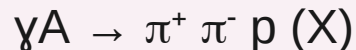


Event Selection

Reaction Filter Stage



Flags: Vertex and Momentum constrained, 4 beam bunches on each sides of prompt peak, 2 Extra tracks and 5 extra shower: **B4F4T2S5**

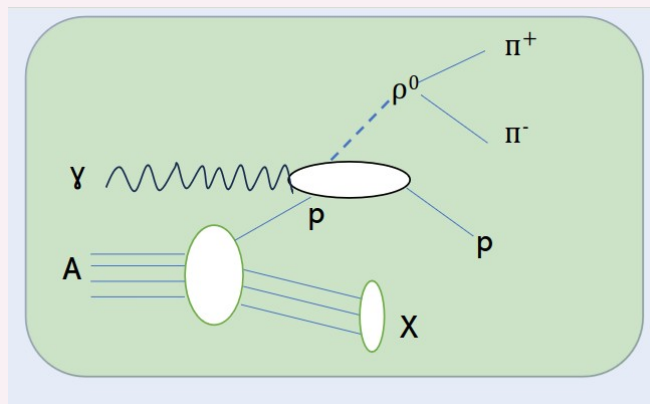
DSelector Stage

Loose cuts

CL > 0.0001 , beam energy > 6.0 GeV, Extra tracks = 0, Missing Momentum < 350 MeV , 2 accidental peak on each side of prompt peak.

> Base Criteria

- > Confidence Level > 0.001
- > Beam Energy [6.5,10.8 GeV]
- > Extra Tracks = 0
- > Numbers of Shower = 5
- > Proton Vertex [52,78] cm
- > Missing Momentum < 300 MeV/c

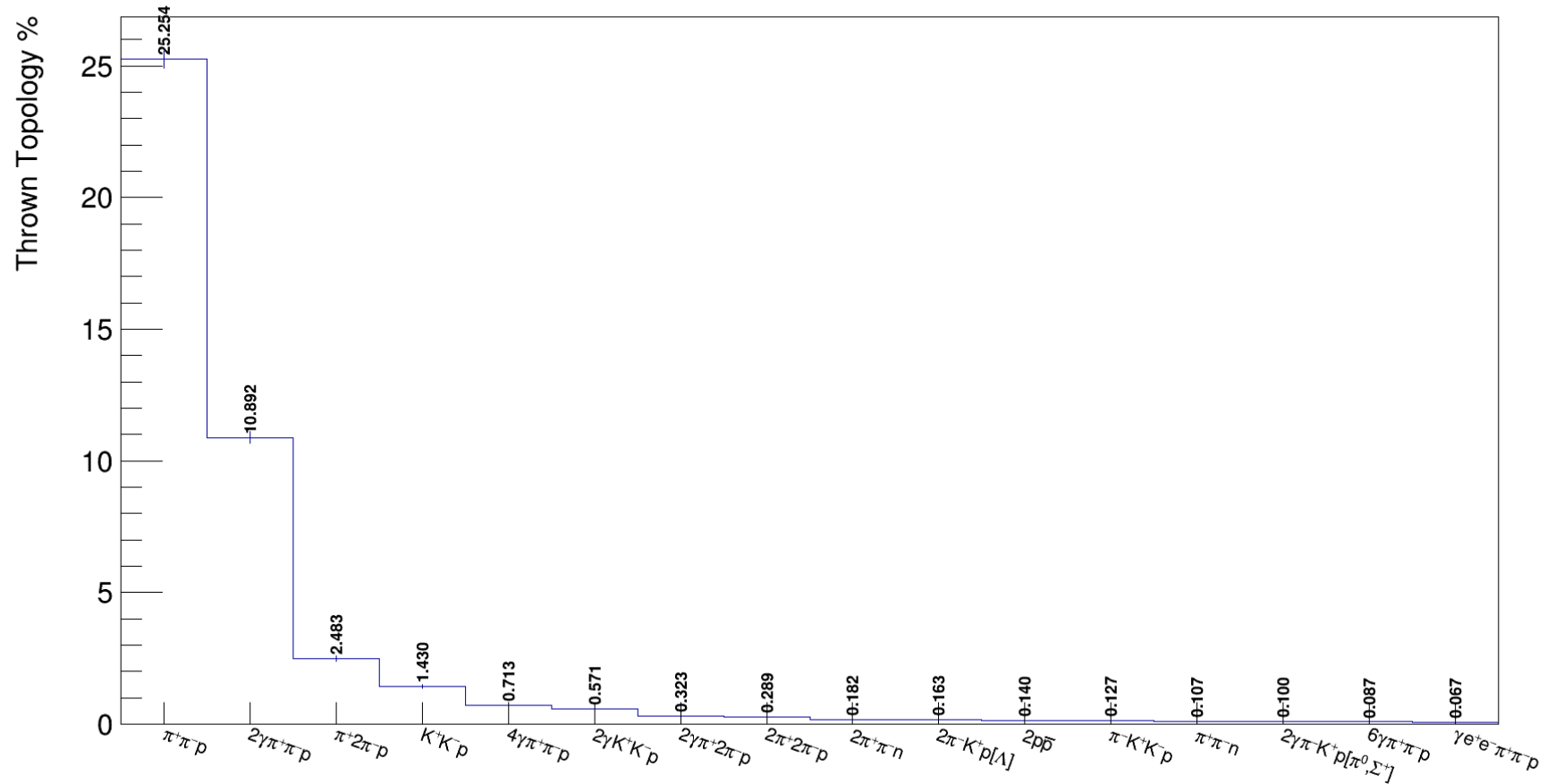


t_min	t_max	Proton angle
1	1.2	> 25 degree
1.2	1.4	> 25 degree
1.4	1.8	> 25 degree
1.8	2.6	> 25 degree
2.6	3.4	> 25 degree
3.4	4.6	> 20 degree

Selection cuts have been applied consistently to both data and reconstructed simulations.

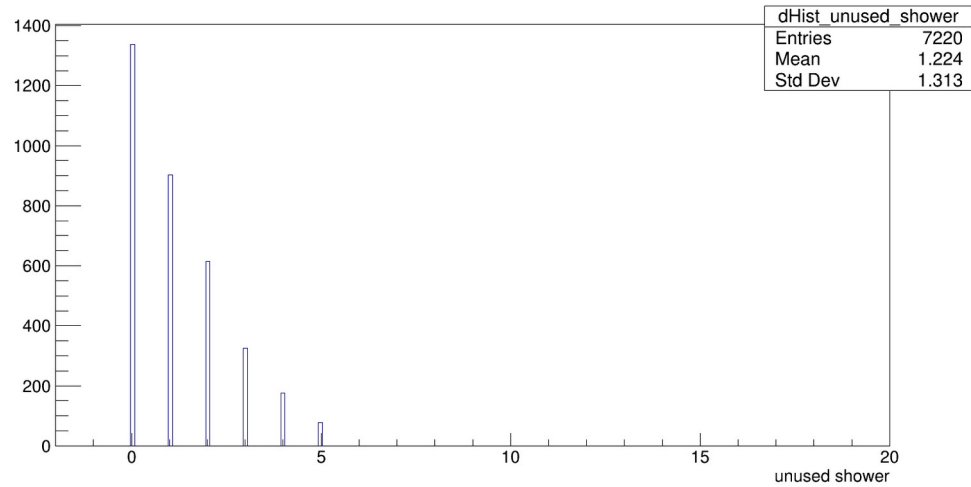
Event Selection for $|t| > 1$.

hThrownTopologies

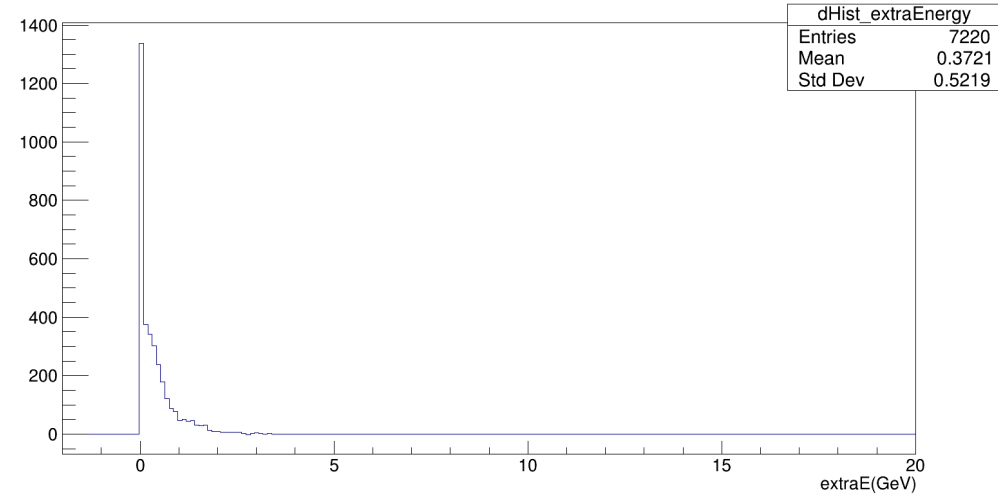


Showers

Number of Unused Showers

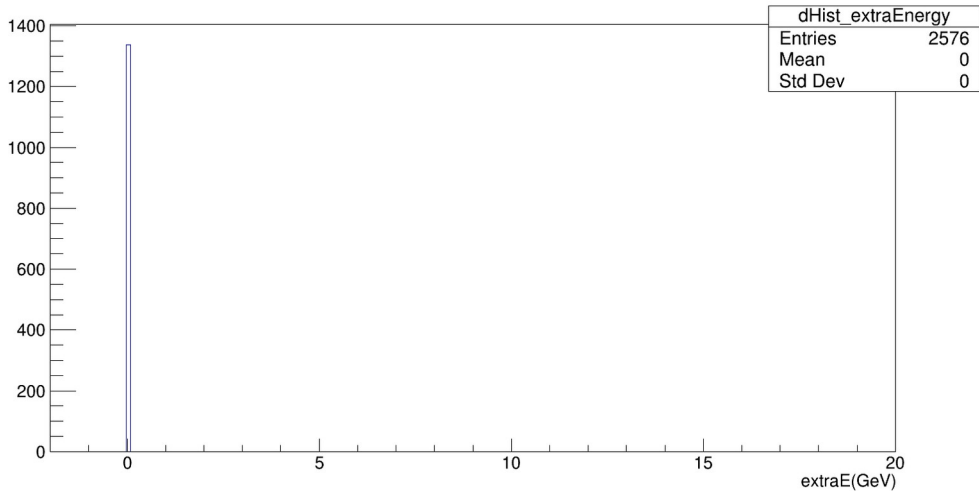


Energy of Unused Showers

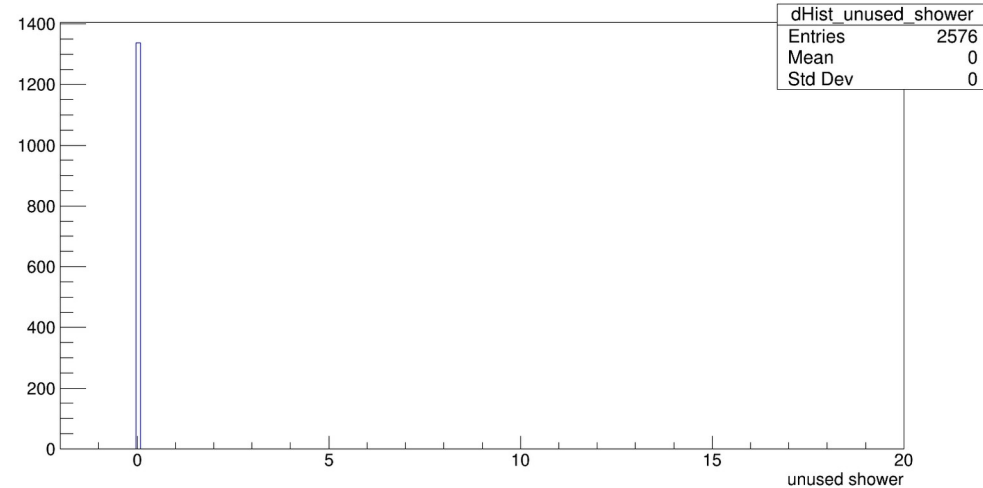


After Applying Cuts on Energy of Unused Shower

Number of Unused Showers



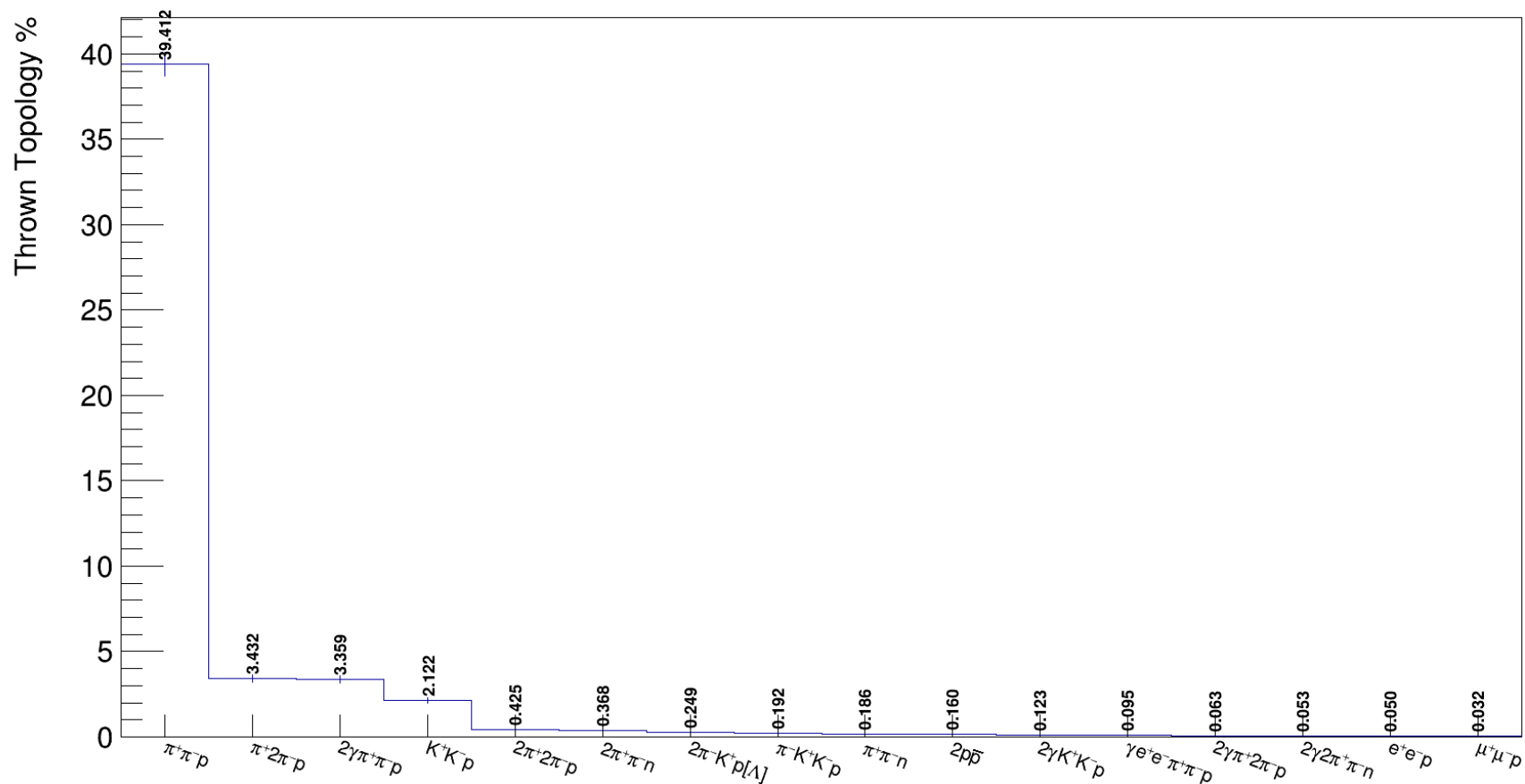
Energy of Unused Showers



Energy of Unused Showers > 0.

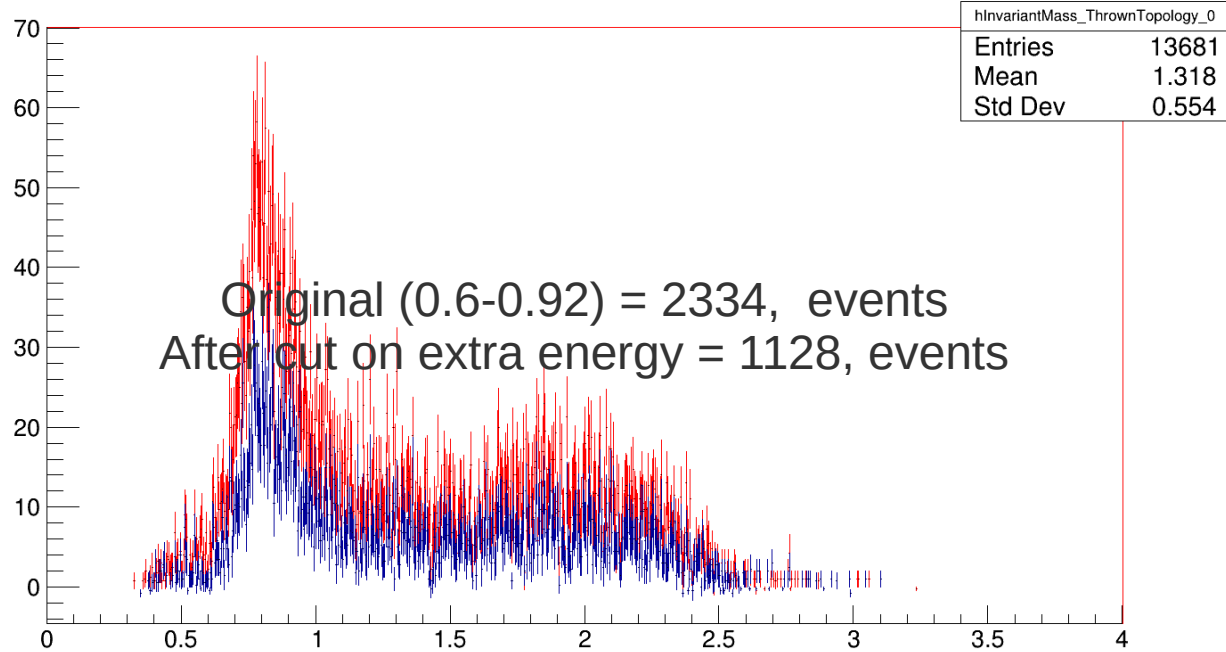
After applying cuts on shower energy.

hThrownTopologies



Bggen Signal events

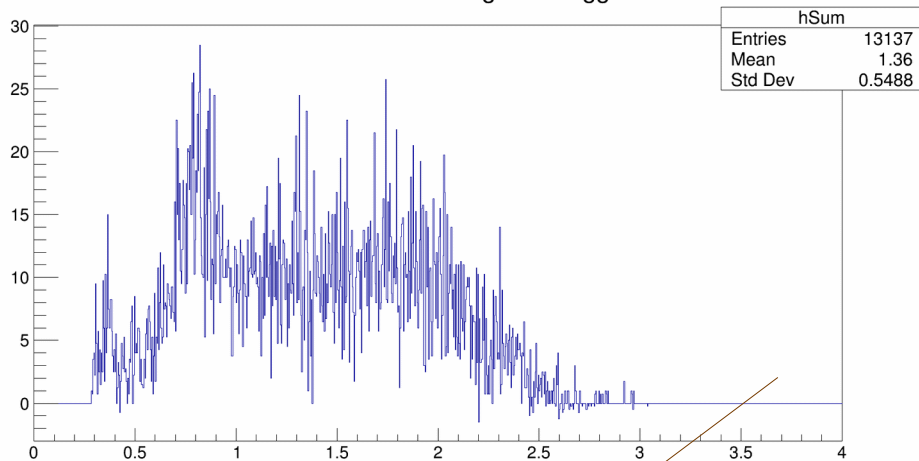
Invariant Mass Topology $|t| > 1$: $\pi^+\pi^-p$



The invariant mass distribution of pure signal events before and after applying the cuts on shower energy. The signal events are integrated between the mass range of 0.6 to 0.92. Decrease of ~50 % events.

Shape of Background With and without shower cut.

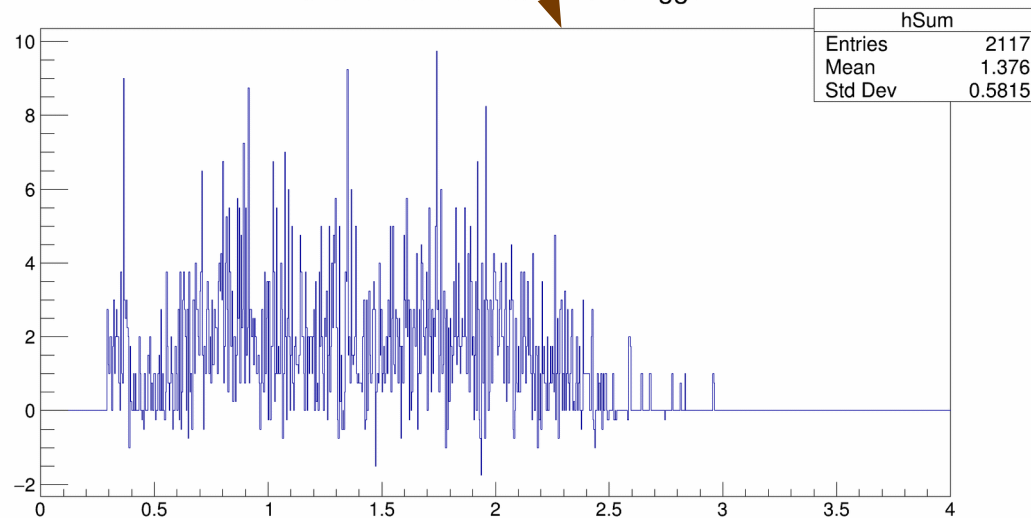
Invariant Mass of Background Bggen



The total shape of background for $|t| > 1$. We see a peak below the signal range. Here the selection cuts is standard.

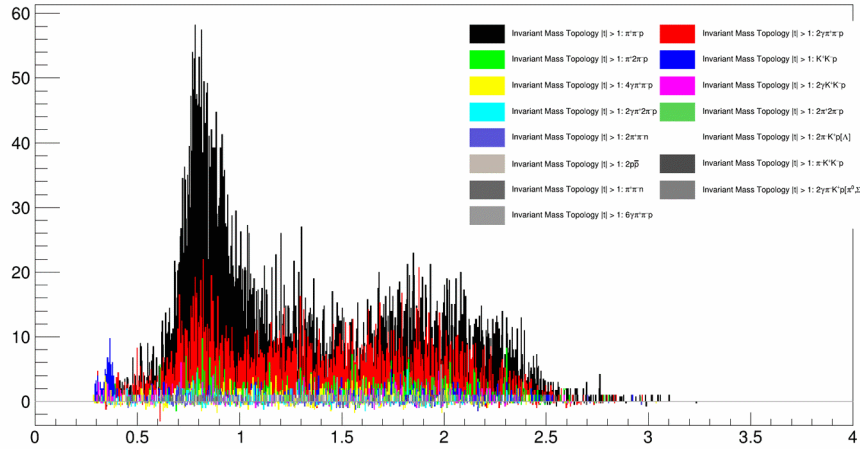
The total shape of background for $|t| > 1$. We see a smooth background. Here the selection cuts includes cuts ofn extra shower energy.

Invariant Mass of Background Bggen

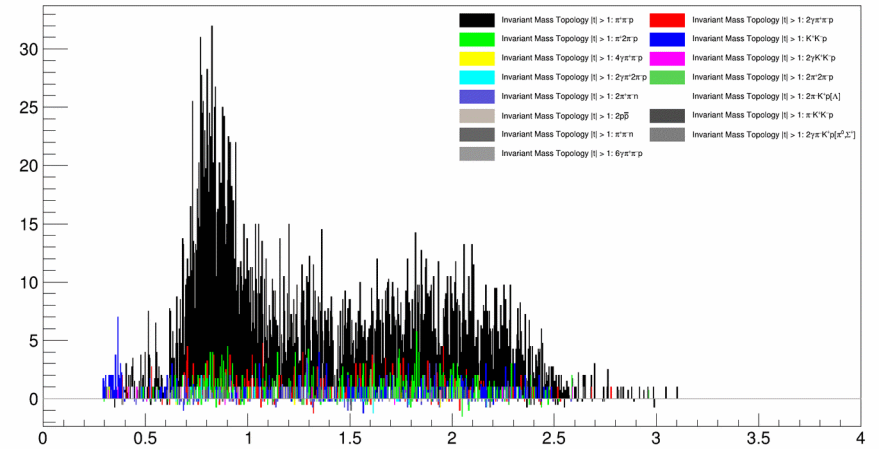


With and Without applying shower cuts.

Invariant Mass Topology $|t| > 1: \pi^+\pi^-p$



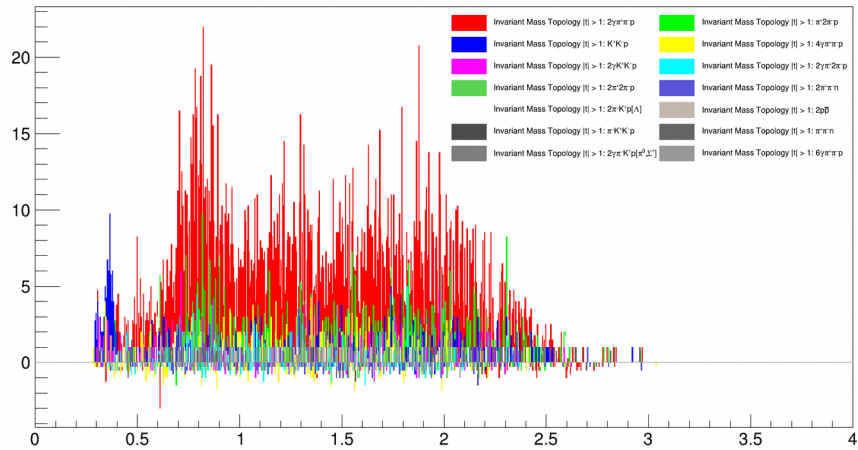
Invariant Mass Topology $|t| > 1: \pi^+\pi^-p$



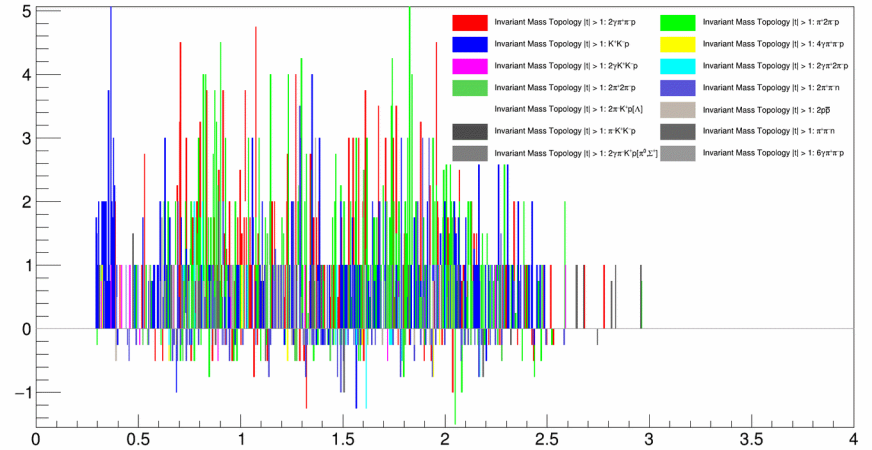
The plot on the left uses standard cuts. The black represents the signal, and the rest are backgrounds. Once shower cuts are applied, although the total signal is reduced to 51%, the background has been significantly suppressed.

Background Shapes.

Invariant Mass Topology $|t| > 1: 2\gamma\pi^+\pi^-p$



Invariant Mass Topology $|t| > 1: 2\gamma\pi^+\pi^-p$

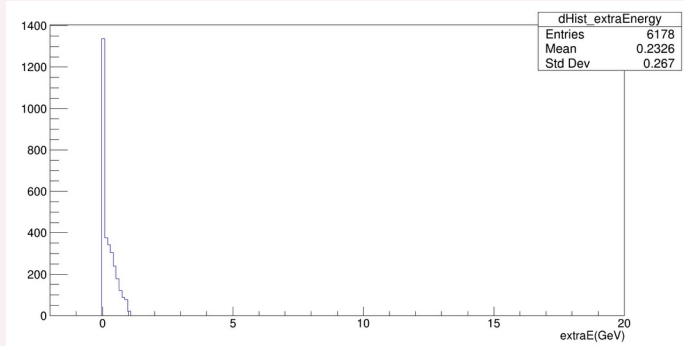


The plot on the left uses standard cuts. The red color represents the major background contributing from 2 gamma. Once shower cuts

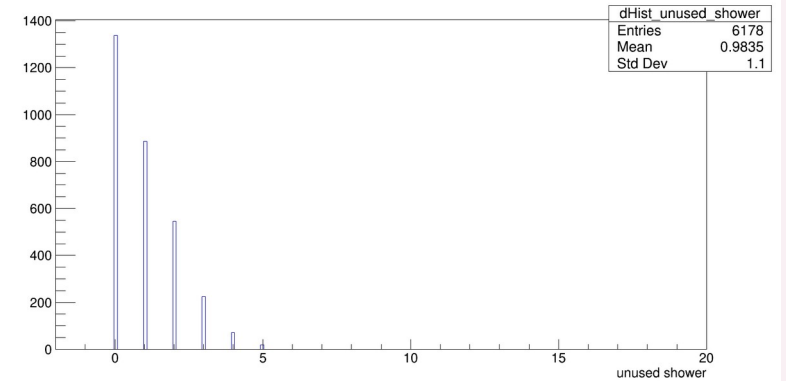
Test

Energy of showers > 1 GeV

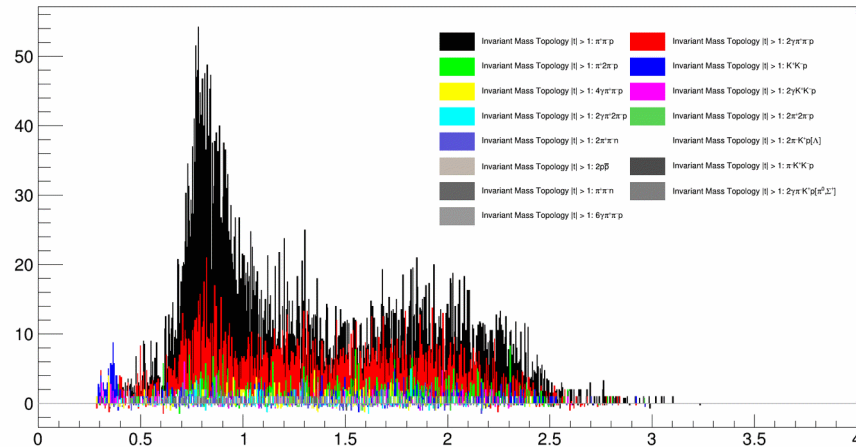
Energy of Unused Showers



Number of Unused Showers



Invariant Mass Topology $|t| > 1: \pi^+\pi^-p$



Energy of showers > 2 GeV

Invariant Mass Topology $|t| > 1$: $\pi^+\pi^-p$

