

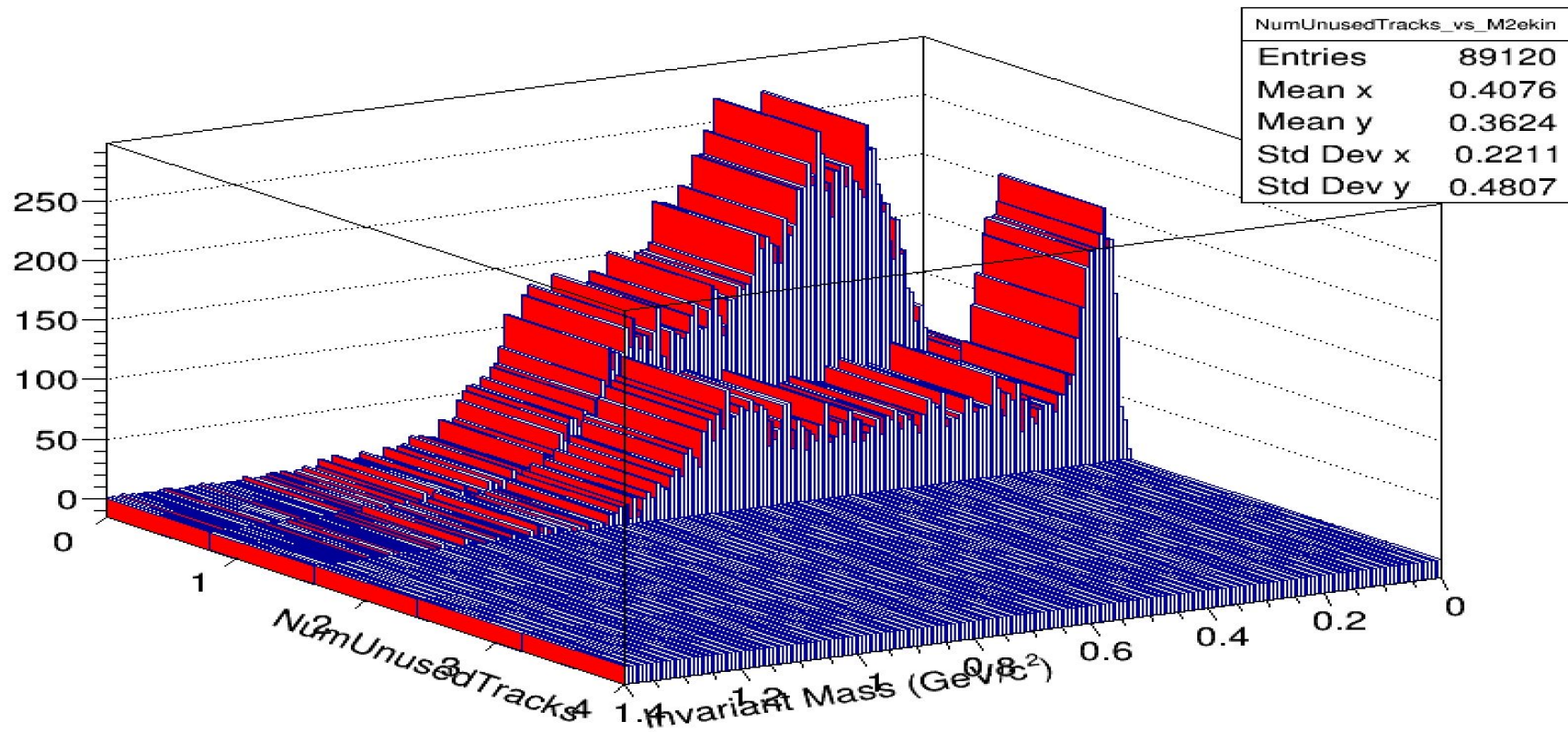
Simulating the Proton Track vs. Not Simulating in $\gamma p \rightarrow e^+ e^- (p)$

June 7, 2019
Andrew Schick

Want to Answer two questions:

1. How often does the proton appear as an unused track?
2. What is causing the low W peak in the W plot? Is it an artifact of the proton?

Want to Explain Low W peak in Data



Cuts Applied to MC

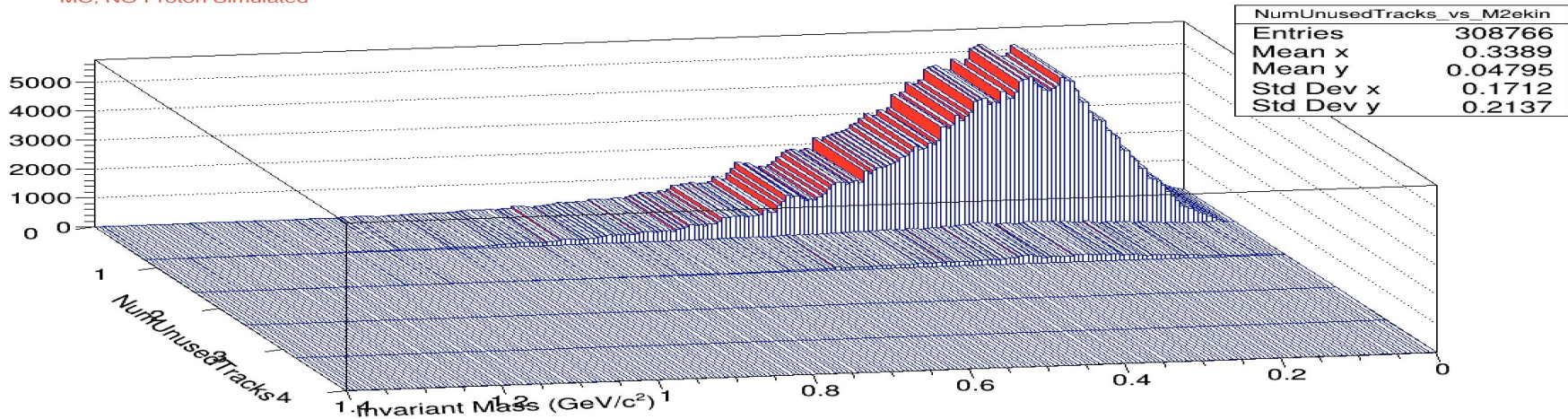
Preselection Cuts

1. Default GlueX Cuts: https://halldweb.jlab.org/wiki/index.php/Spring_2017_Analysis_Launch_Cuts
2. Require $E/p = 0.7$ for electron and positron tracks in FCAL and BCAL

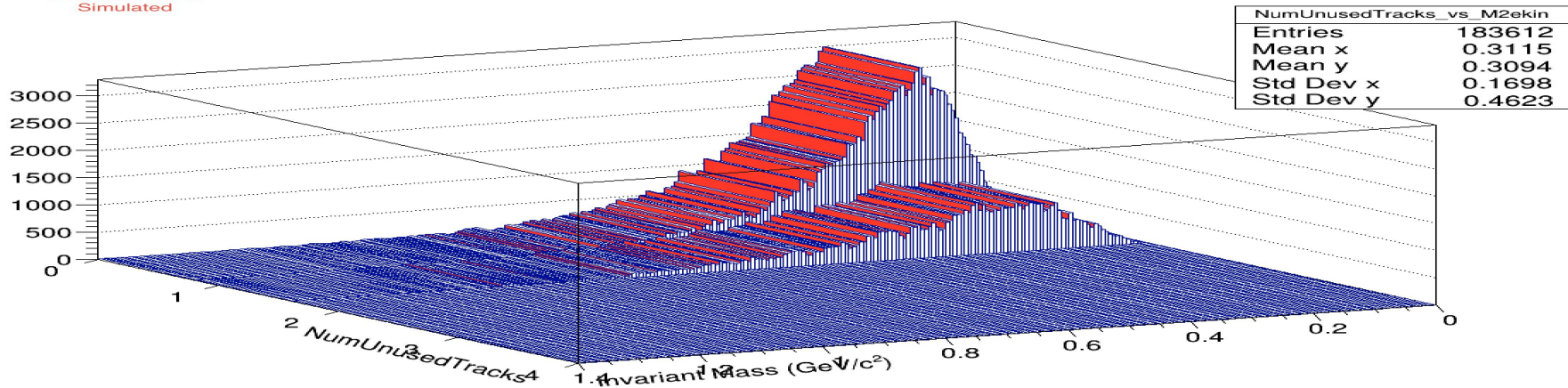
DSelector Cuts

1. Cut on Coherent Peak: $8.12 < E_\gamma < 8.88$ (MC is monochromatic at 8.78 GeV)
2. Require both electron and positron tracks have hits in the FCAL
3. Require both electron and positron tracks have hits in the TOF
4. Require $dMinKinFitCL > 10E-6$
5. Eliminate $NumUnusedTracks \geq 2$

MC, NO Proton Simulated

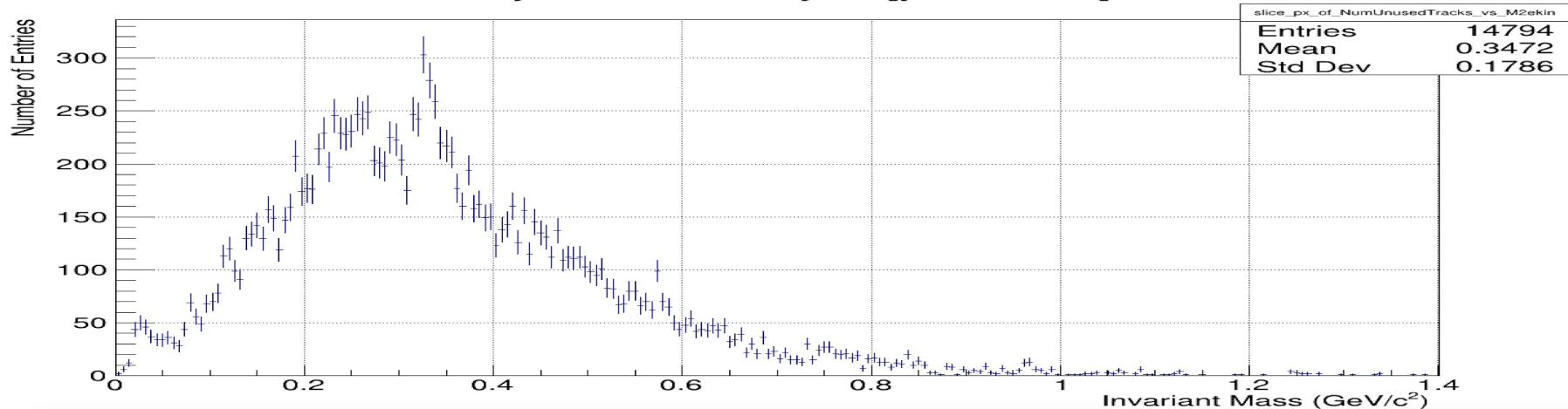


MC, YES Proton Simulated



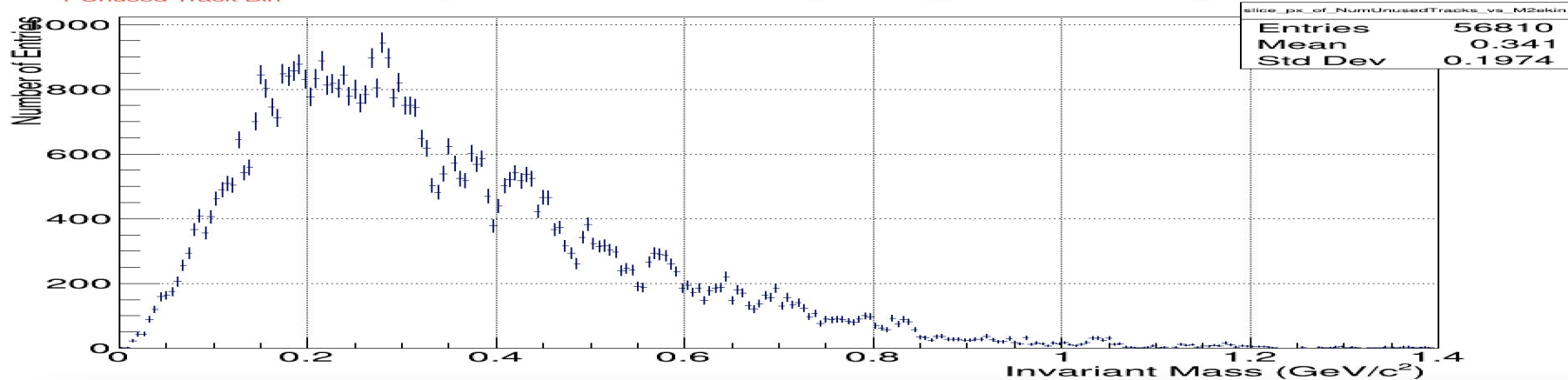
MC, NO Proton, 1 Unused Track Bin

ProjectionX of biny=2 [y=0.8..1.6]



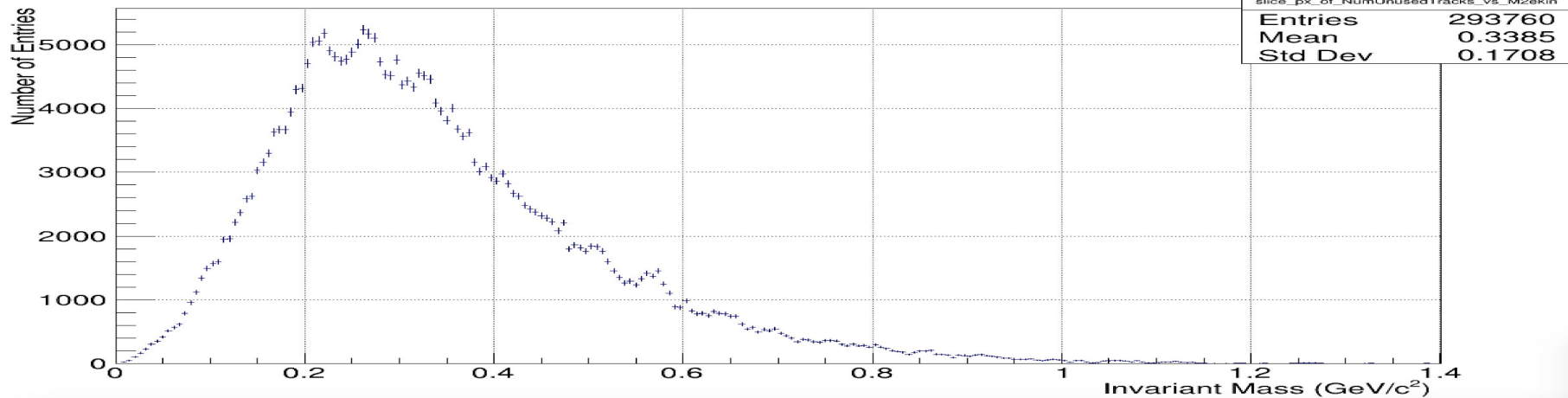
MC, YES proton
1 Unused Track Bin

ProjectionX of biny=2 [y=0.8..1.6]



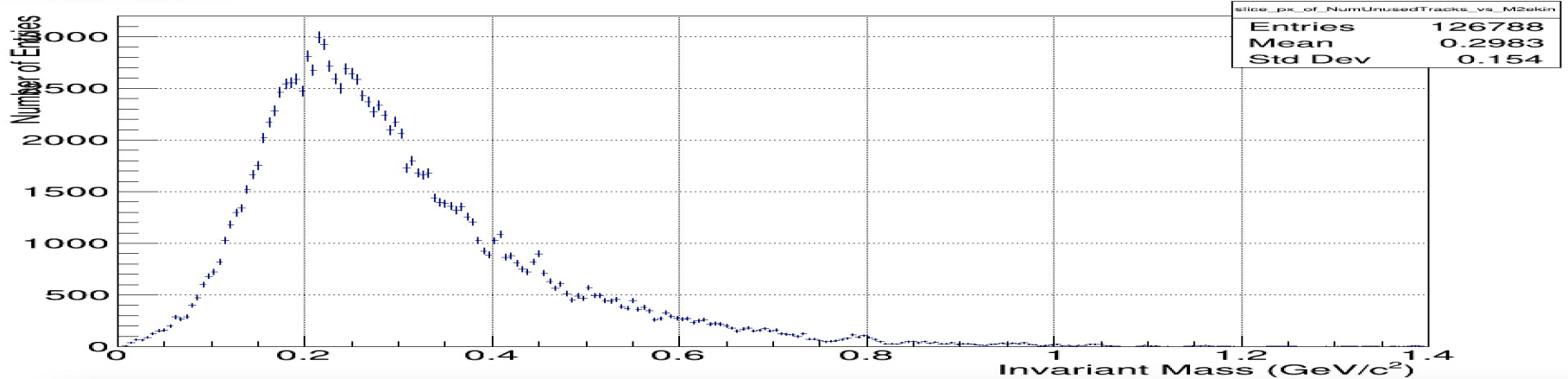
MC, NO Proton, 0
Unused Track Bin

ProjectionX of biny=1 [y=0.0..0.8]



MC, Yes Proton
0 Unused Track Bin

ProjectionX of biny=1 [y=0.0..0.8]

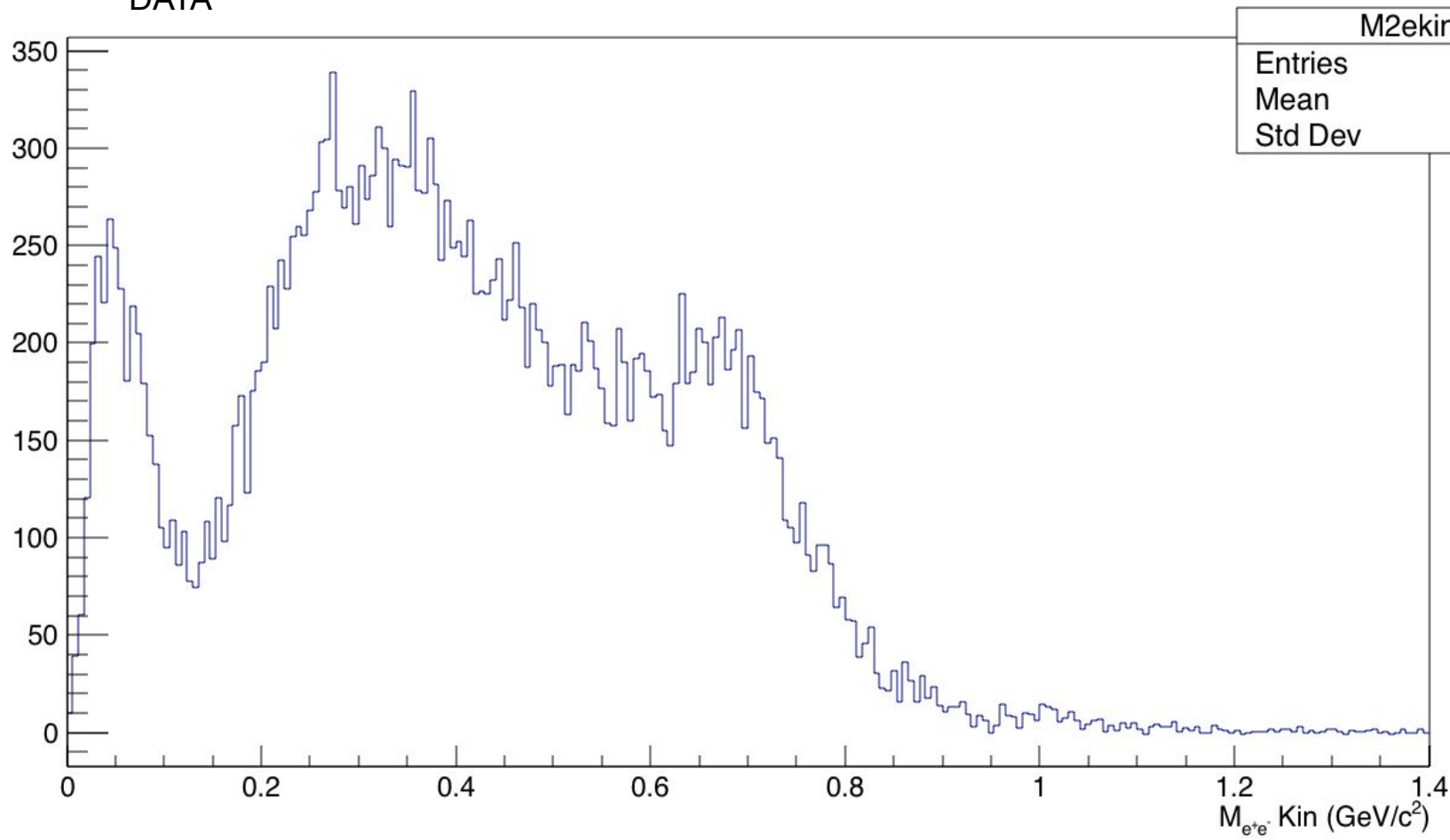


No Proton: $(1\text{UnusedTrack}/\text{TotEvents}) = 14794/308766 = 0.047$

With Proton: $(1\text{UnusedTrack}/\text{TotEvents}) = 56810/183612 = .309$

-> Proton detected and appears as an unused track about 25% of the time.

DATA



M2ekin	
Entries	89120
Mean	0.4076
Std Dev	0.2211

Want to Explain Low W peak in Data

US

