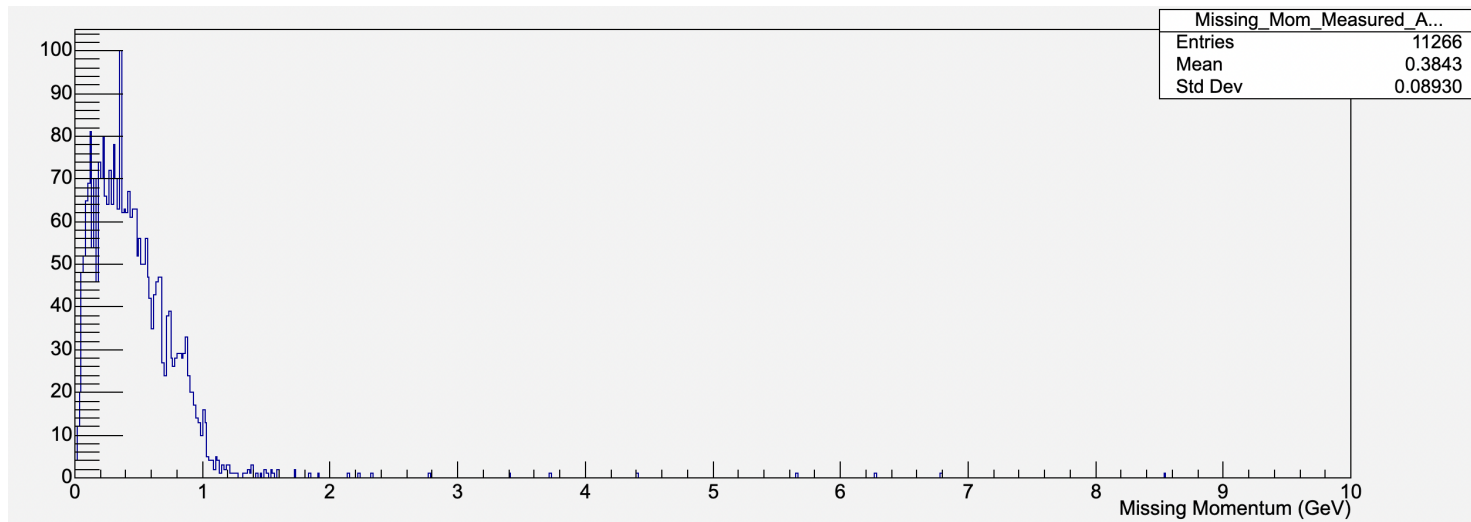
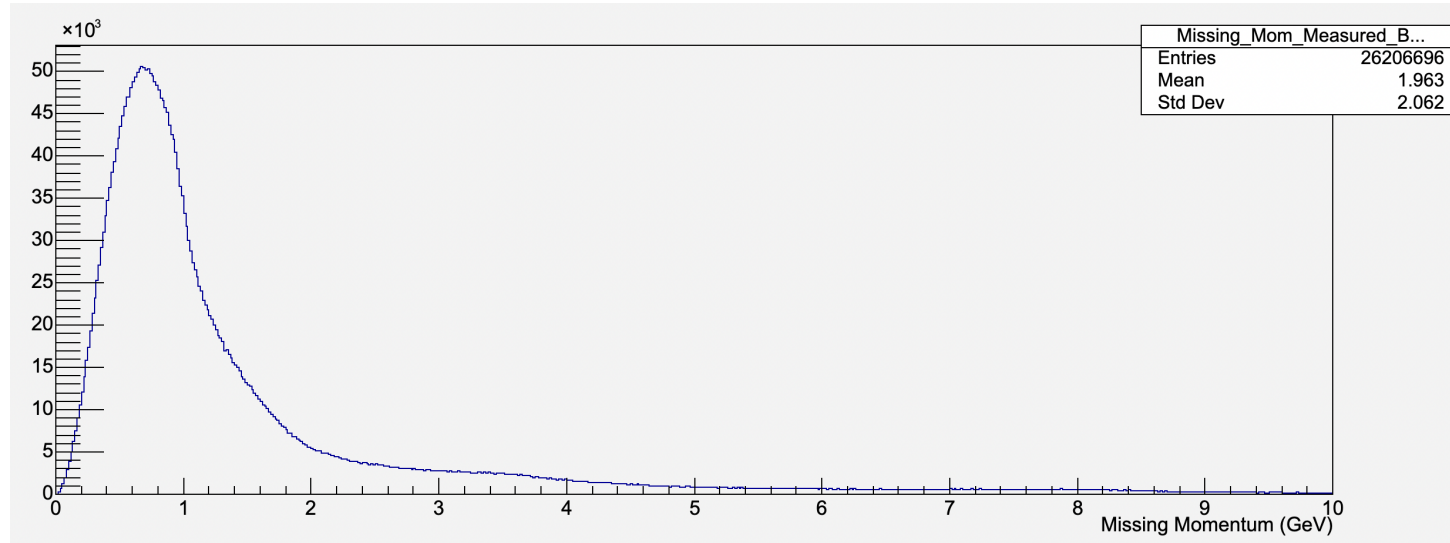
Analysis Results - KinFit Missing Energy

- KinFit missing energy before all cuts (top), before number of unused S&T (middle), after all cuts (bottom)



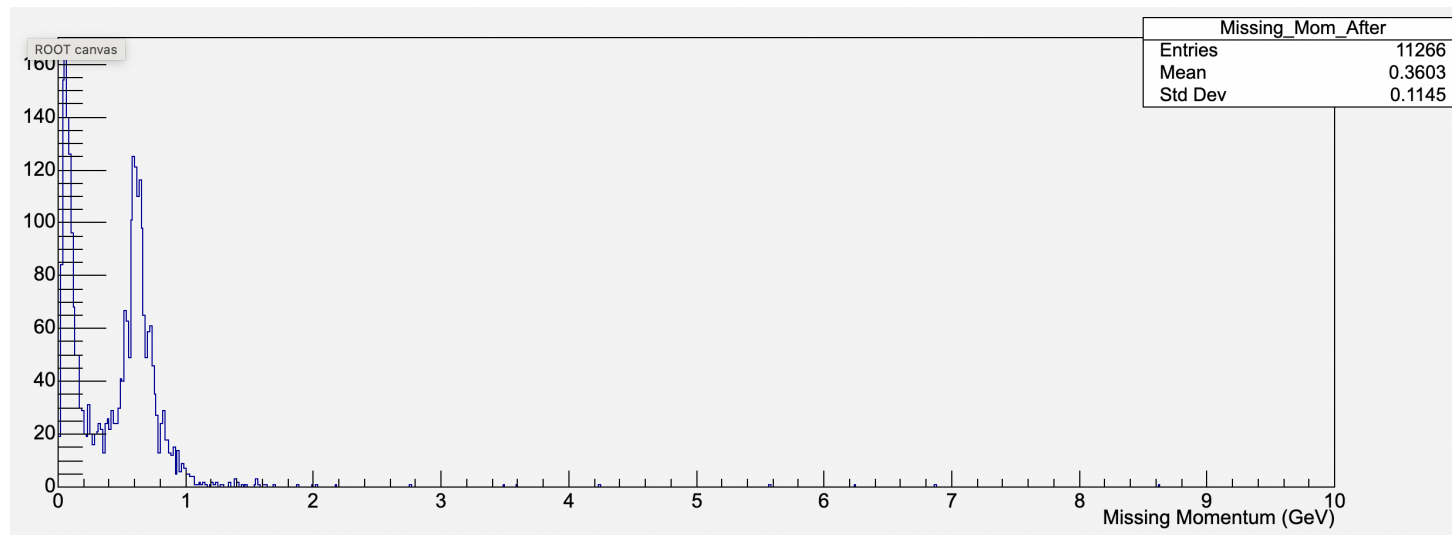
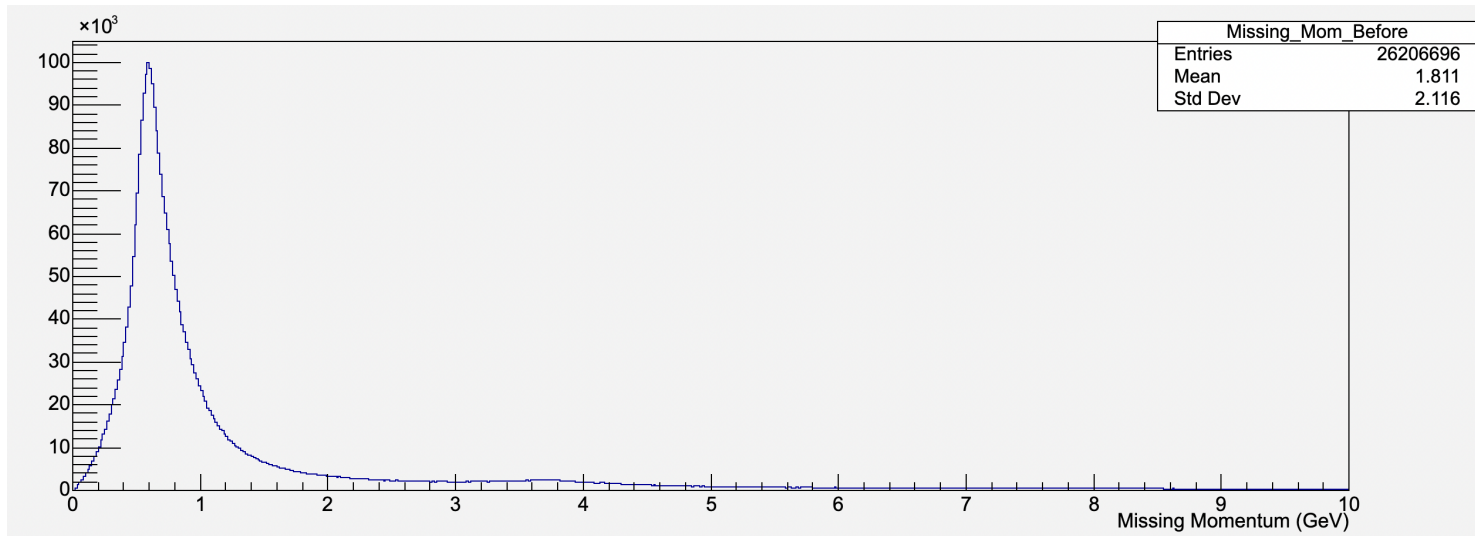
Analysis Results - Measured Missing Momentum

- Measured missing momentum before (top) and after (bottom) all cuts



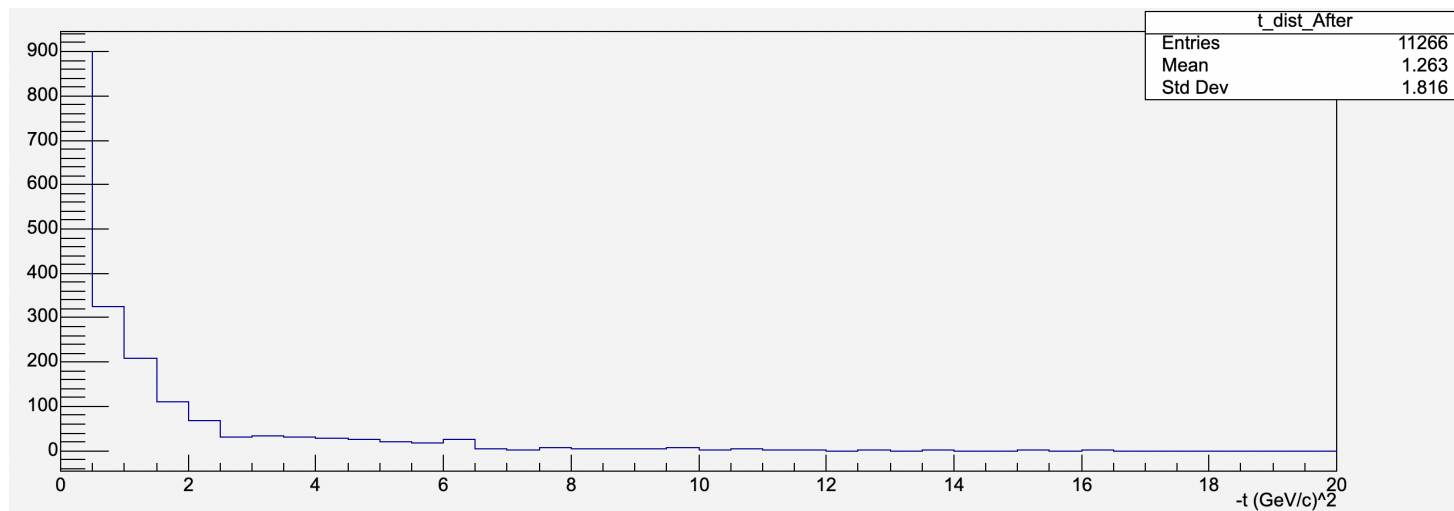
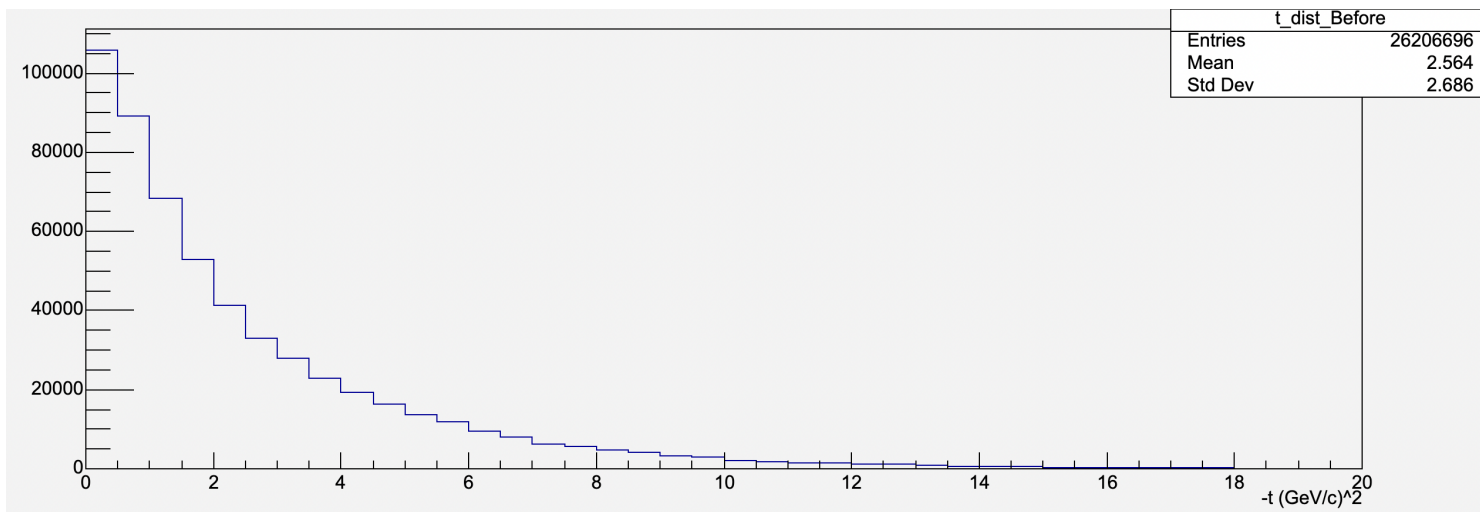
Analysis Results - KinFit Missing Momentum

- KinFit missing momentum before (top) and after (bottom) all cuts



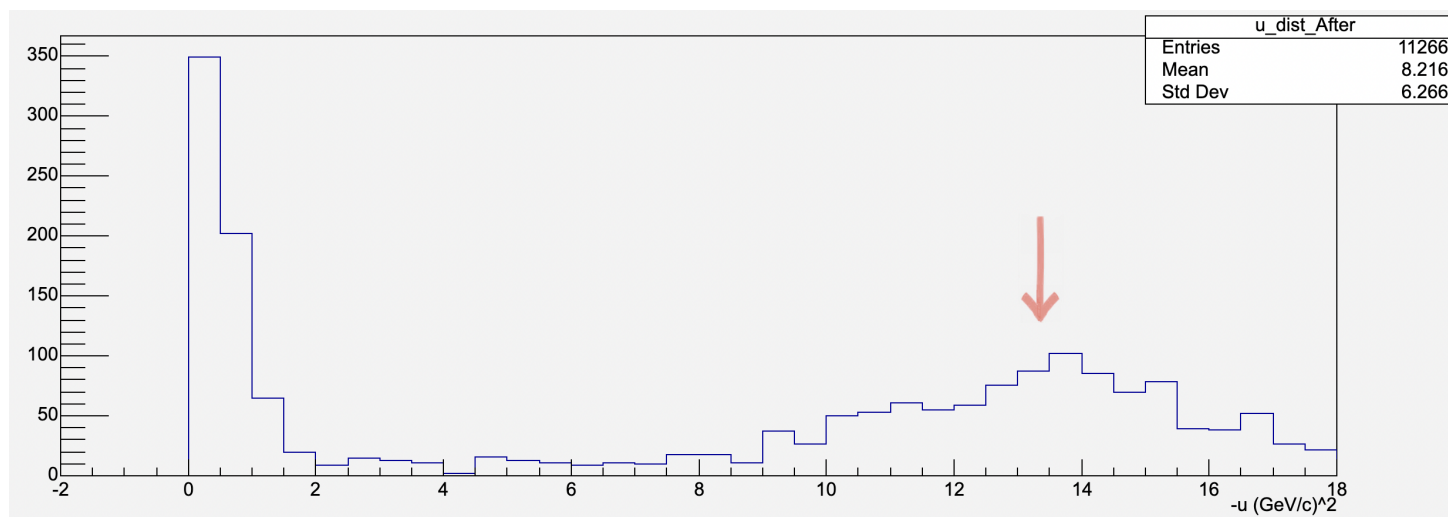
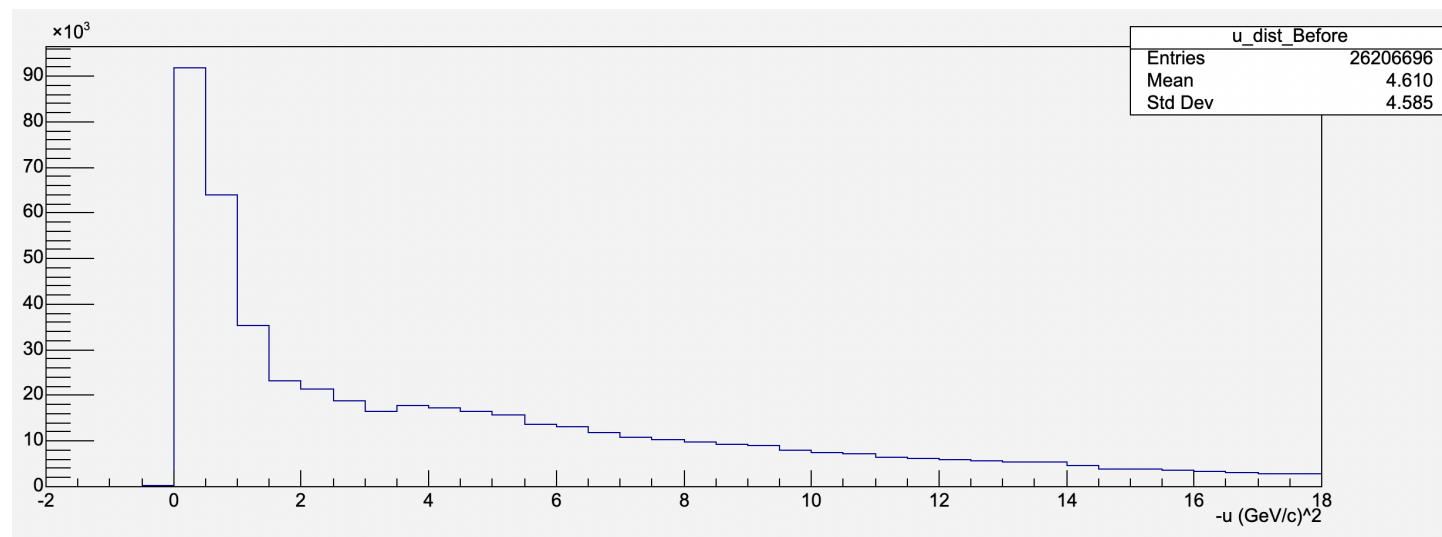
Analysis Results - t Distribution

- t distribution before (top) and after (bottom) all cuts



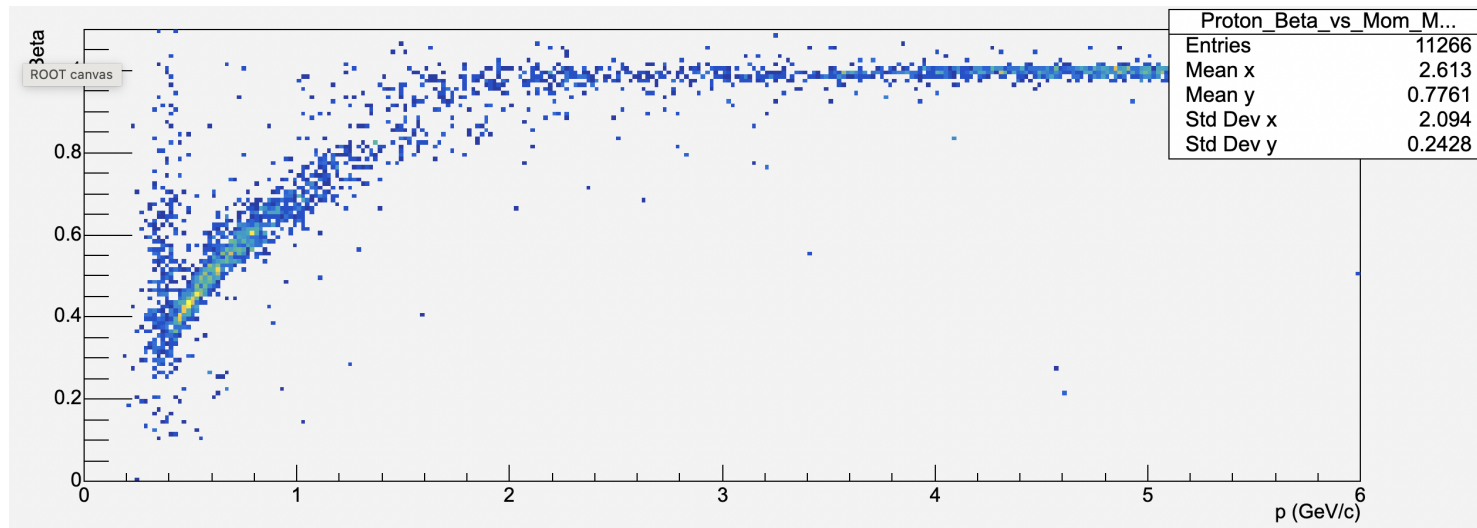
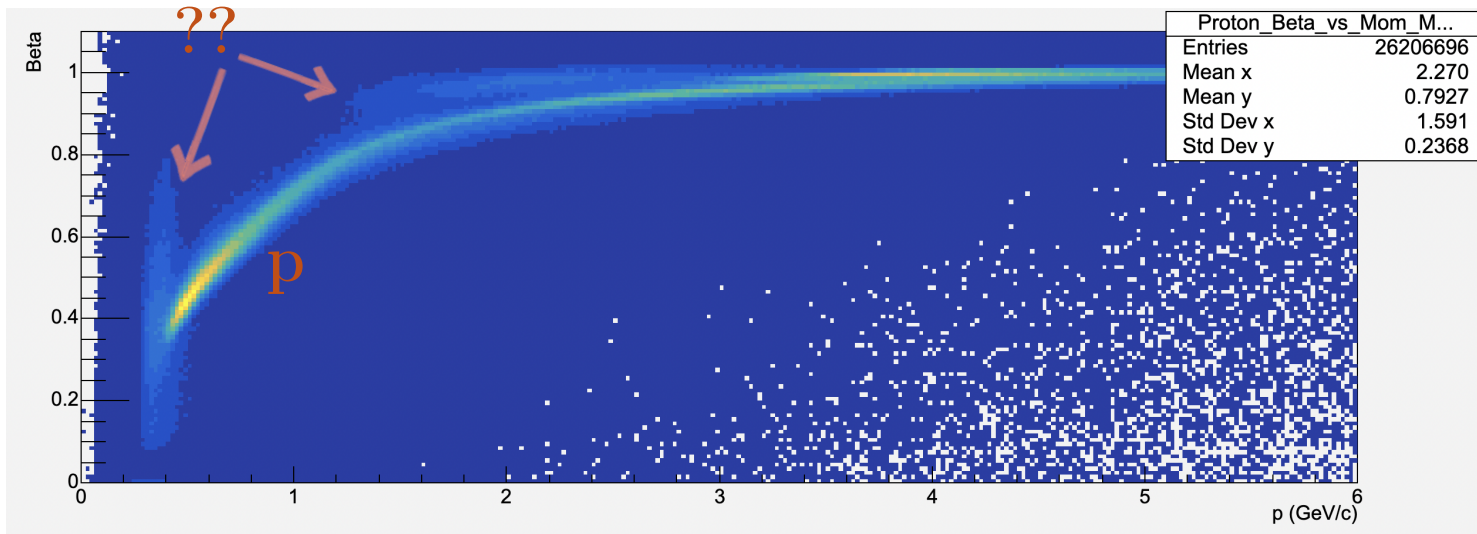
Analysis Results - u Distribution

- u distribution before (top) and after (bottom) all cuts



Possible Analysis Improvements - Proton β vs. Momentum

- Proton β vs. momentum before (top) and after (bottom) all cuts



Support Slides - KinFit Confidence Level

- KinFit CL after all cuts

