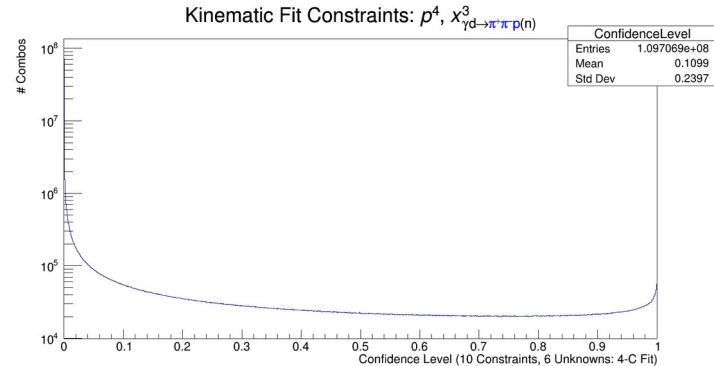
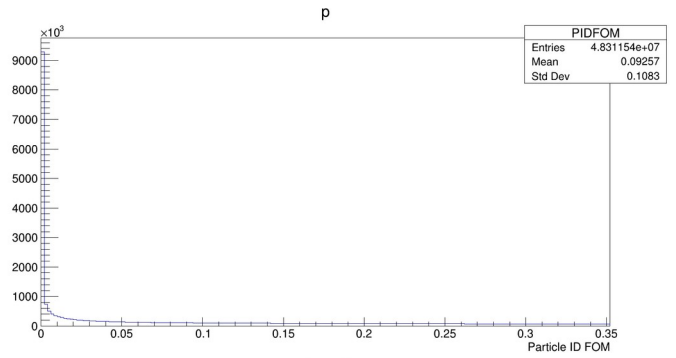
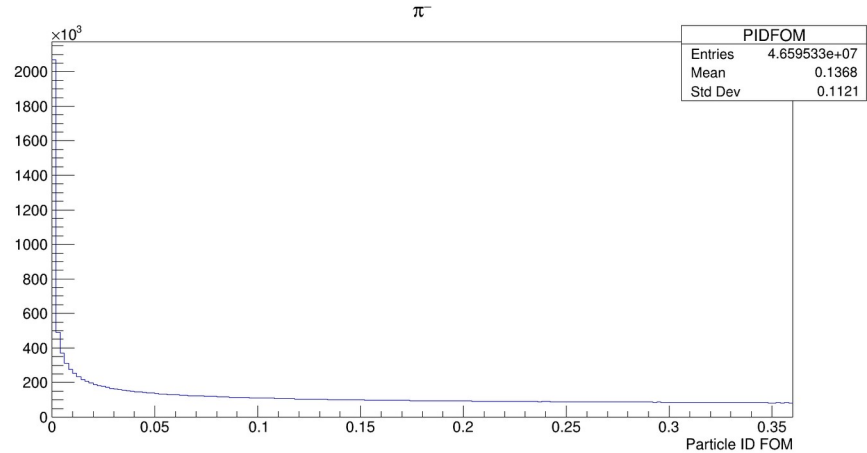
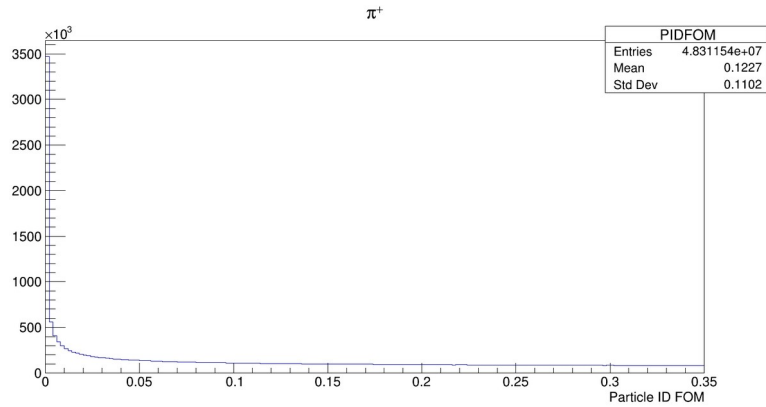


Event Selection for Rho0 candidate.

Reaction Filter is used to find the events for rho0 channels to make analysis Tree.
Prelim Analysis for Rho0 channel in Deuterium.

- $\gamma + D = (\pi^+), (\pi^-), p$, missing neutron.
- $\gamma + D = (\pi^+), (\pi^-), p$, missing unknown

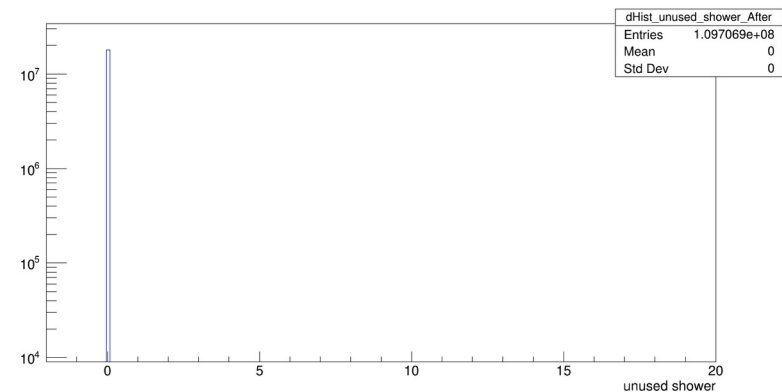
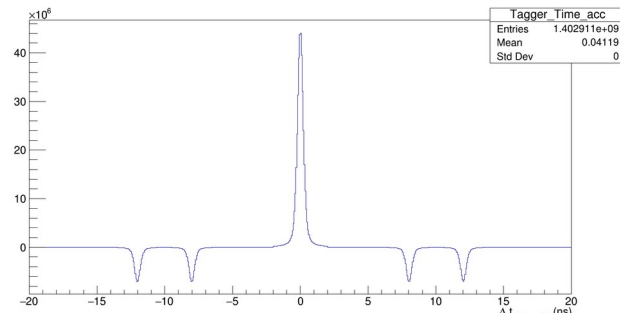
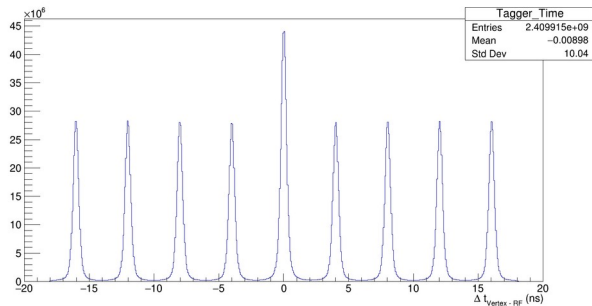
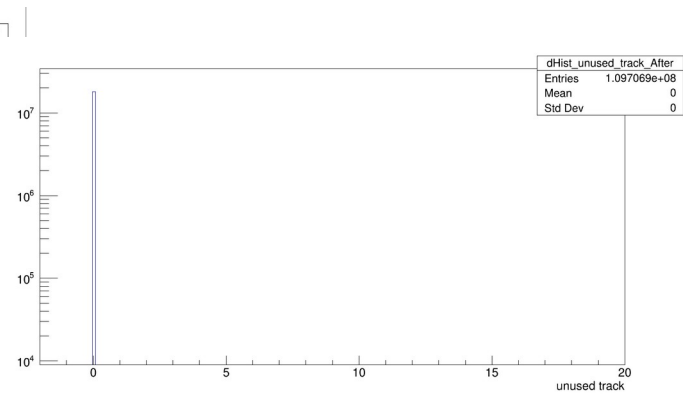
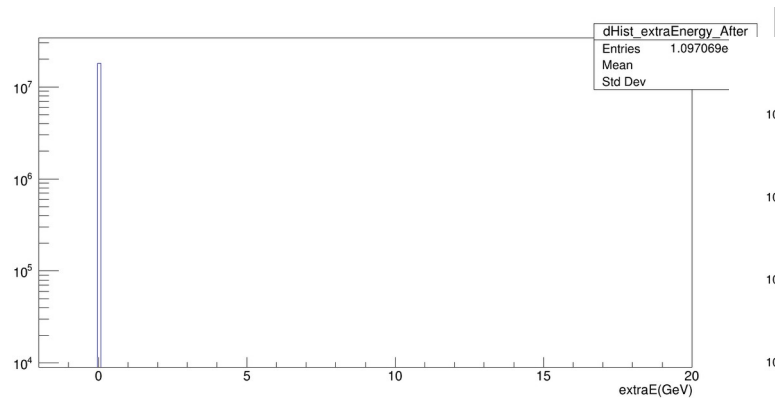


Event Selection for Rho0 candidate.

- $\gamma + D = (\pi^+) , (\pi^-) , p , \text{missing neutron.}$

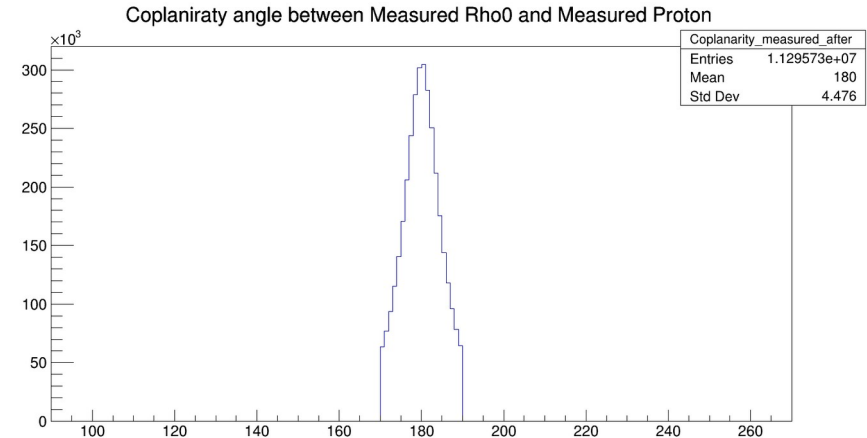
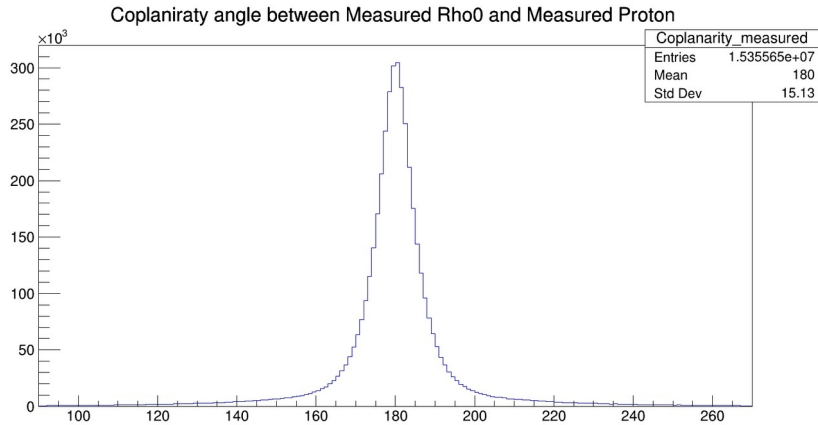
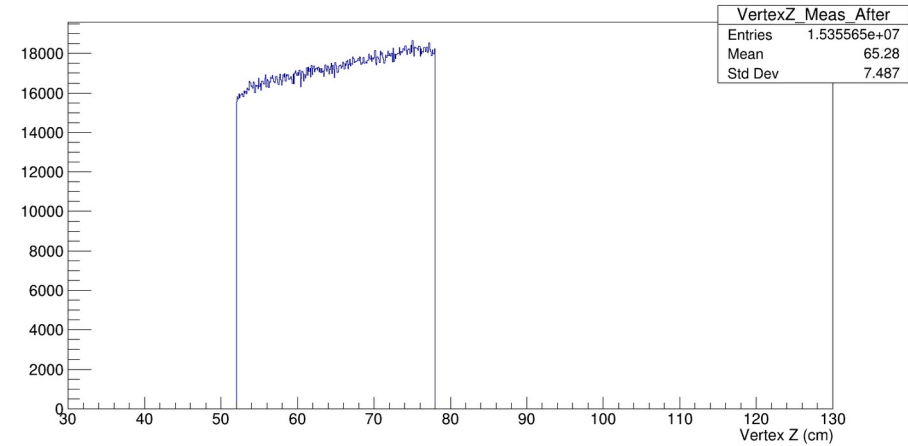
• Cut Applied:

- 1) PIDFOM > 0.01
- 2) CL > 0.001
- 3) Beam Energy_measured > 6.5 GeV
- 4) No Extra Shower,
- 5) No Extra Tracks
- 6) Accidentally beam Subtracted.



Event Selection for Rho0 candidate.

- $\gamma + D = (\pi^+) , (\pi^-) , p , \text{missing neutron.}$
- Cut Applied:
 - 7) Measured Proton Vertex (52,78)
 - 8) Coplanarity angle (170,190)



Events Selection for Rho0 candidate in Deuterium.

- $\gamma + D = (\pi^+) , (\pi^-), p , \text{missing neutron.}$

- Cut Applied:

- 1) PIDFOM > 0.01
- 2) CL > 0.001
- 3) Beam Energy_measured > 6.5 GeV
- 4) No Extra Shower,
- 5) No Extra Tracks
- 6) Accidentally beam Subtracted.
- 7) Measured Vertex Proton(52,78)
- 8) Coplanarity angle (170,190)

- $\gamma + D = (\pi^+) , (\pi^-), p , \text{missing unknown.}$

- Cut Applied:

- 1) PIDFOM > 0.01
- 2) CL > 0.001
- 3) Beam Energy_measured > 6.5 GeV
- 4) No Extra Shower,
- 5) No Extra Tracks
- 6) Accidentally beam Subtracted.
- 7) Measured Vertex Proton(52,78)
- 8) Coplanarity angle (170,190)

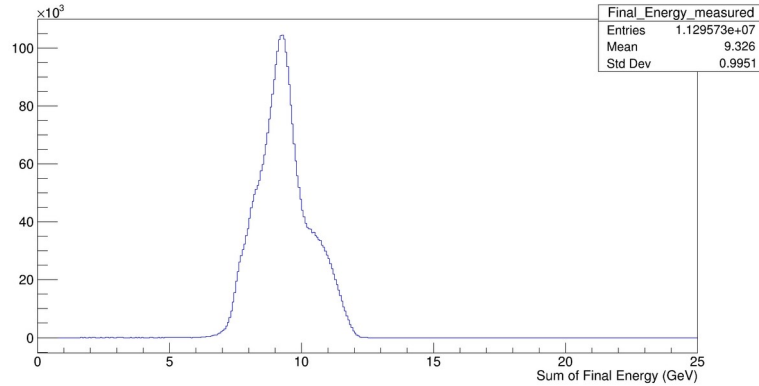
Skipping plots of missing unknown as they have similar shapes to that of missing neutron.

Events Selection for Rho0 candidate in Deuterium.

- $\gamma + D = (n^+) , (n^-) , p , \text{missing neutron.}$

- Cut Applied:

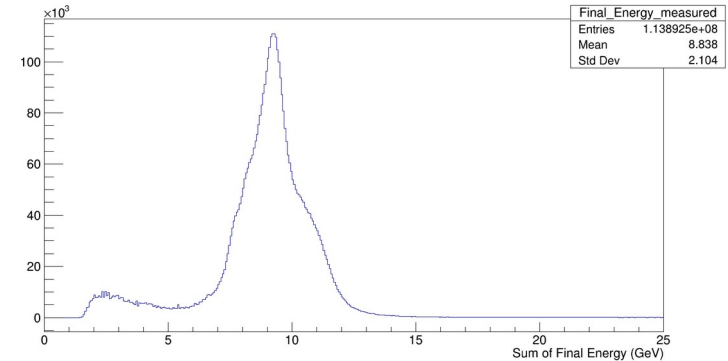
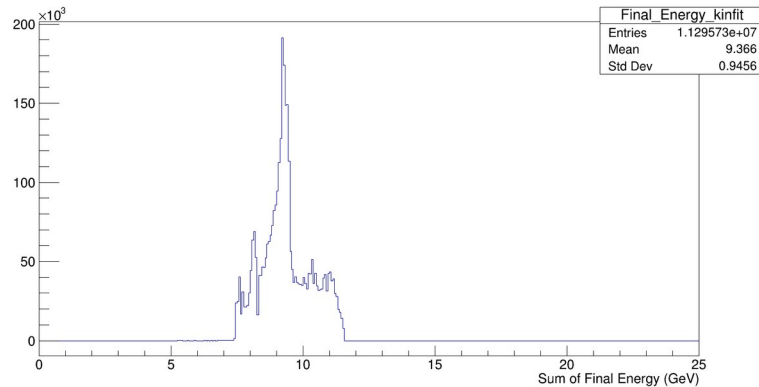
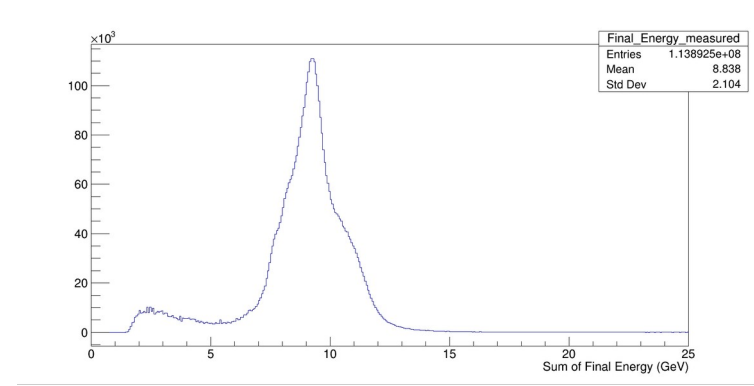
9) $\Sigma(E_{\text{final}}) E_{\text{p}} + E_{\text{p}} + E_{\text{proton}} > 6.5 \text{ GeV}$



- $\gamma + D = (n^+) , (n^-) , p , \text{missing unknown.}$

- Cut Applied:

9) $\Sigma(E_{\text{final}}) E_{\text{p}} + E_{\text{p}} + E_{\text{proton}} > 6.5 \text{ GeV}$

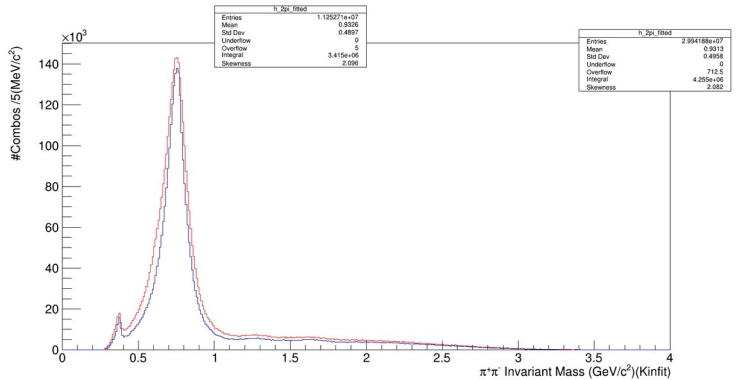
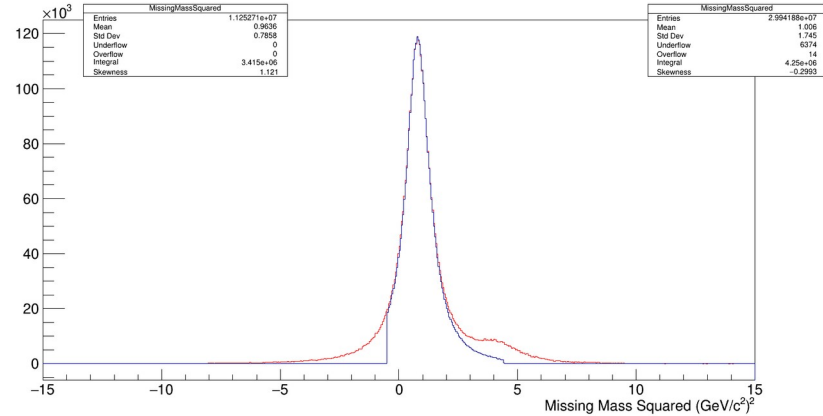
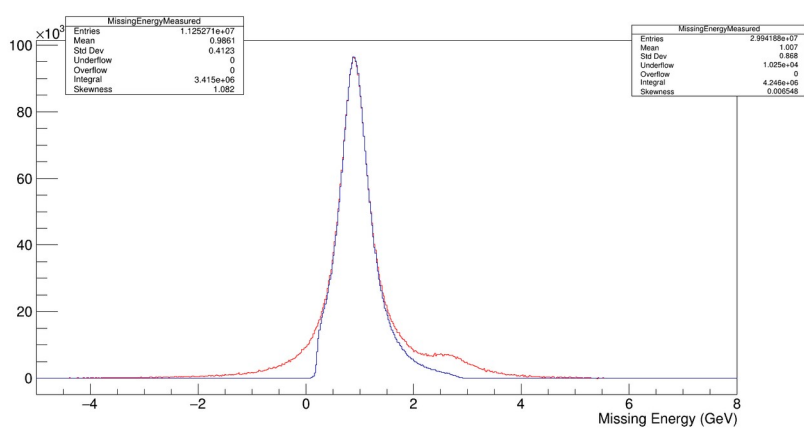


Events Selection for Rho0 candidate in Deuterium.

- $\gamma + D = (n^+) , (n^-) , p ,$ missing neutron.

- $\gamma + D = (n^+) , (n^-) , p ,$ missing unknown.

- Cut Applied:
1 σ



- Remaining Cut Pminus, (0.8,1.1)
 $|t| > 1$ && $|u| > 1$

Events Selection for Rho0 candidate in Deuterium.

- $\gamma + D = (n^+), (n^-), p$, missing neutron.

Loc2pi = locpiplus + locpiminus;

```
double s_kin = ((locBeamP4 + dTargetP4).M2());  
double minus_t_kin = -((locBeamP4 - loc2Pi).M2());  
double minus_u_kin = -((locBeamP4 - locProtonP4).M2());  
  
double minus_t_meas = -((locBeamP4_Measured - loc2Pi_Measured).M2());  
double minus_u_meas = -((locBeamP4_Measured - locProtonP4_Measured).M2());
```

////////////////////////////////////Alternate////////////////////////////////////

```
double s_alter_kin = ((loc2Pi + locProtonP4).M2());  
double minus_t_alter_kin = -((locProtonP4 - dTargetP4).M2());  
double minus_u_alter_kin = -((loc2Pi - dTargetP4).M2());  
  
double s_alter_meas = ((loc2Pi_Measured + locProtonP4_Measured).M2());  
double minus_t_alter_meas = -((locProtonP4_Measured - dTargetP4).M2());  
double minus_u_Alter_meas = -((loc2Pi_Measured - dTargetP4).M2());
```

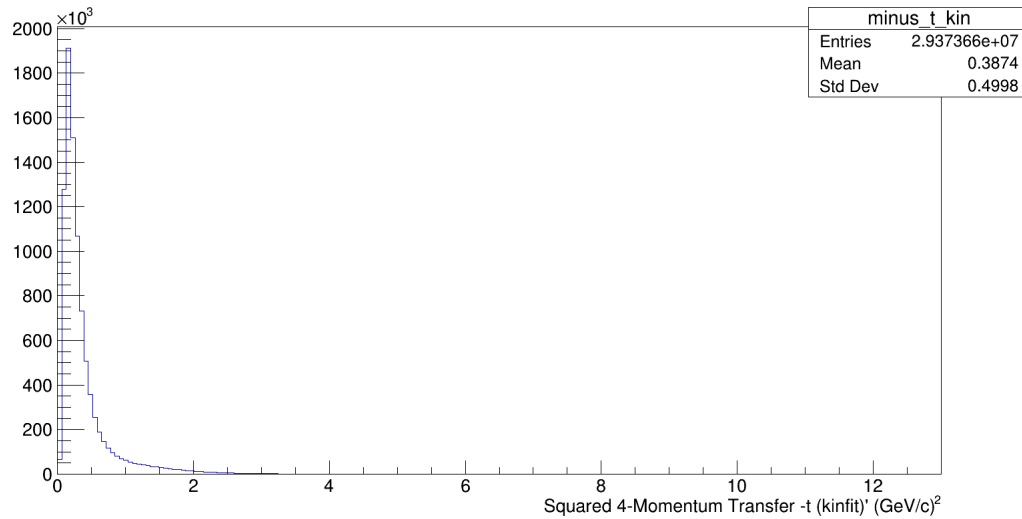
- Note:

1) Here, 2Pi is the Lorentz mass of Piplus && PiMinus and dTargetP4 is the mass of the target.

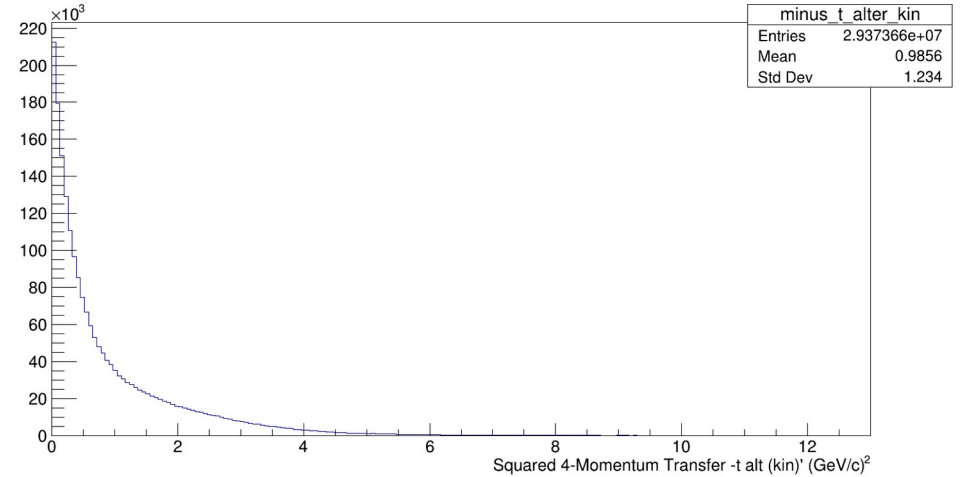
2) We have lots of background in Rho0 candidate and phase space hasn't been restricted.

Events Selection for Rho0 candidate in Deuterium.

- Cut Applied:
10) (E_{pip} + E_{pi} + E_{proton})P_{minus} (0.8 ,1.1) |t| distribution



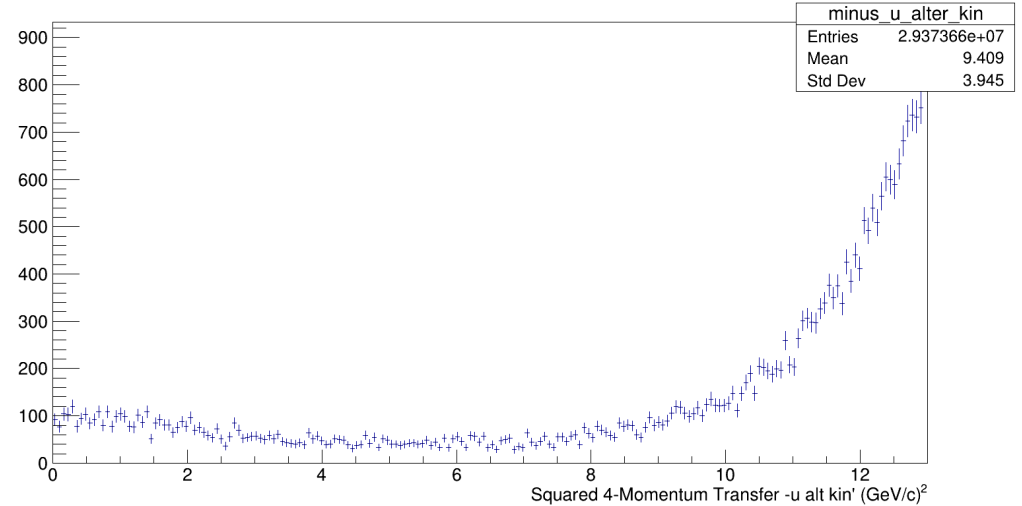
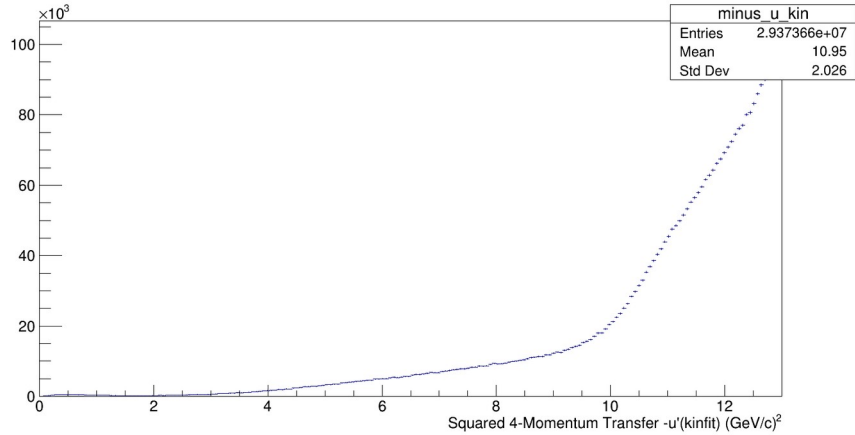
$$\text{minus_t_kin} = -(\text{locBeamP4} - \text{loc2Pi}).M2()$$



$$\text{minus_t_alter_kin} = -(\text{locProtonP4} - \text{dTargetP4}).M2()$$

Events Selection for Rho0 candidate in Deuterium.

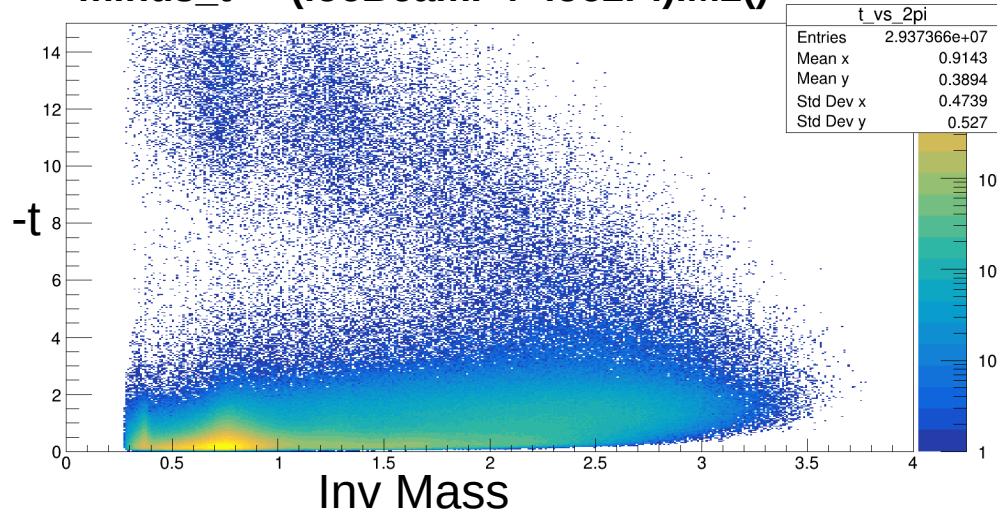
- Cut Applied:



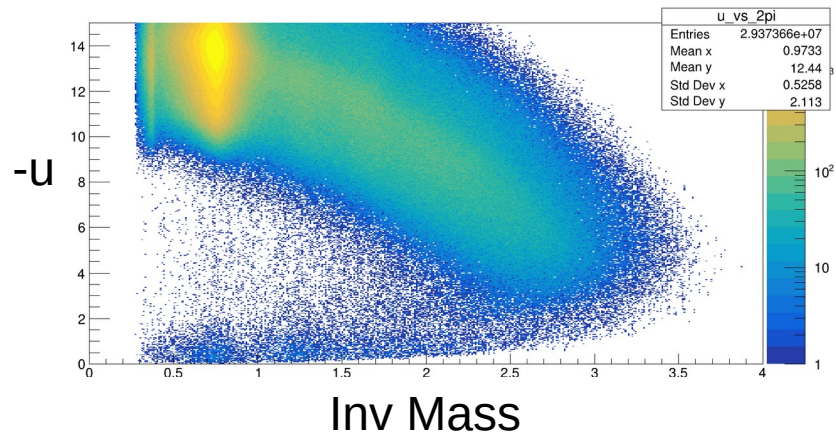
$$\text{minus_u_kin} = -(\text{locBeamP4} - \text{locProtonP4}).M2()$$

$$\text{minus_u_alter_kin} = -(\text{loc2Pi} - \text{dTargetP4}).M2()$$

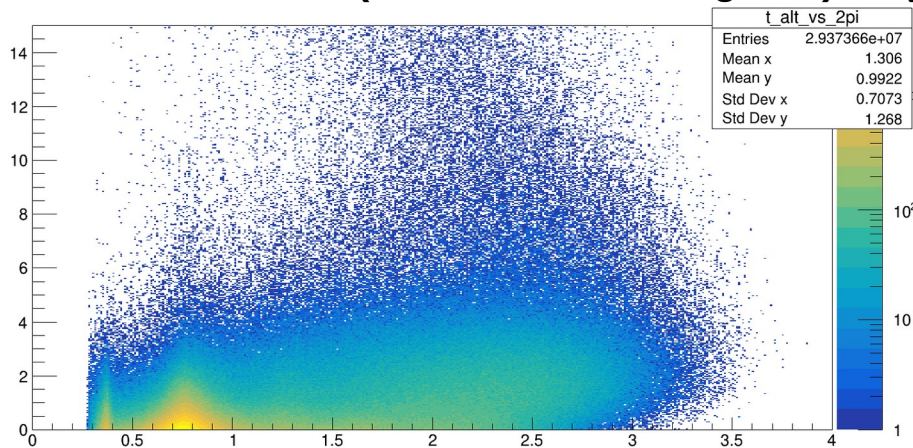
$$\text{minus_t} = -(\text{locBeamP4} - \text{loc2Pi}).M2()$$



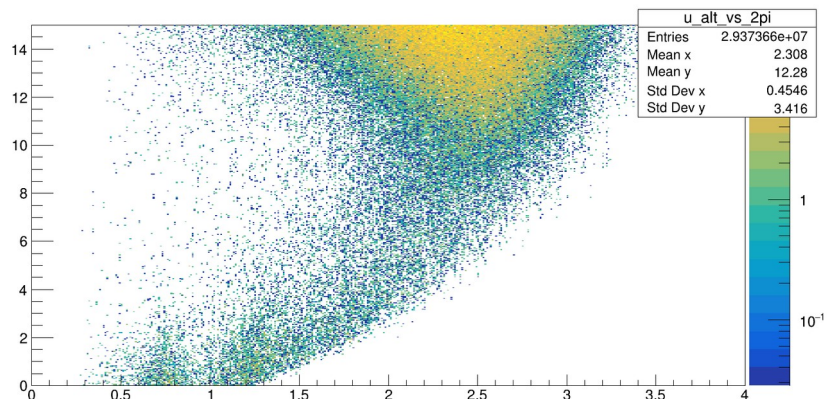
$$\text{minus_u} = -(\text{locBeamP4} - \text{locProtonP4}).M2()$$



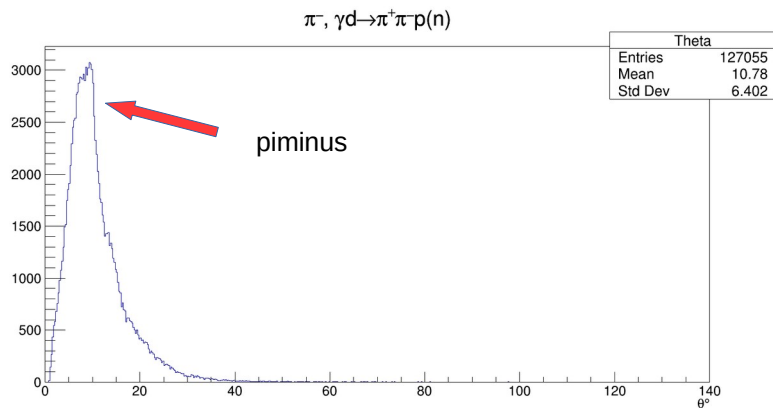
$$\text{minus_t_alter} = -(\text{locProtonP4} - \text{dTargetP4}).M2()$$



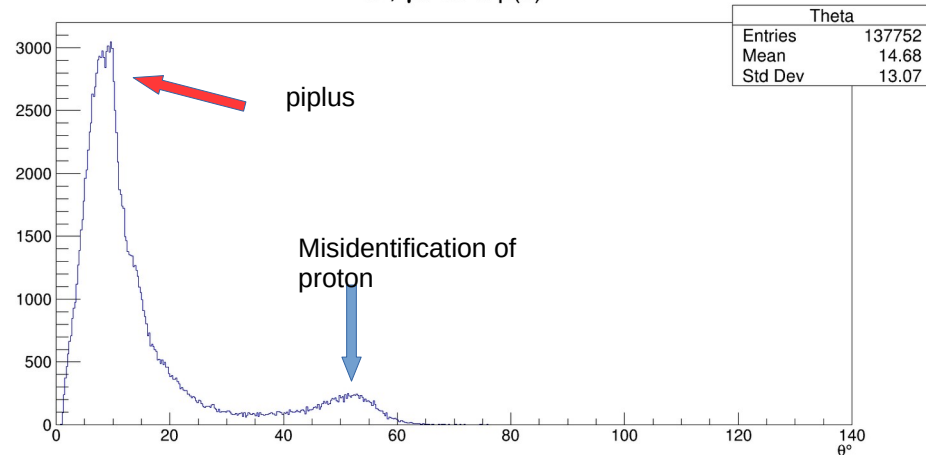
$$\text{minus_u_alter} = -(\text{loc2Pi} - \text{dTargetP4}).M2()$$



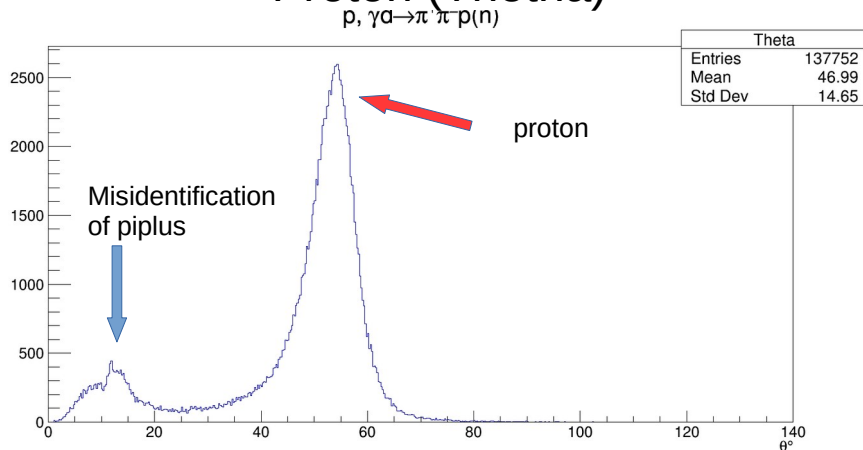
PiMinus (Thetha)



PiPlus (Thetha)

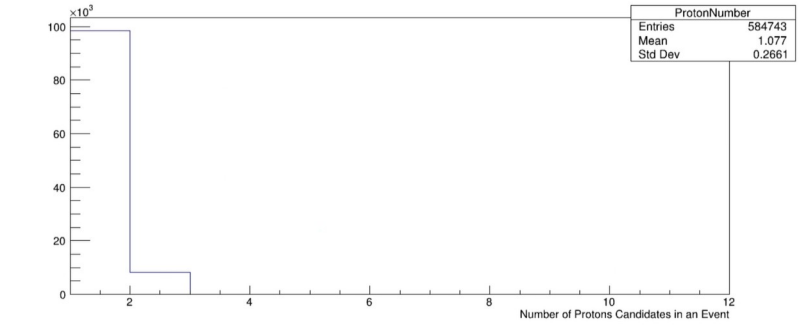


Proton (Thetha)

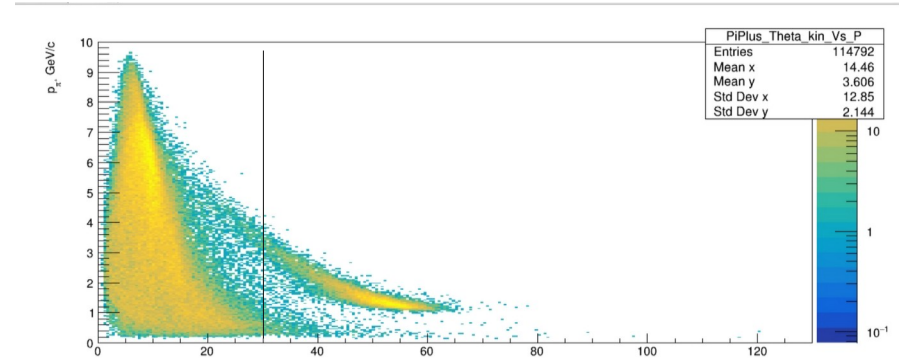


Simulation

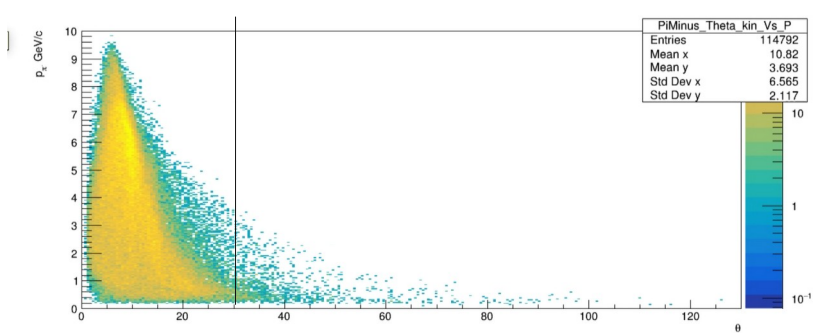
Simulation momentum vs Theta



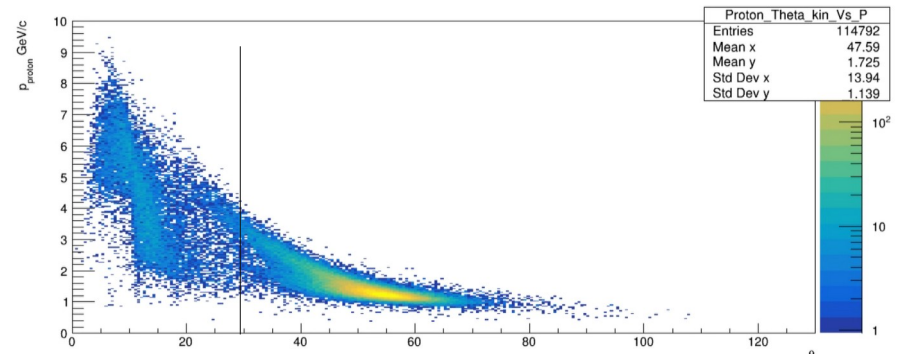
PiPlus (Thetha) vs P

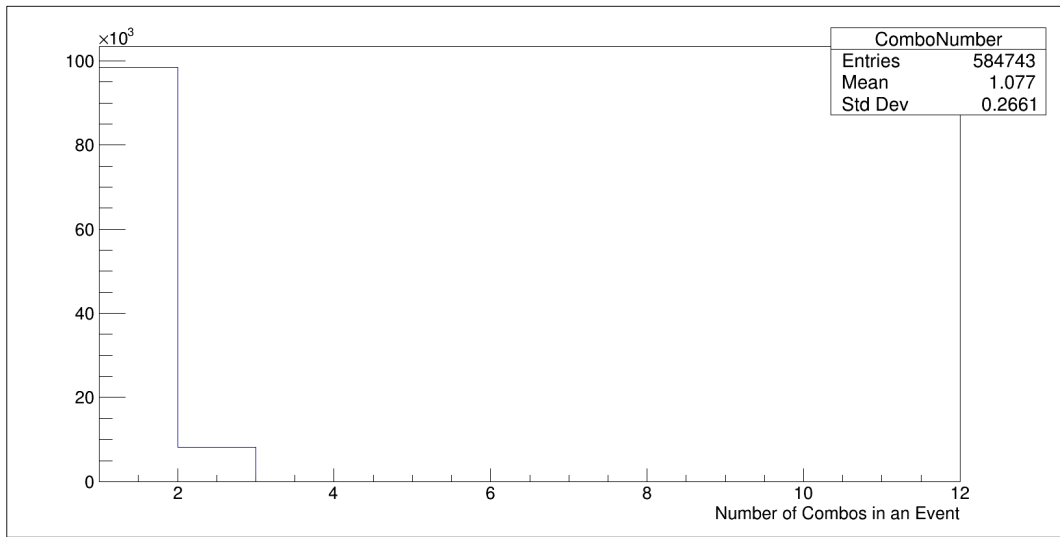


PiMinus (Thetha) vs P

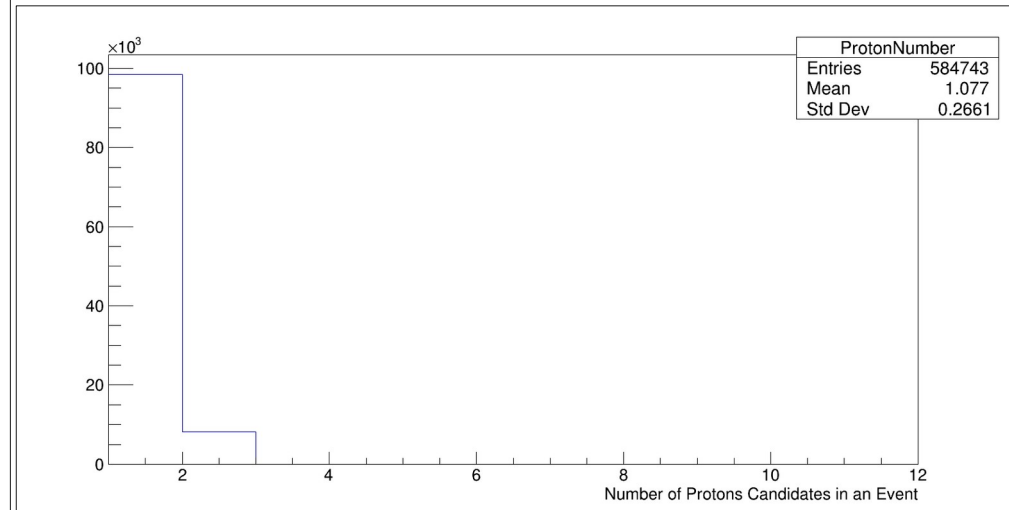
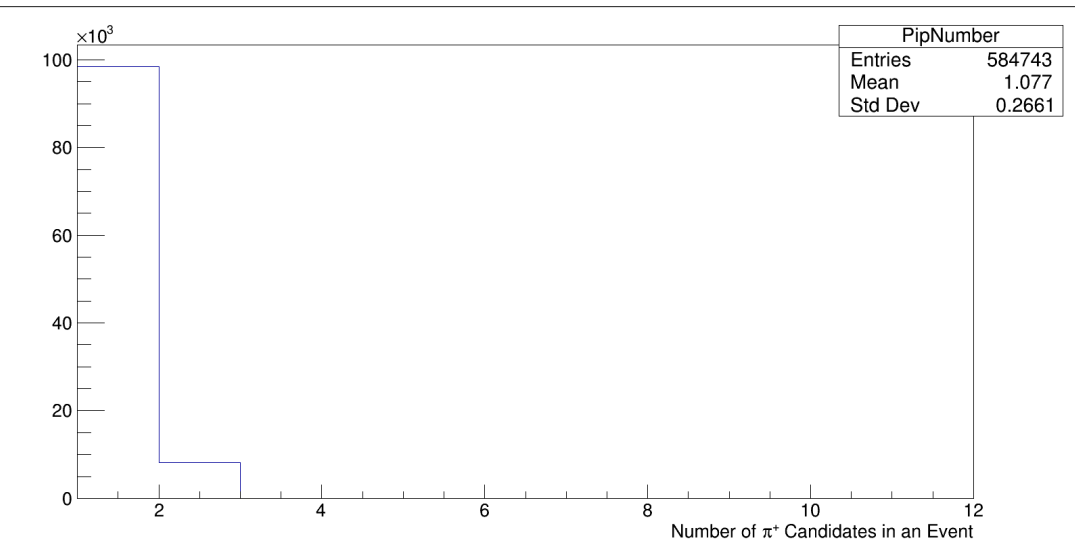


Proton (Thetha) vs P

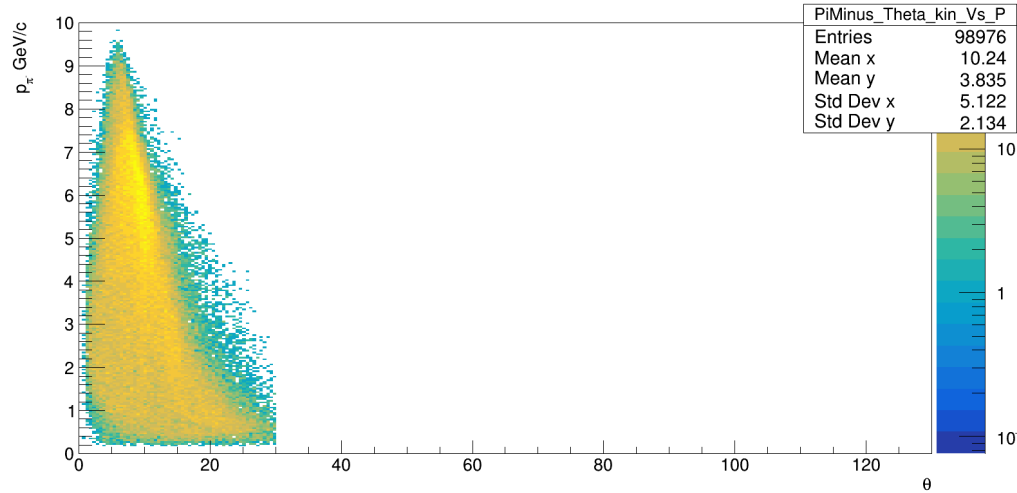
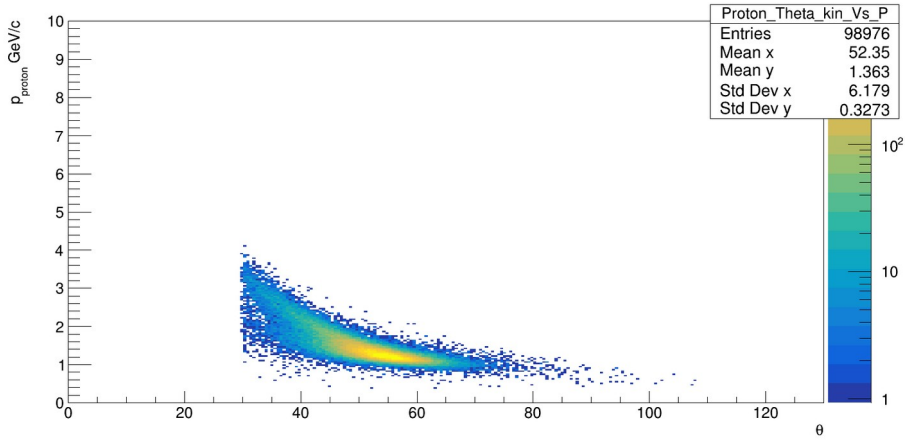
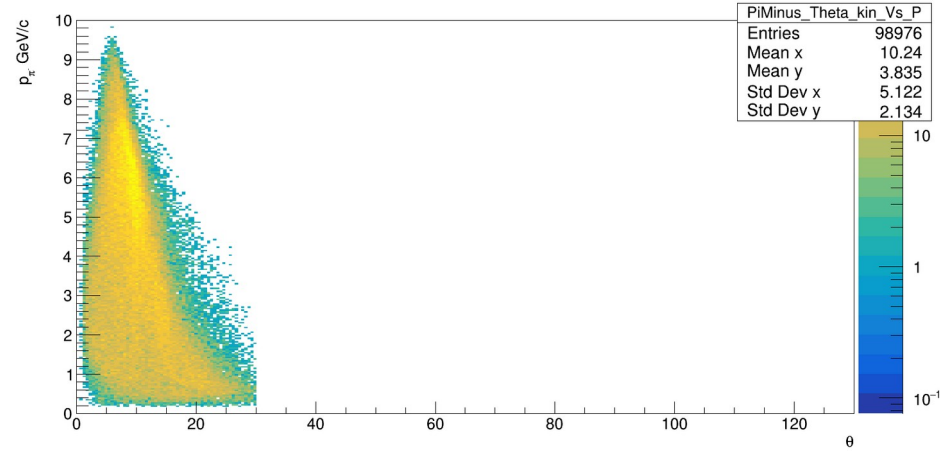
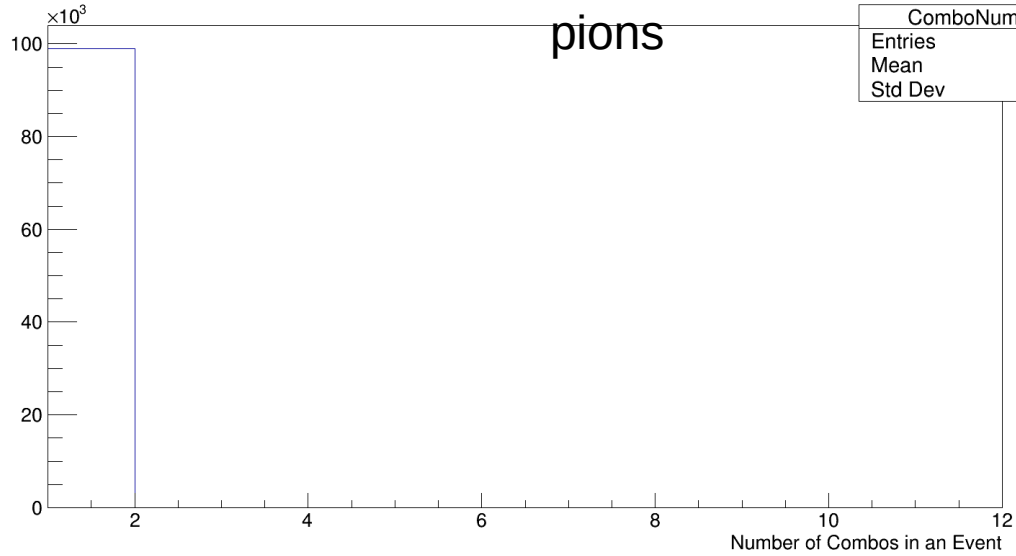




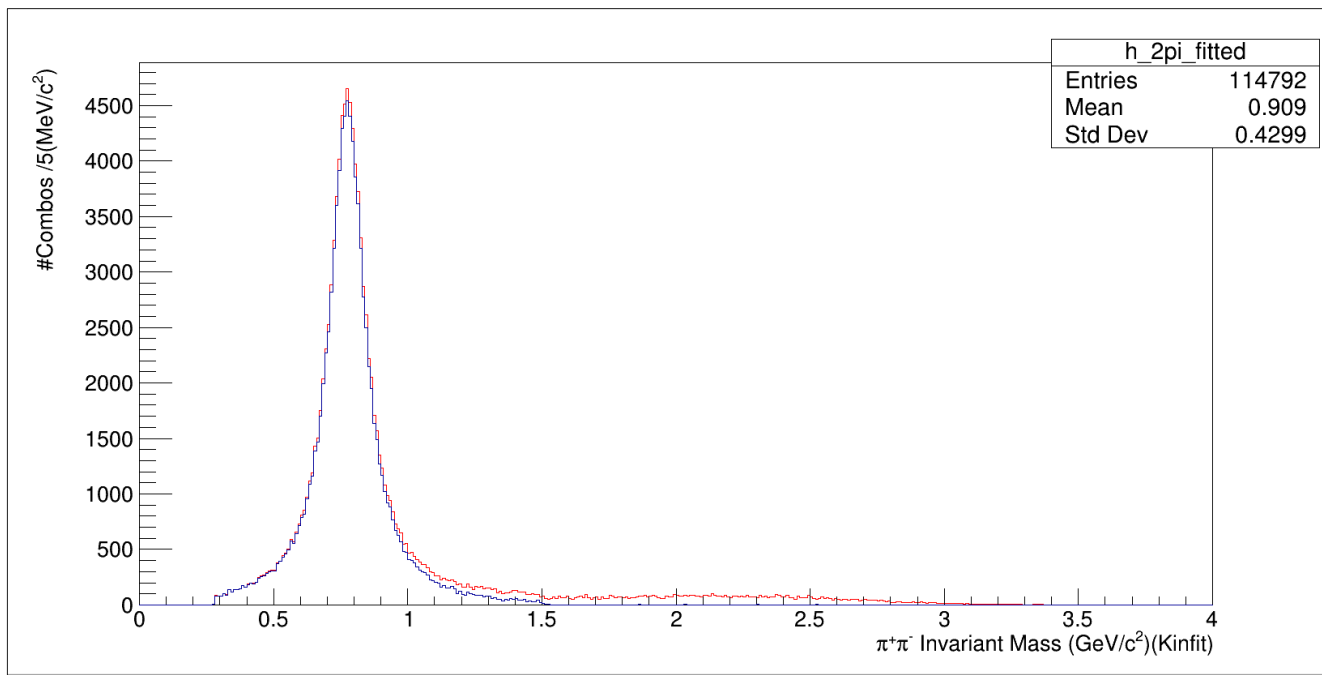
No of combo in simulation
before applying cut on
Theta's.

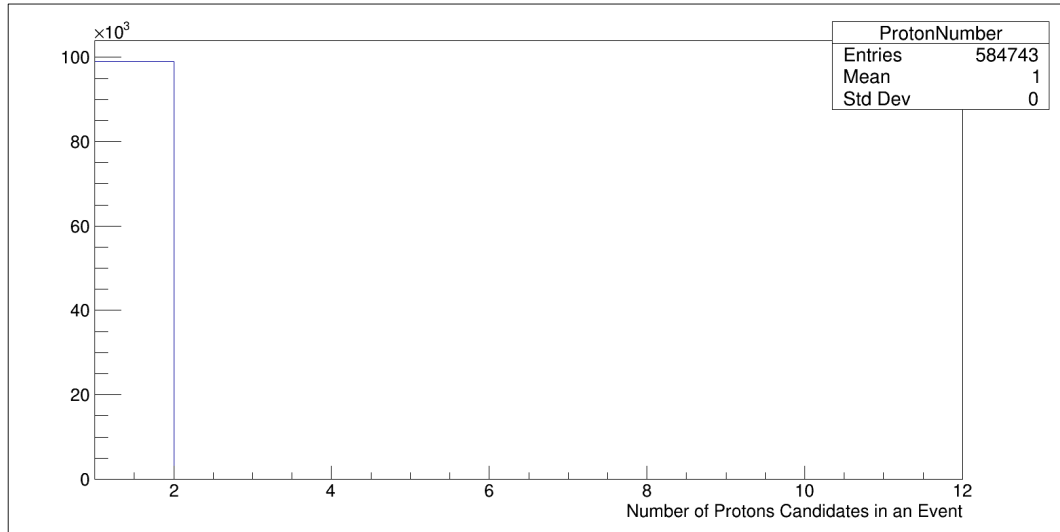
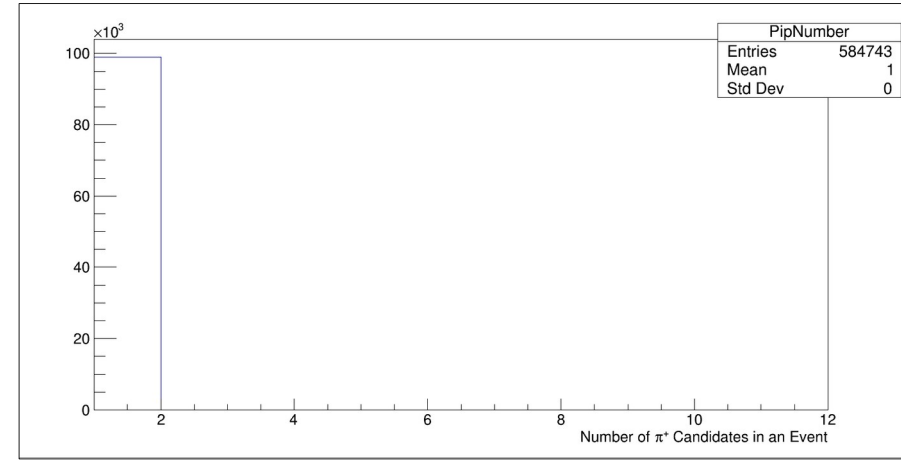
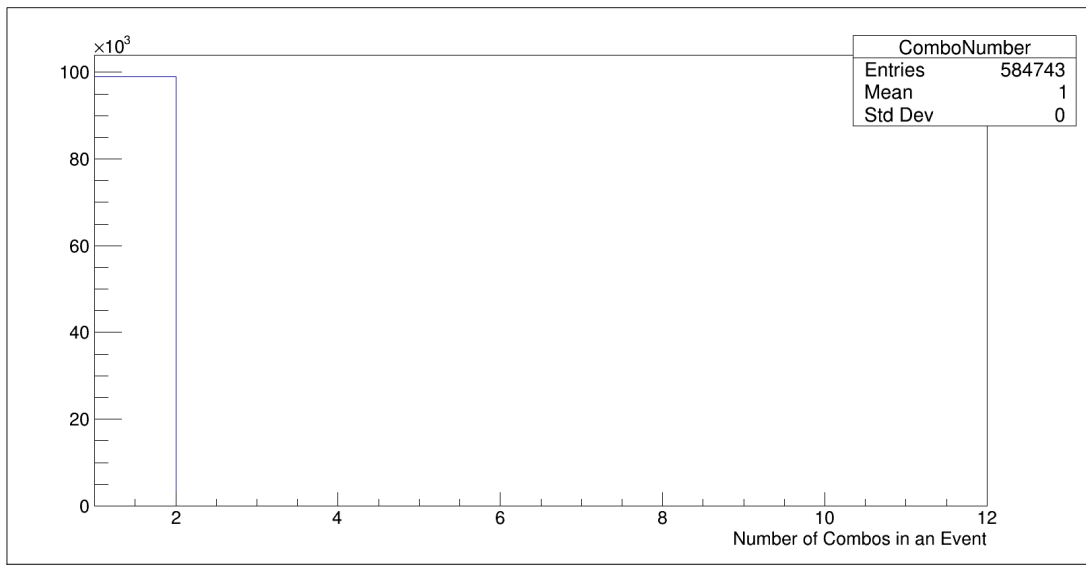


Simulation After cut on Theta of proton, and pions



Invariant mass of Rho0 in Simulation before and after applying cut on Theta's for $|t| > 0$ and $|u| > 0$

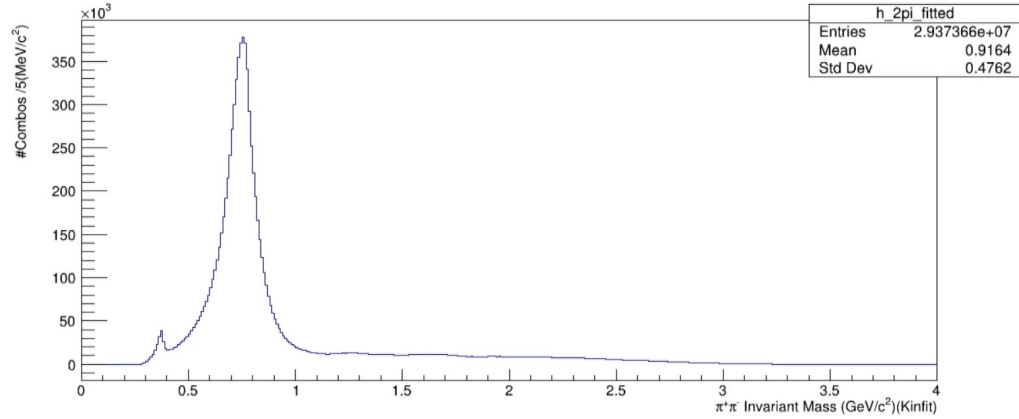




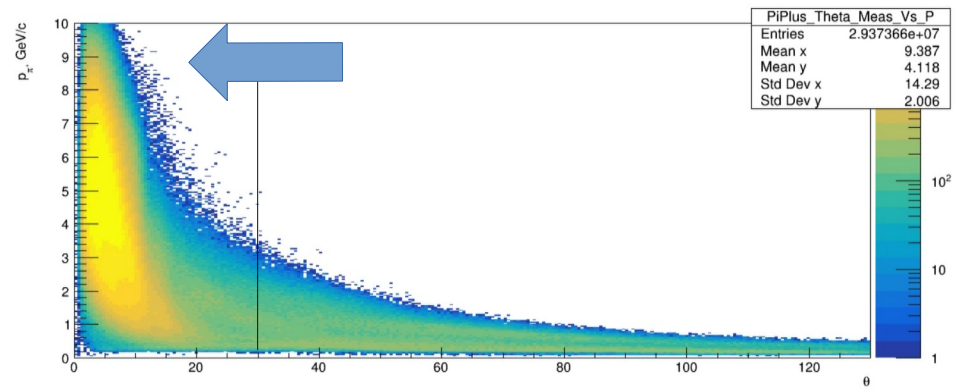
No of combo in simulation After applying cut on Theta's.

$|t| > 0, |u| > 0$

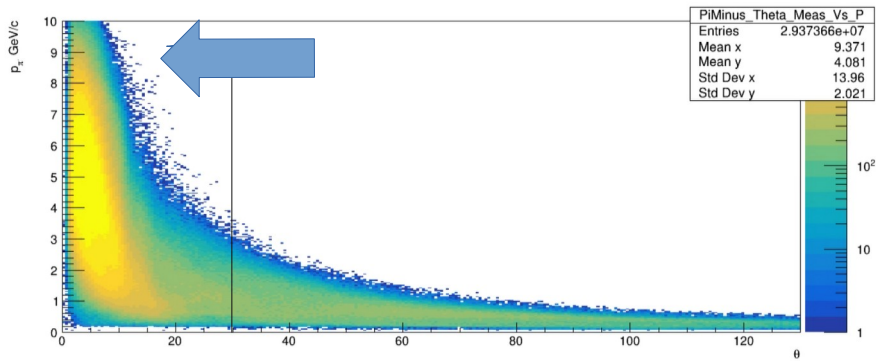
DATA



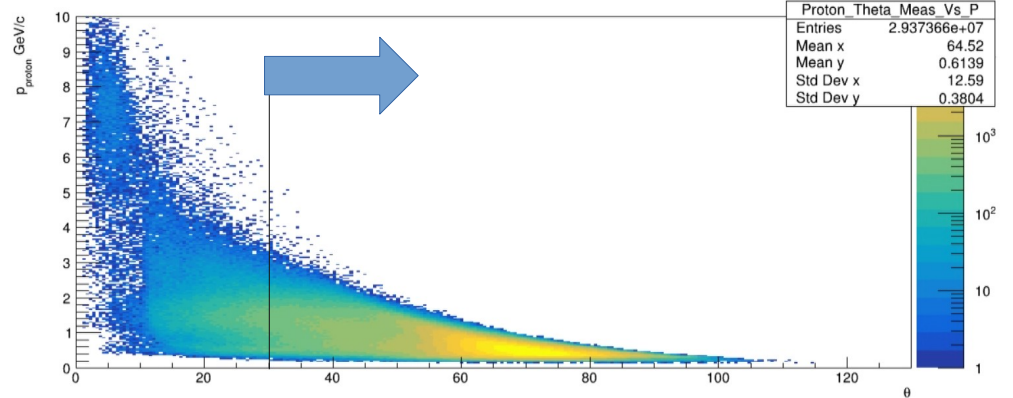
PiPlus (Thetha) vs P



PiMinus (Thetha) vs P

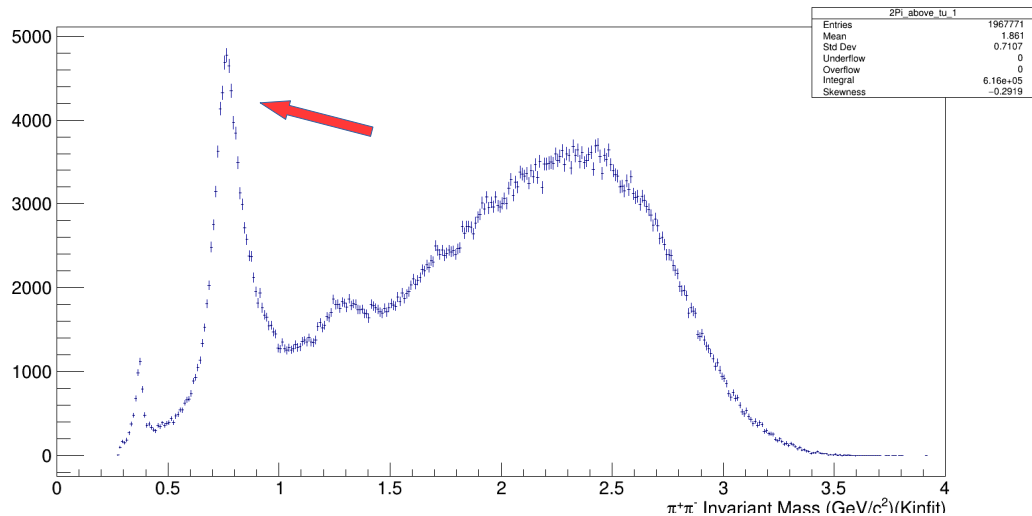


Proton (Thetha) vs P

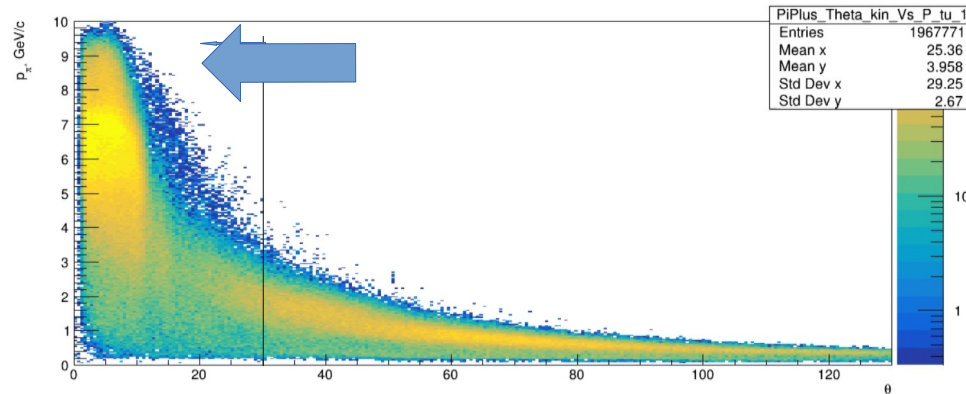


$|t| > 1, |u| > 1$

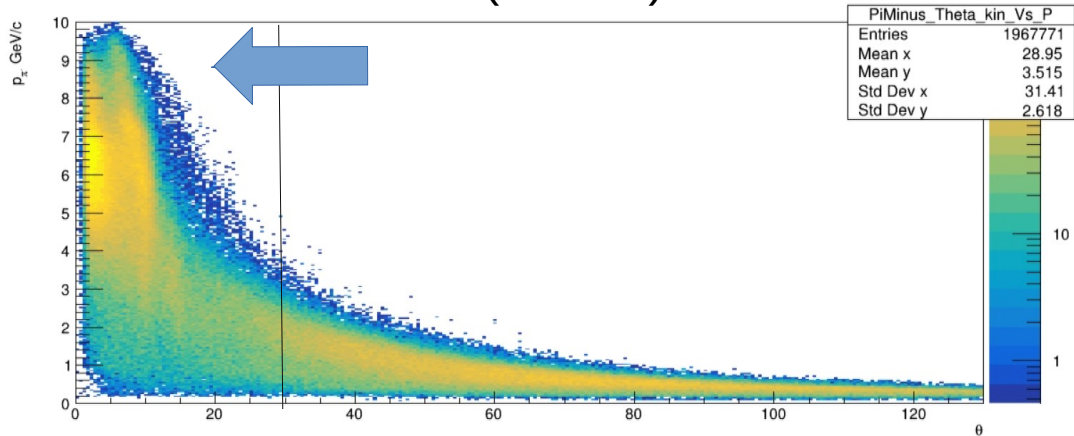
DATA



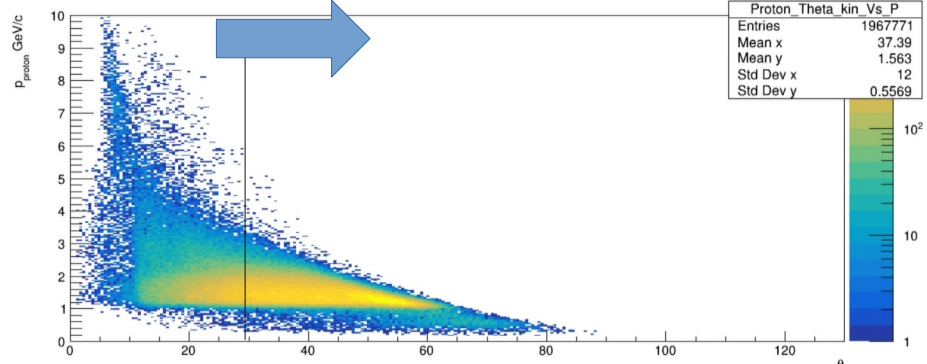
PiPlus (Thetha) vs P



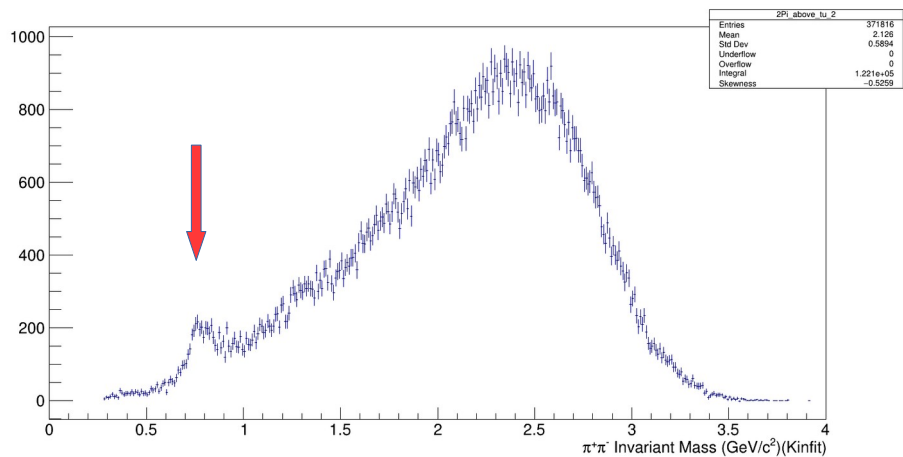
PiMinus (Thetha) vs P



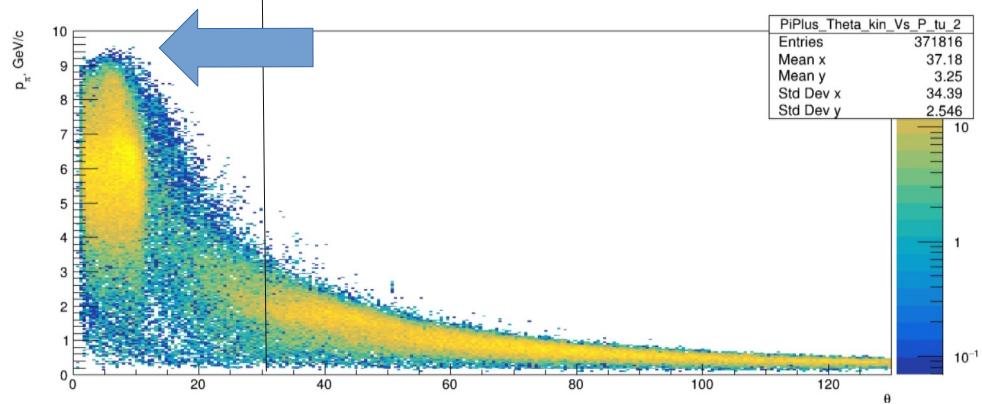
Proton (Thetha) vs P



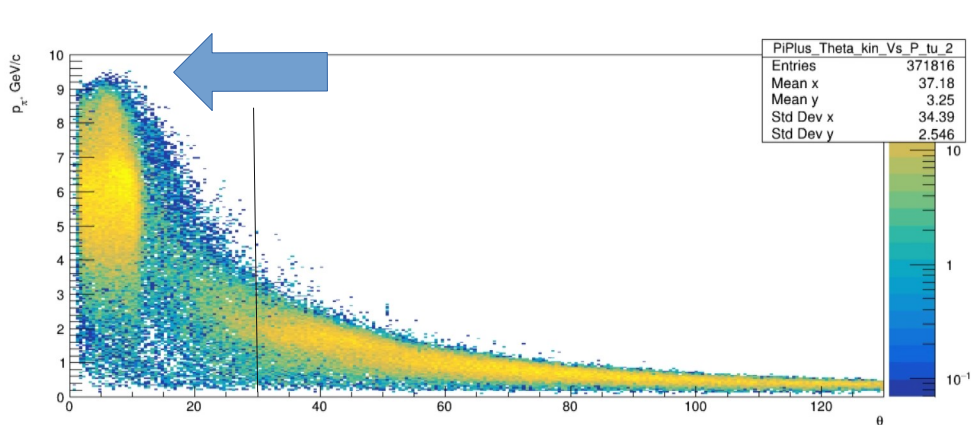
$|t| > 2, |u| > 1$



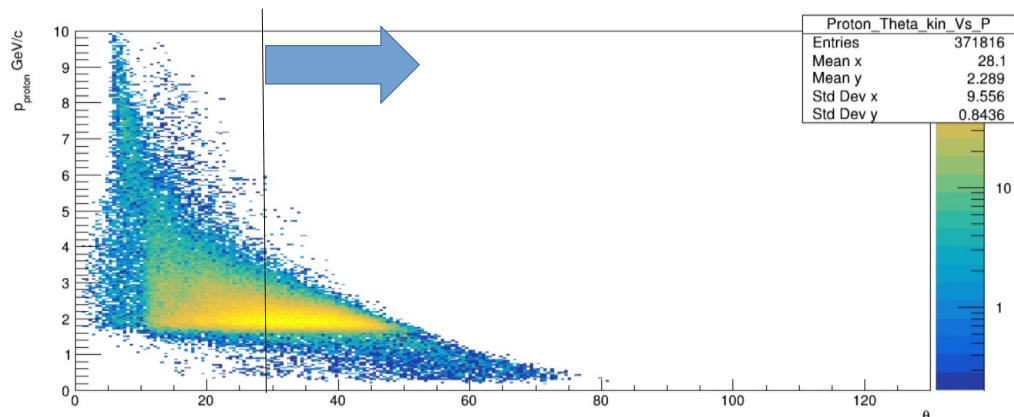
PiPlus (Thetha) vs P



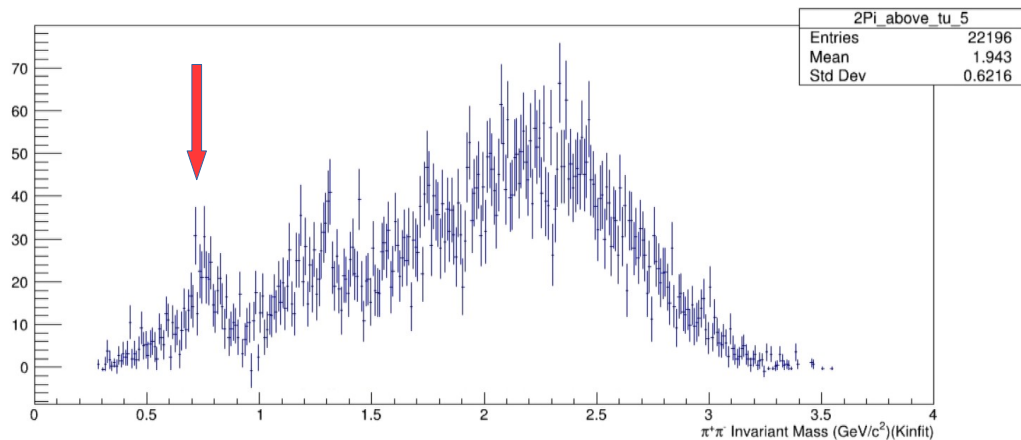
PiMinus (Thetha) vs P



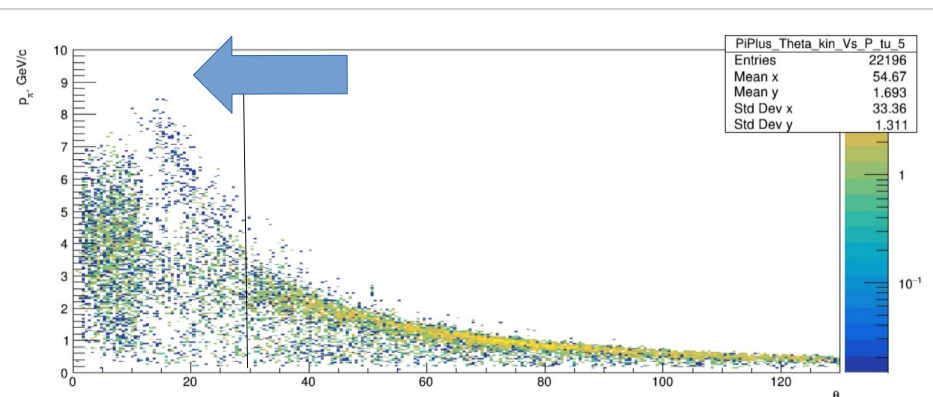
Proton (Thetha) vs P



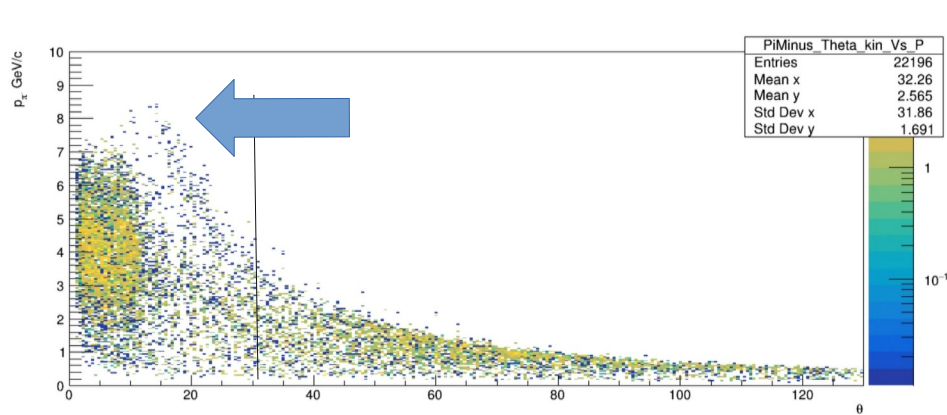
$|t| > 5, |u| > 1$



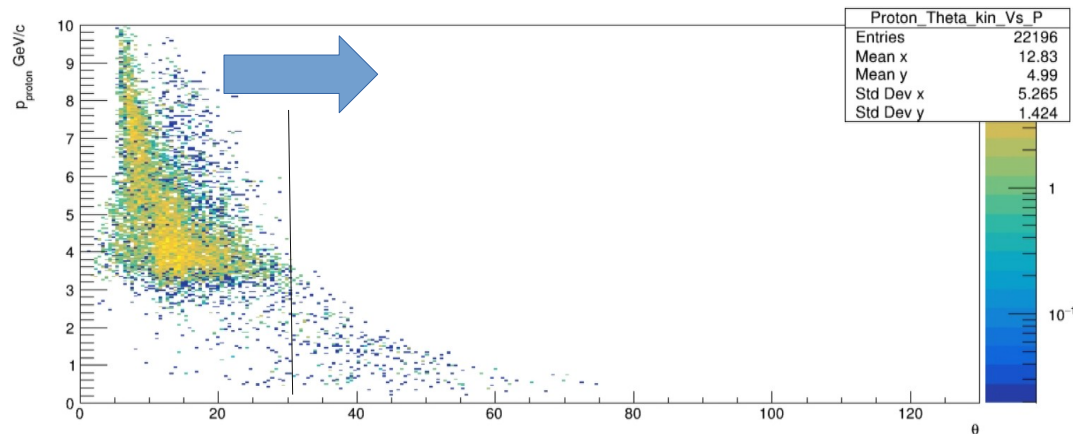
PiPlus (Thetha) vs P



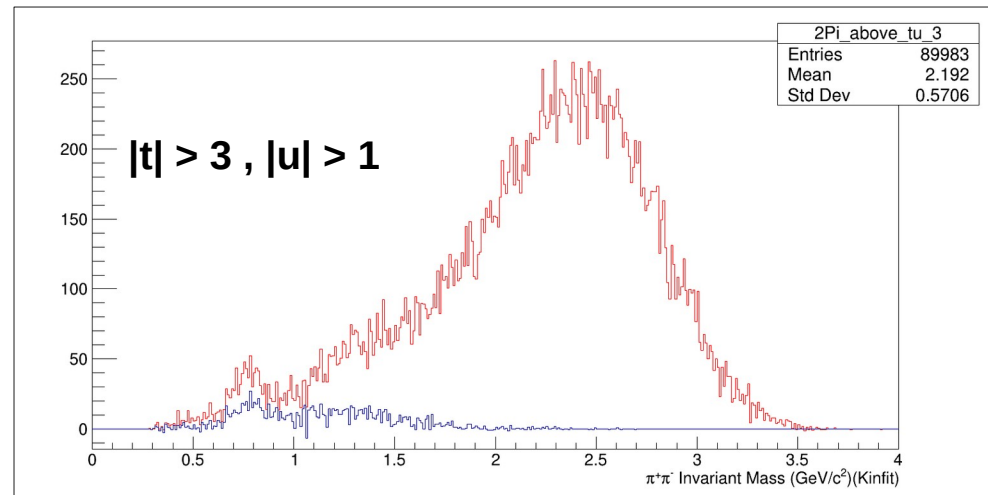
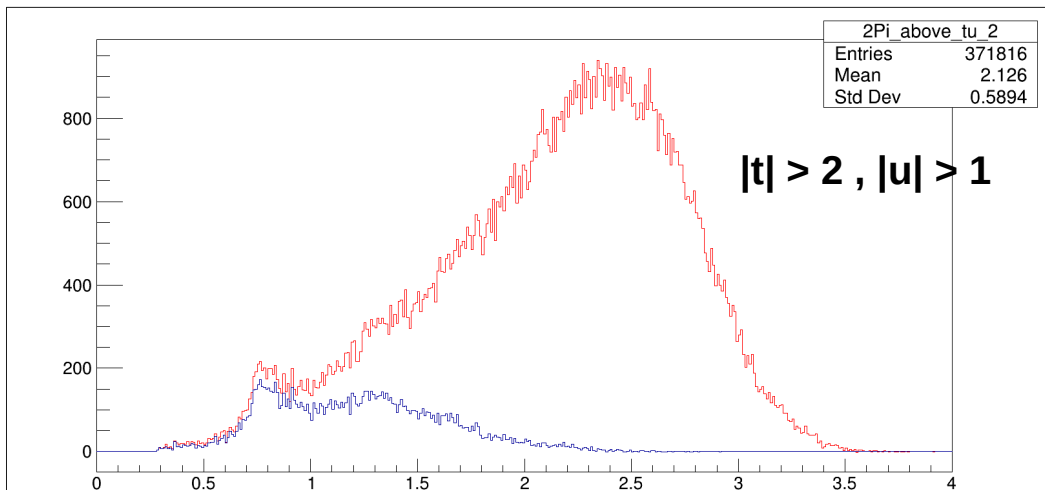
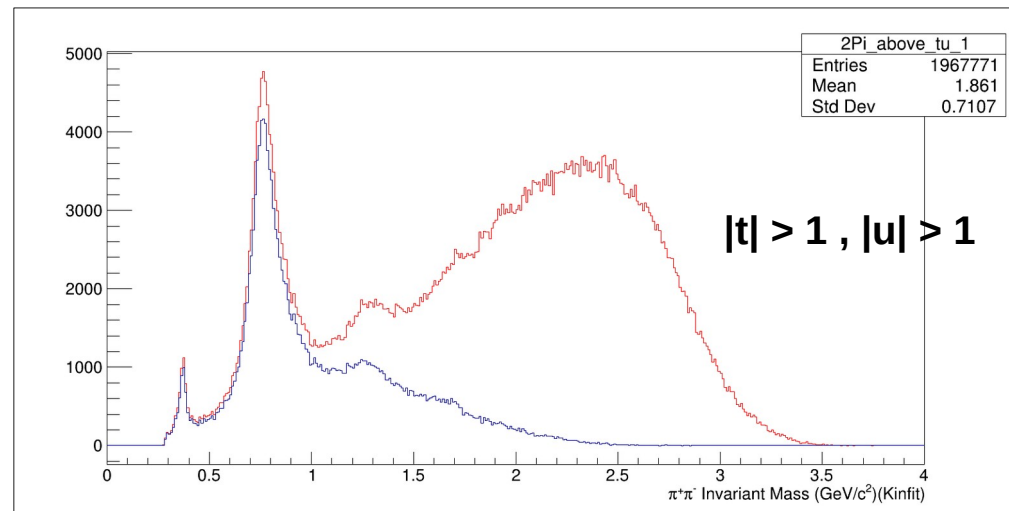
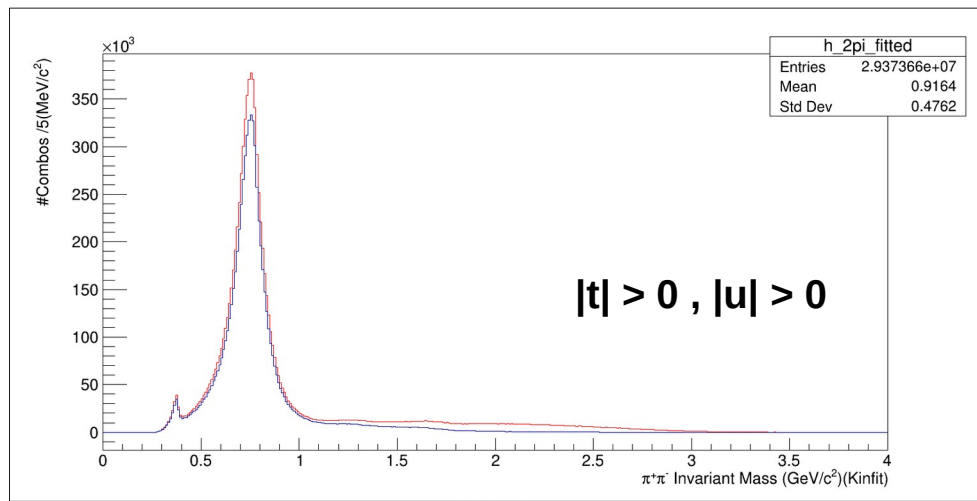
Piminus (Thetha) vs P



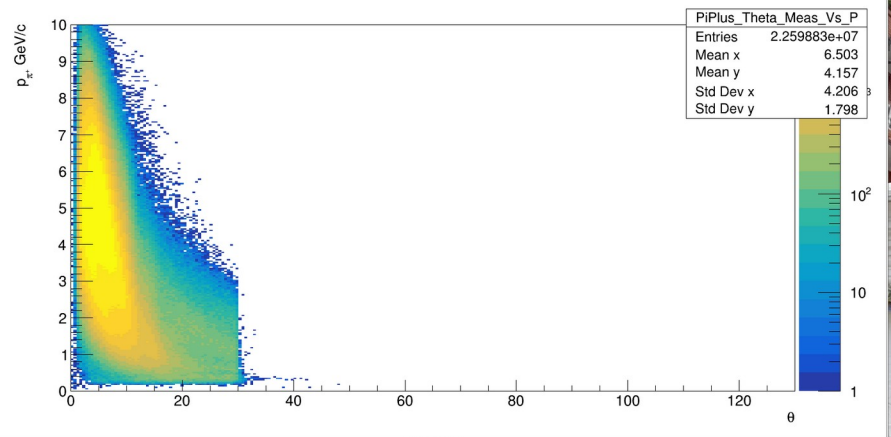
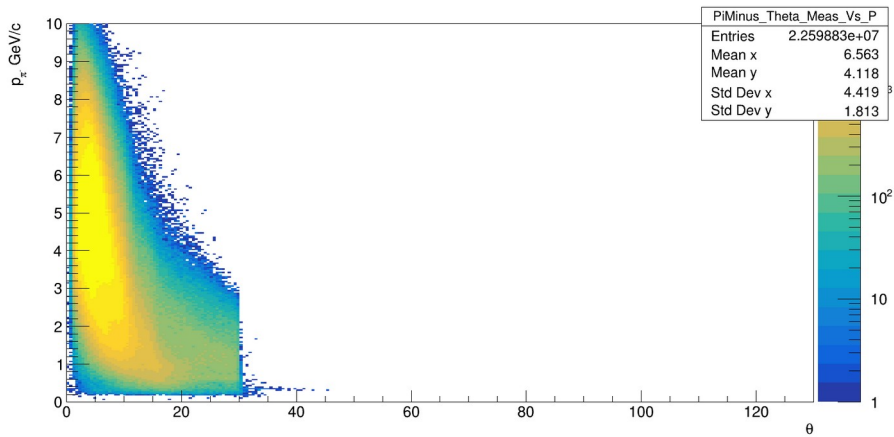
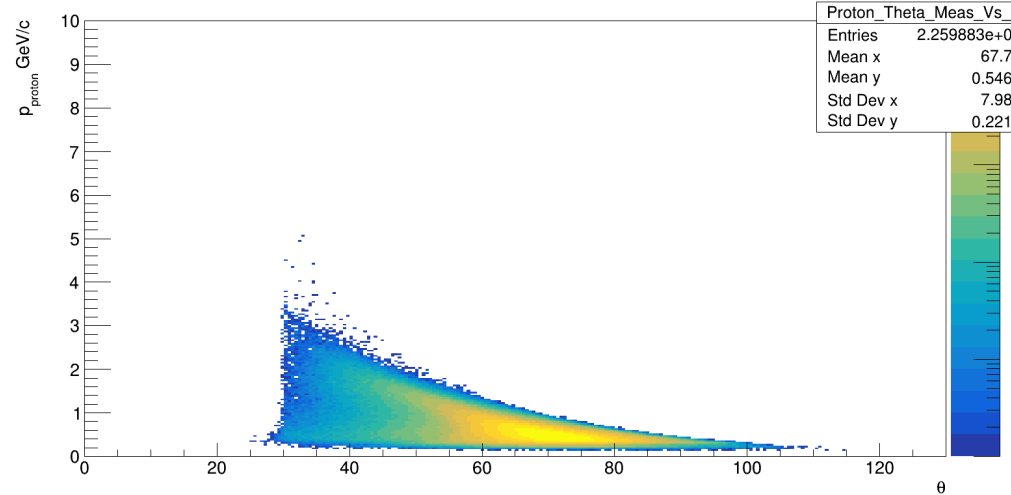
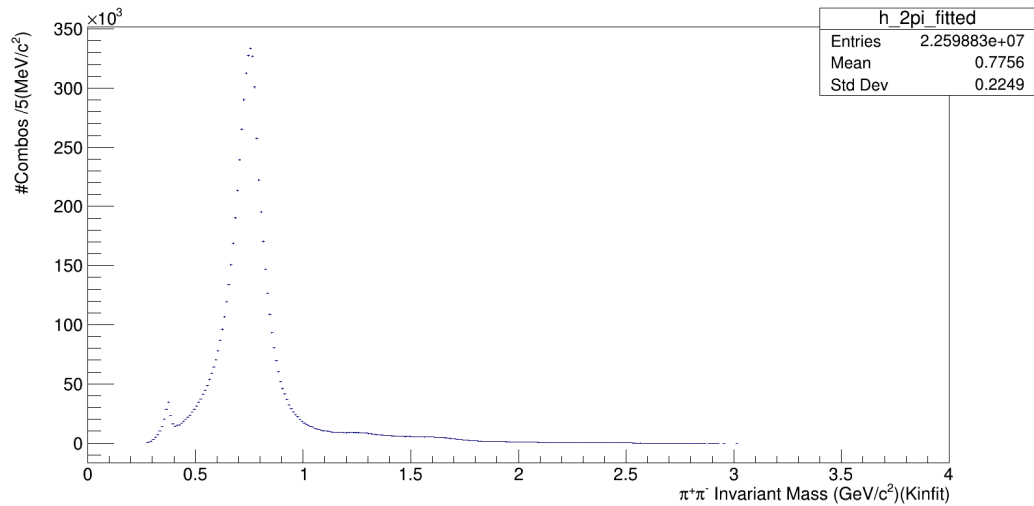
Proton (Thetha) vs P



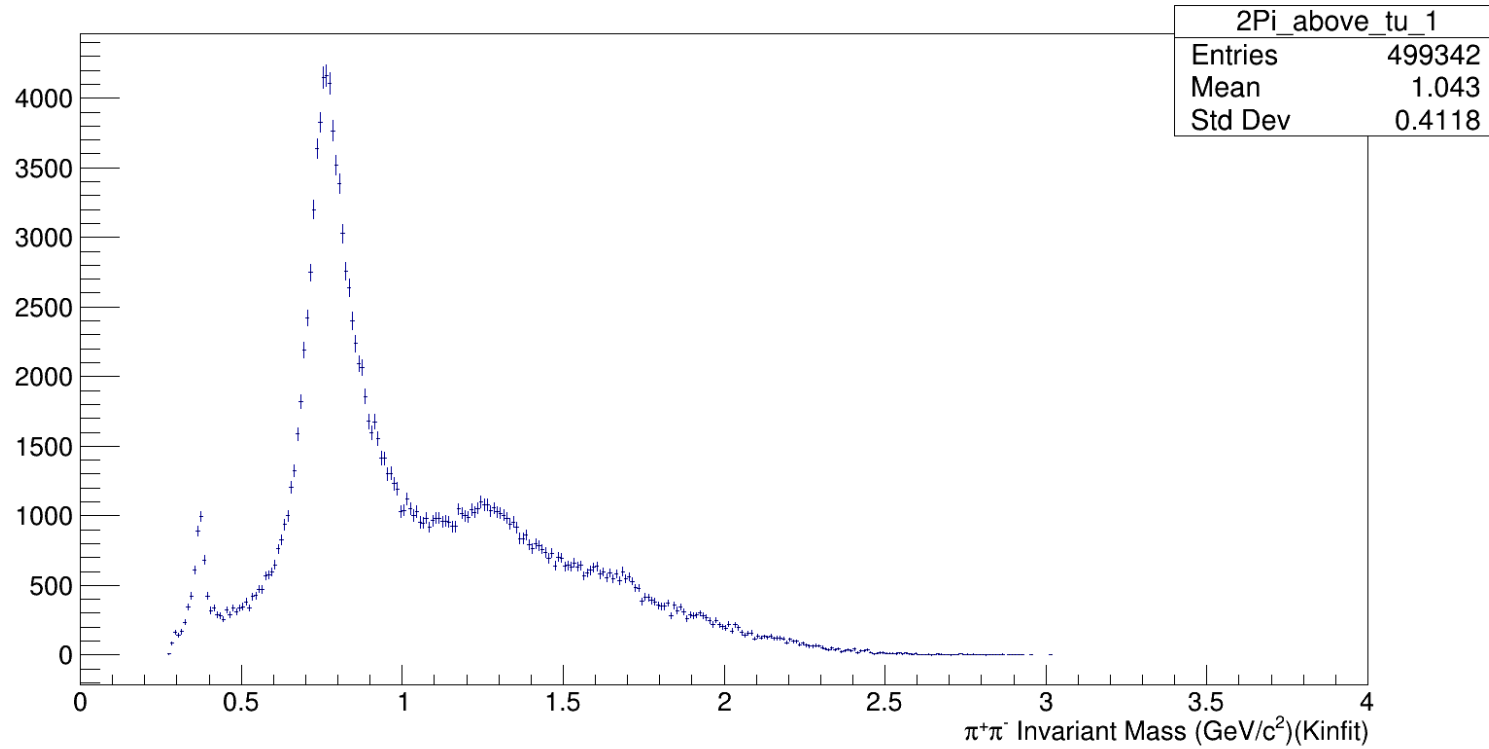
Data Before and After Cut on Proton and Pion's theta



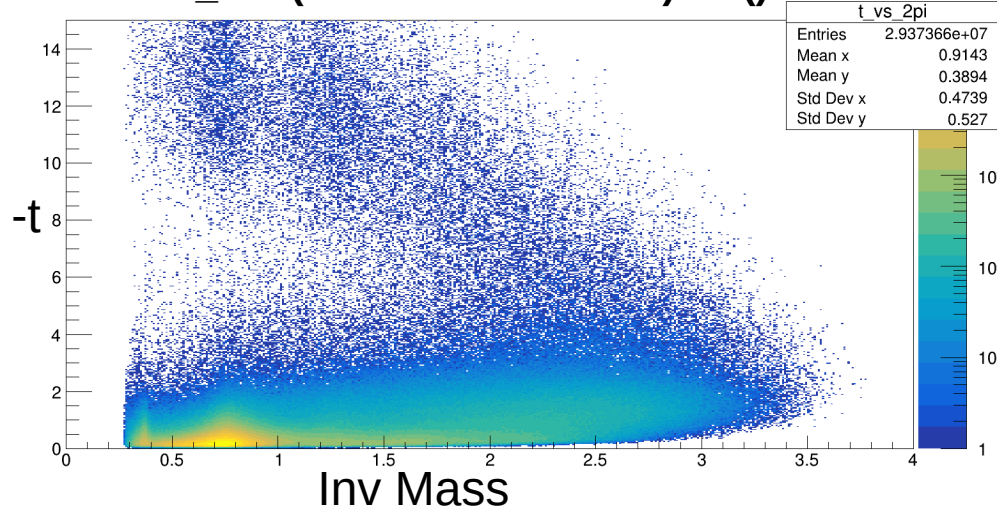
$|t| > 0, |u| > 0$



$|t| > 1$, $|u| > 0$
After cut on
angles.



minus_t = -(locBeamP4 -loc2Pi).M2()



$|t| > 0, |u| > 0$

minus_u = -(locBeamP4 -locProtonP4).M2()

