

# Analysis updates

## PID Study (HGC)

**Run No. 5018**

**P\_shms = 6.053 GeV/c**

**Gas index: HGC - 1.00139 & Aero - 1.011**

**Cherenkov Threshold:**

**HGC, Pion 2.5863 GeV/c, K 9.4797 GeV/c & P 17.784 GeV/c.**

**Aero, Pion 0.9345 GeV/c, K 3.3617 GeV/c & P 6.3066 GeV/c.**

**Cuts:**

`{"P_gtr_beta" : ((abs(P_gtr_beta-1)) < 0.3)}`

`{"P_gtr_dp" : ((P_gtr_dp > -10) & (P_gtr_dp < 20))}`

`{"P_gtr_th" : ((P_gtr_xp > -0.06) & (P_gtr_xp < 0.06))}`

`{"P_gtr_ph" : ((P_gtr_yp > -0.04) & (P_gtr_yp < 0.04))}`

`{"CTime_ePiCoinTime_ROC1" : (CTime_ePiCoinTime_ROC1 > ((44.45)-((4.008)/2)-(0.25))) & (CTime_ePiCoinTime_ROC1 < ((44.45)+((4.008)/2)+(0.25)))}`

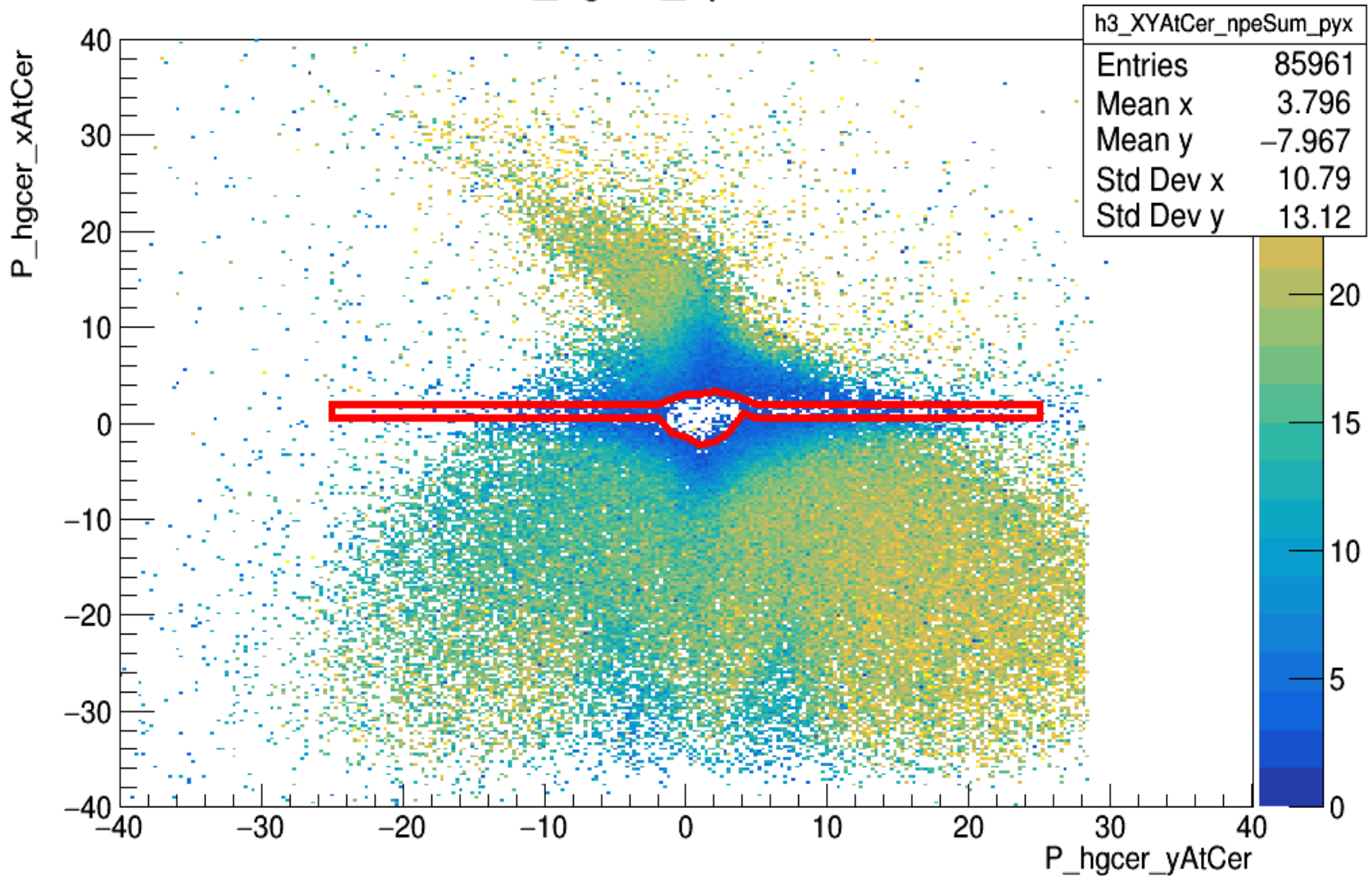
`{"CTime_eKCoinTime_ROC1" : (CTime_eKCoinTime_ROC1 > ((44.55)-((4.008)/2)-(0.25))) & (CTime_eKCoinTime_ROC1 < ((44.55)+((4.008)/2)+(0.25)))}`

`{"CTime_epCoinTime_ROC1" : (CTime_epCoinTime_ROC1 > ((44.6)-((4.008)/2)-(0.25))) & (CTime_epCoinTime_ROC1 < ((44.6)+((4.008)/2)+(0.25)))}`

**First Geometrical cut around the hole.**

**Color axis: P\_hgcer\_npeSum**

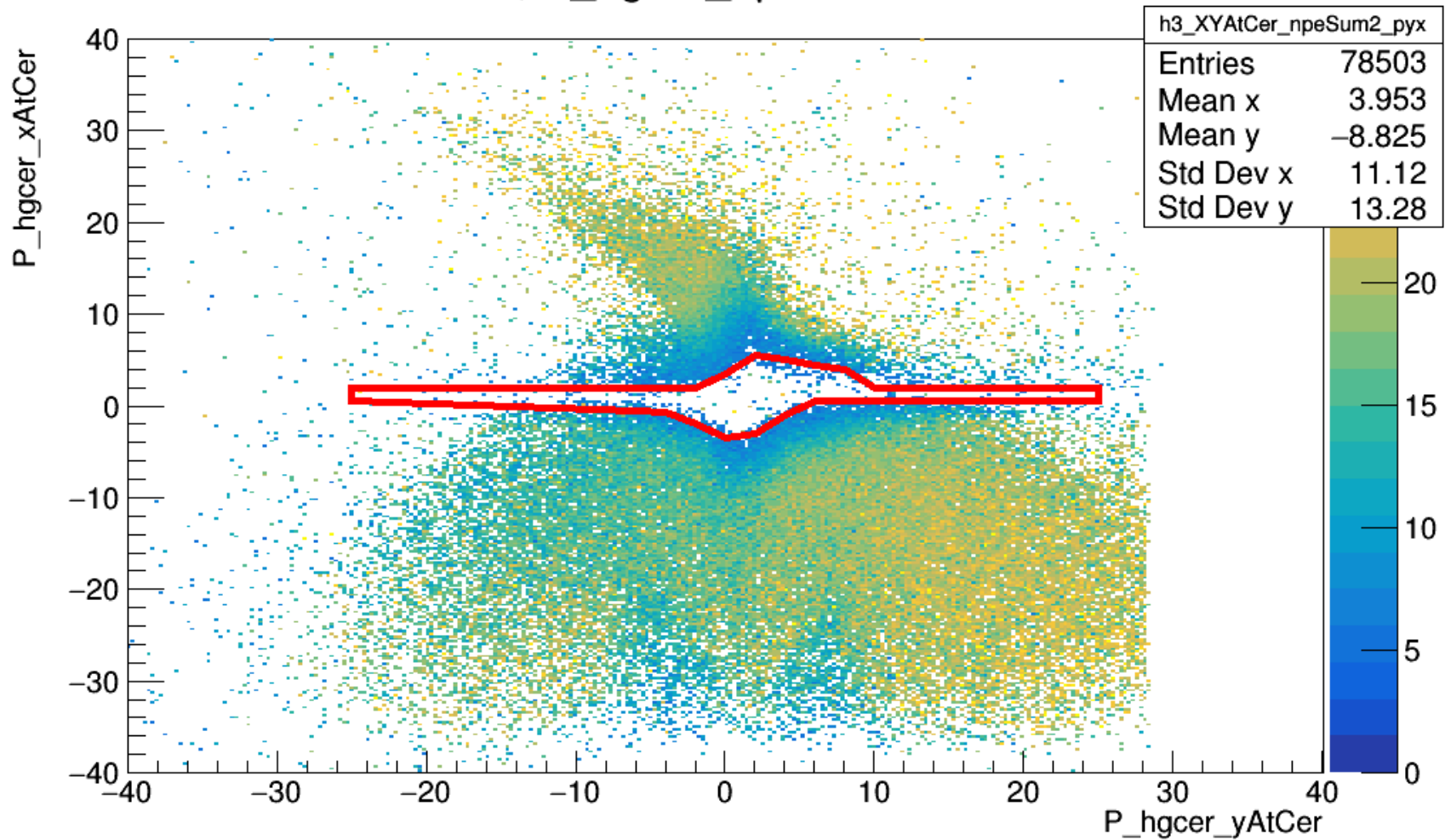
HGC,P\_hgcer\_npeSum => 1.5



## Second Geometrical cut around the hole.

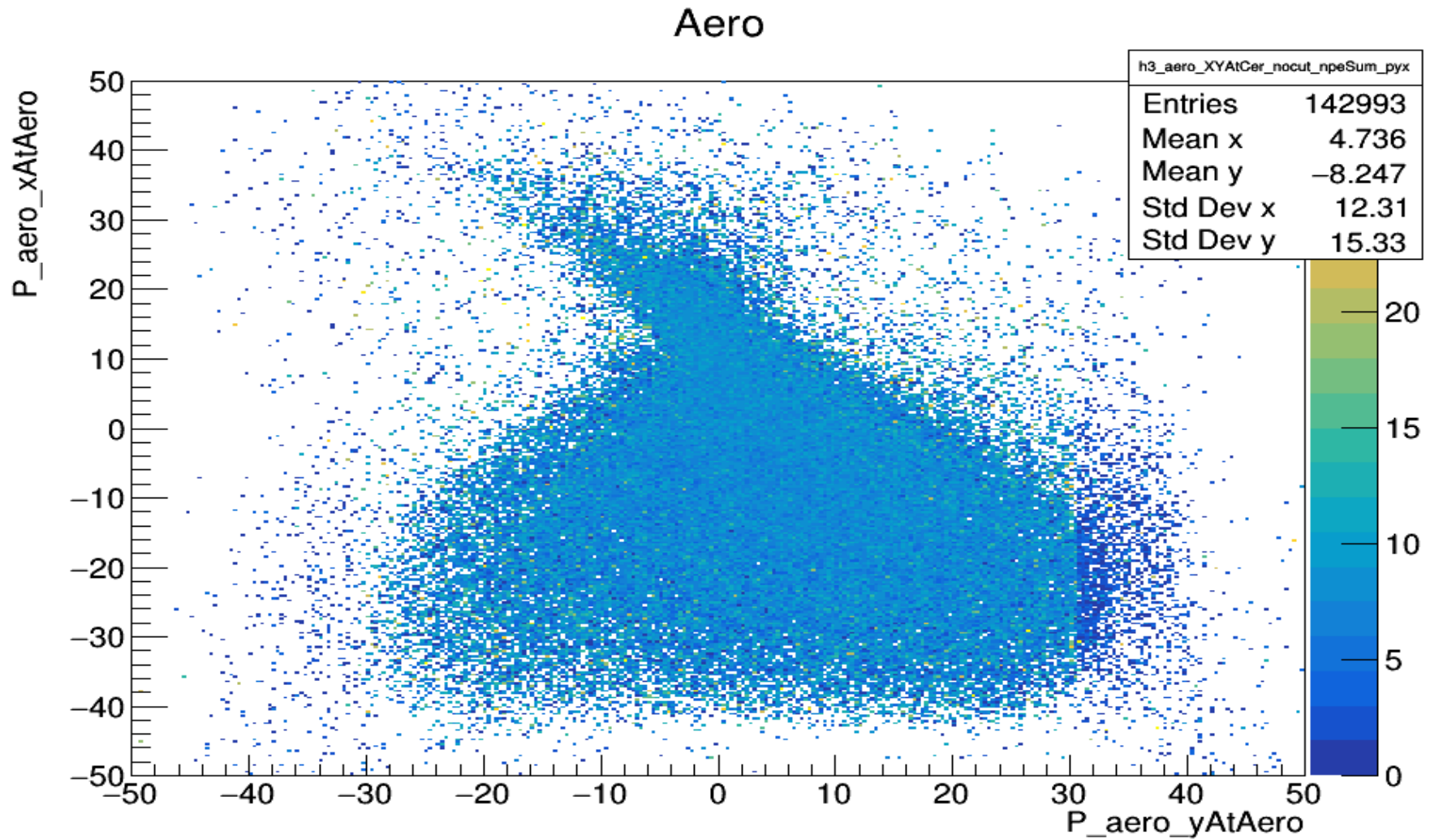
Color axis: P\_hgcer\_npeSum

HGC, P\_hgcer\_npeSum  $\Rightarrow$  5.0



Aerogel Cherenkov.

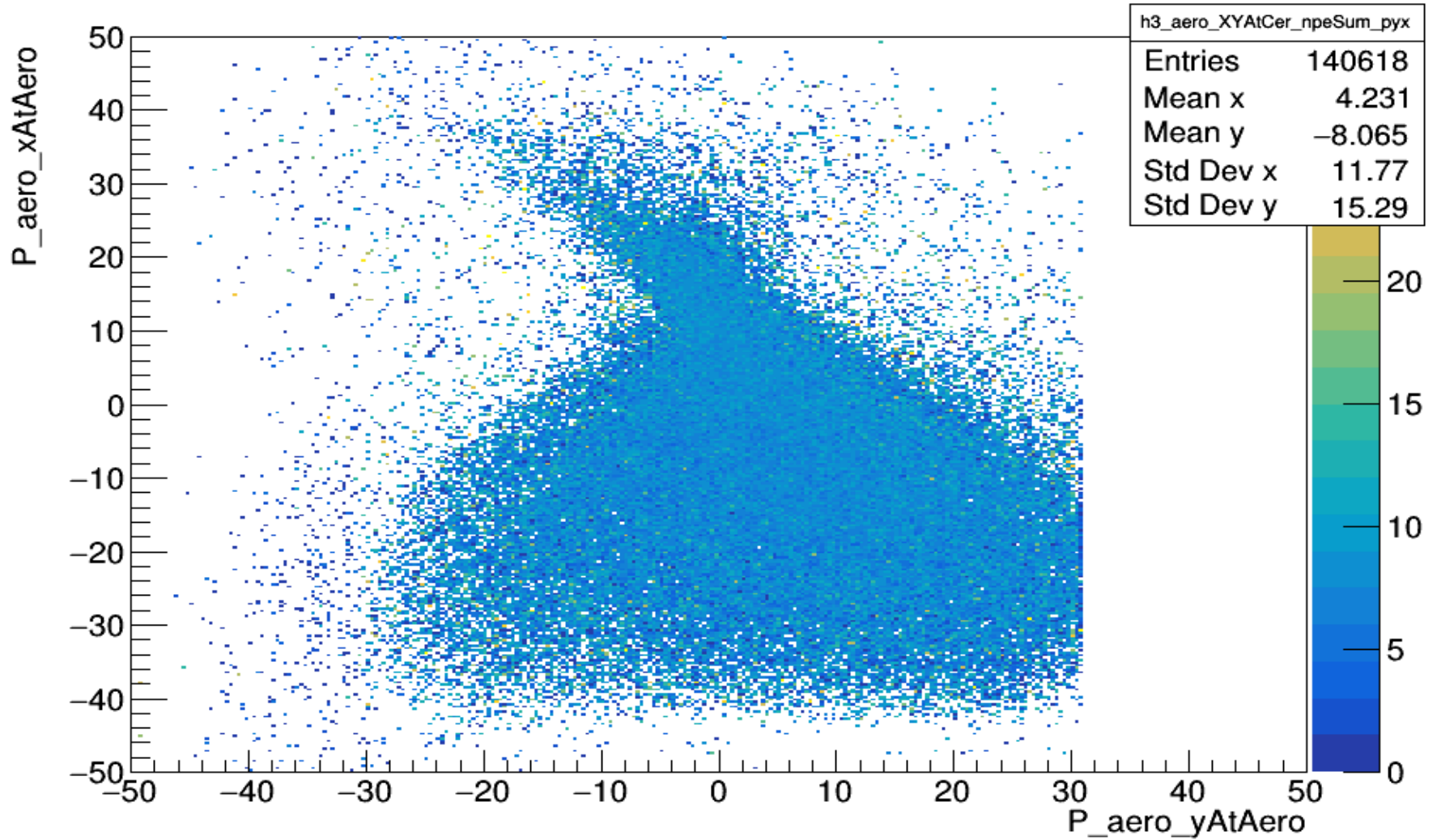
**Color axis: P\_aero\_npeSum**



Aerogel Cherenkov with cut.

**Color axis: P\_aero\_npeSum**

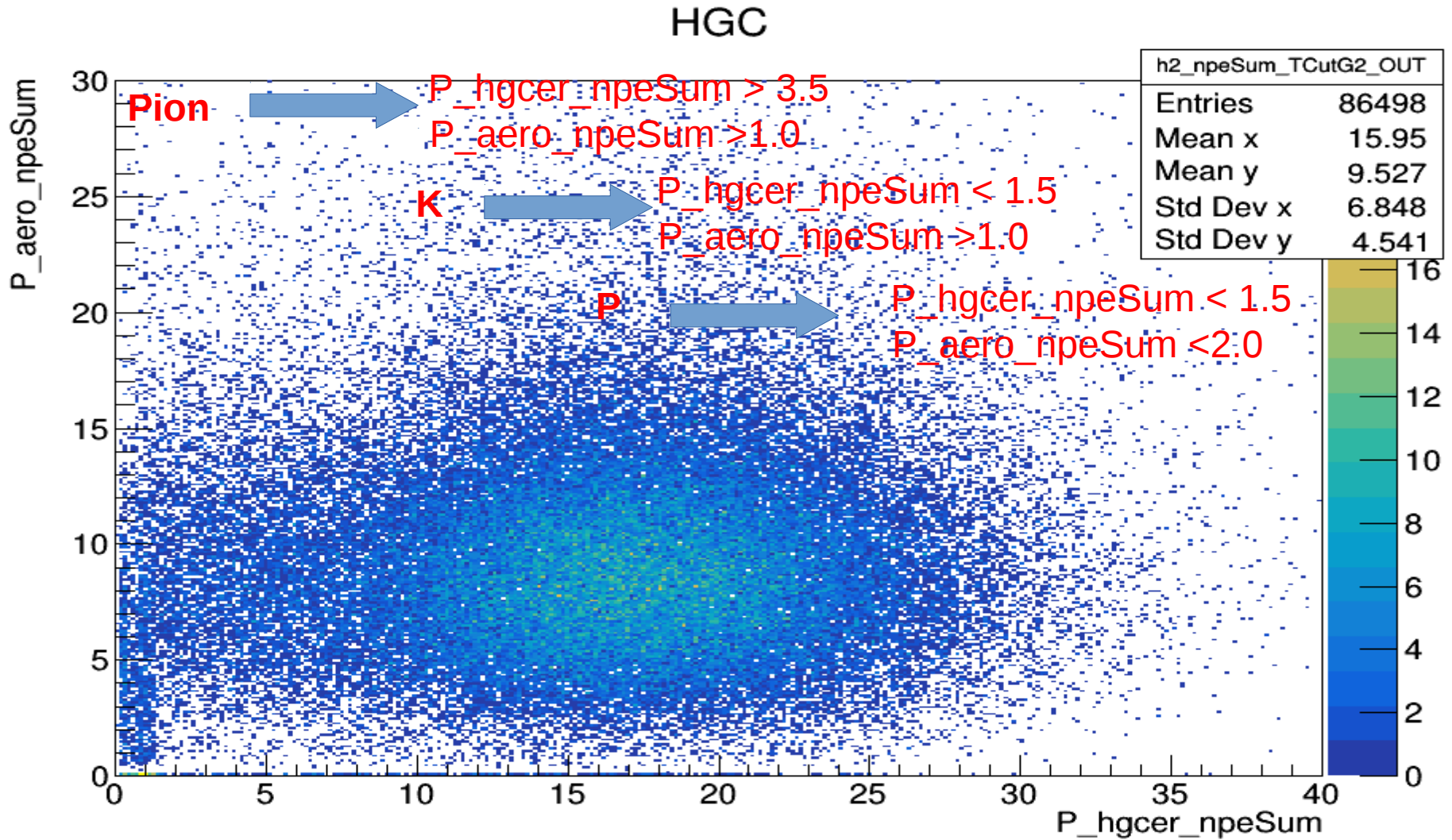
Aero





Events passed the outside region of **Second Geometrical cut**.

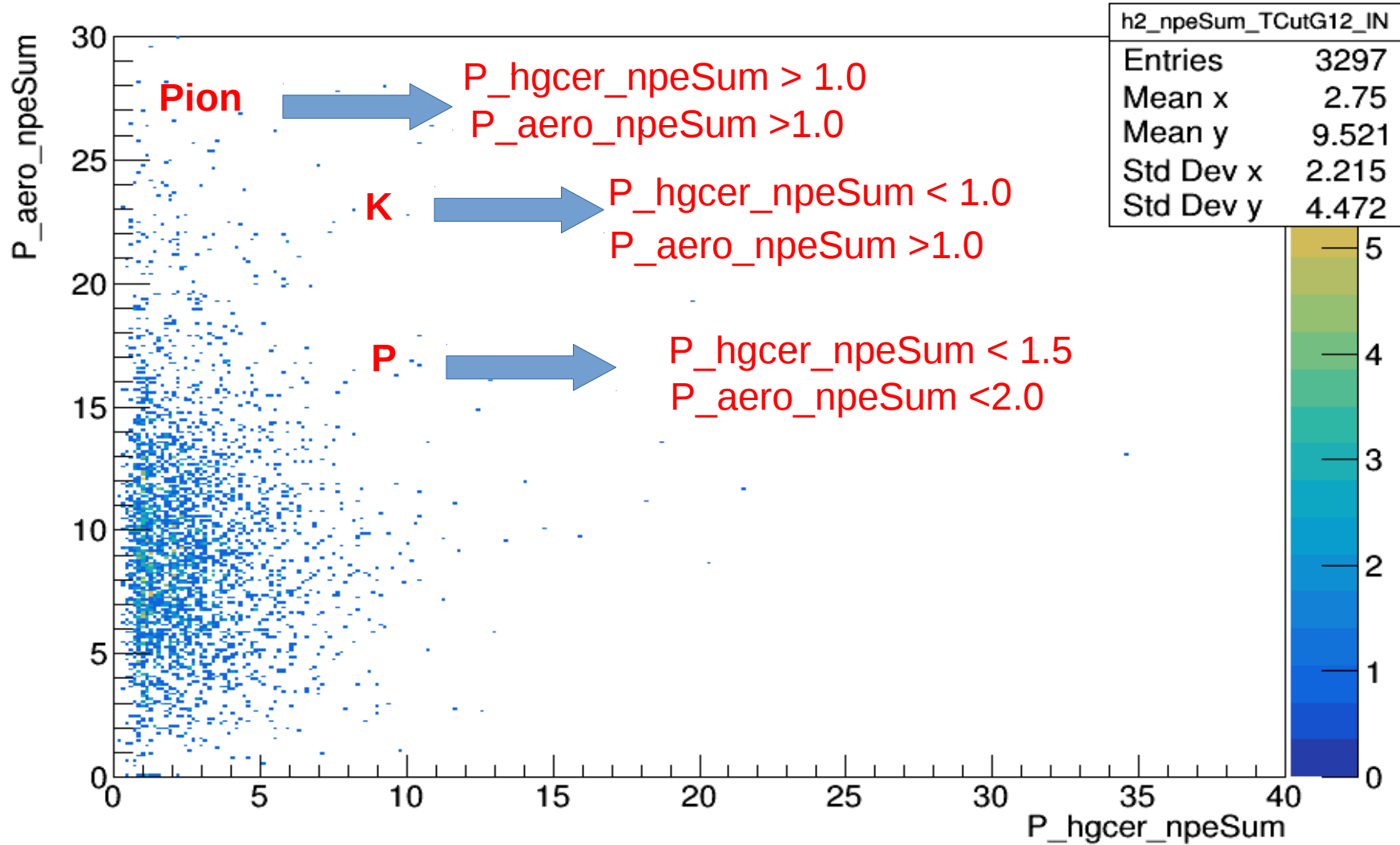
This is used to select the Pion, Kaon & Proton outside the **Second Geometrical cut**.



Events selected from the region that is between **First & Second Geometrical cuts**.

This is used to select the Pion, Kaon & Proton between **First & Second Geometrical cuts**.

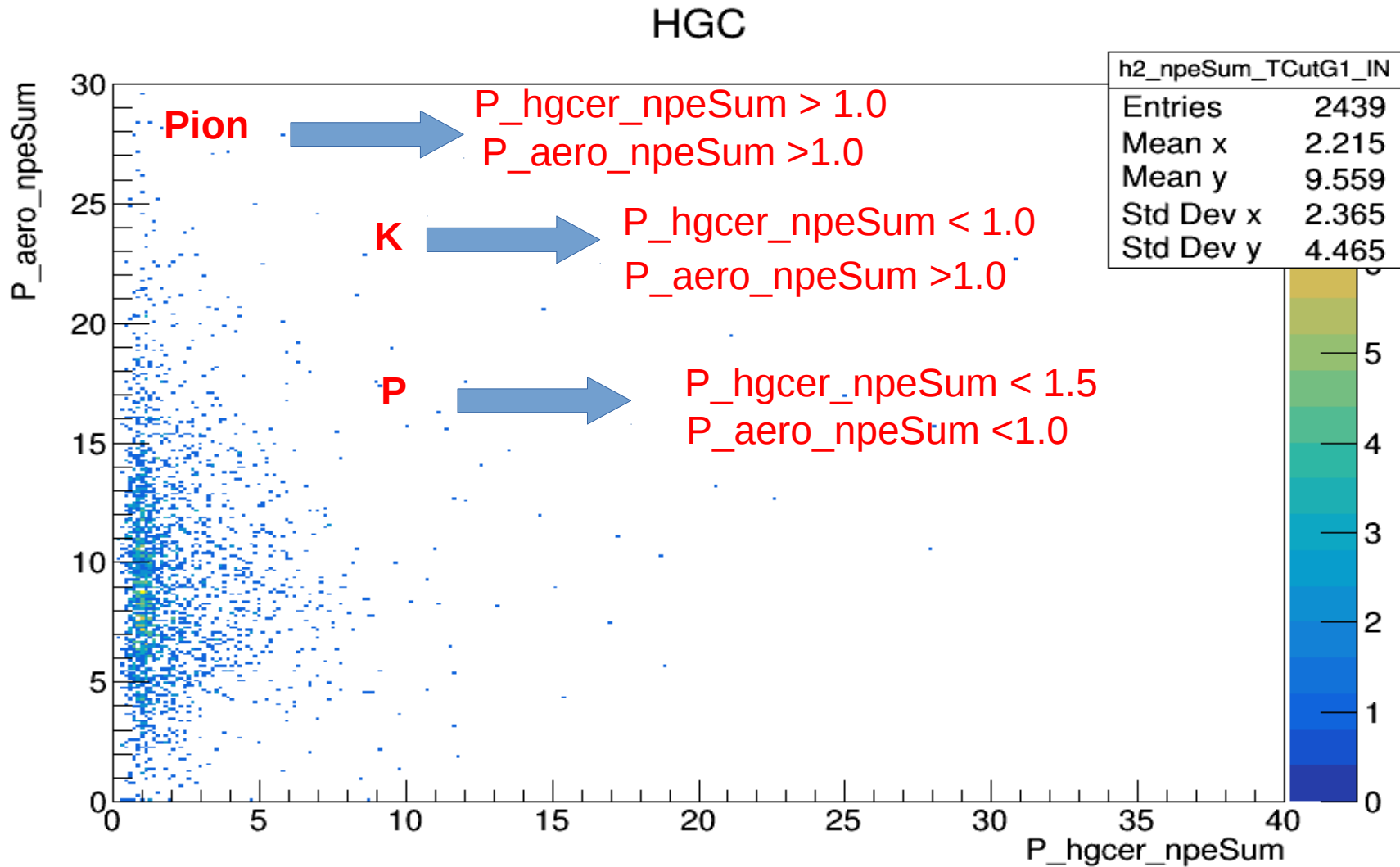
HGC





# Events passed through the **First Geometrical cut**

This is used to select the Pion, Kaon & Proton inside the **First Geometrical cut**



Pion missing mass outside the **Second Geometrical cut**.

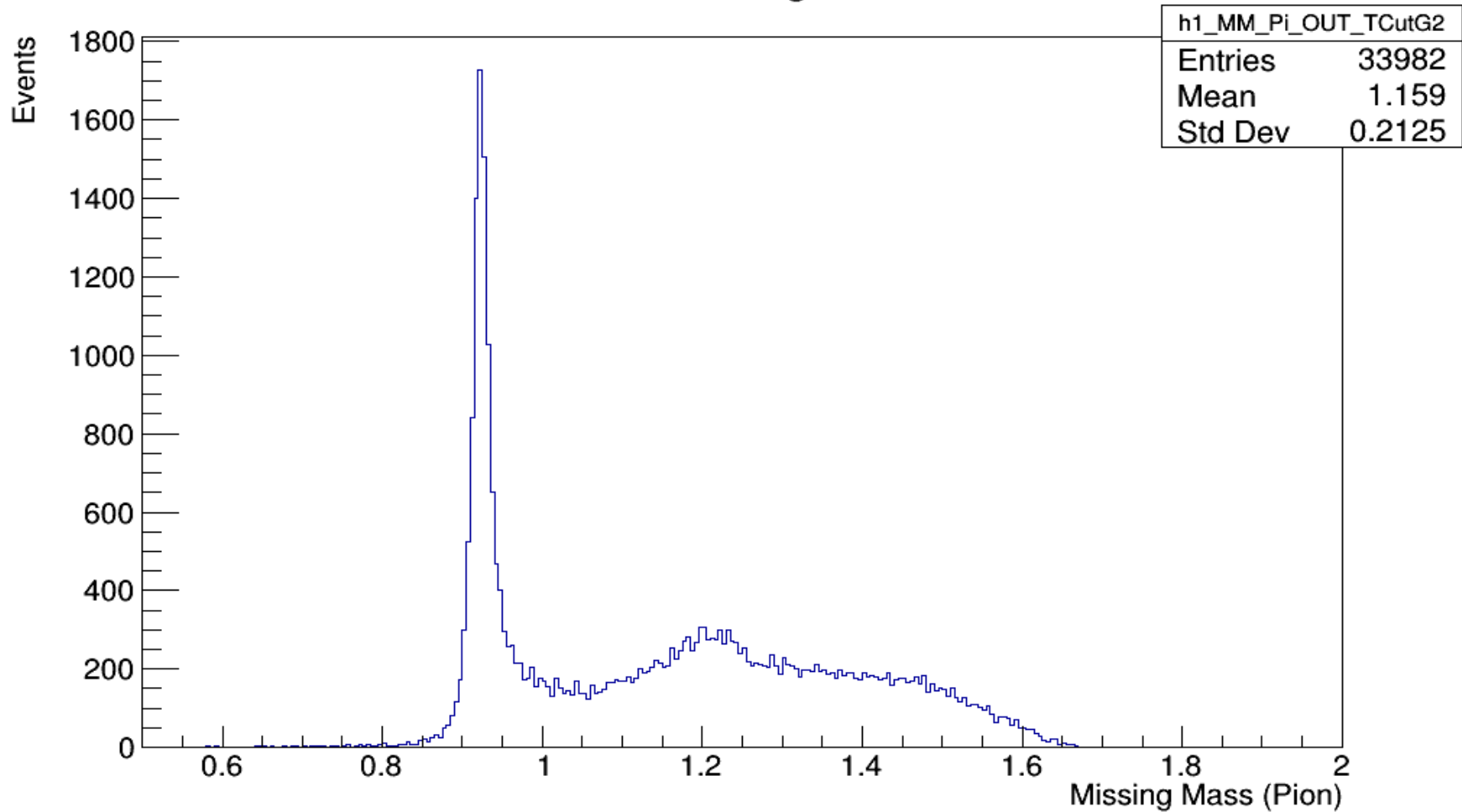
**Cuts used**

$P\_hgcer\_npeSum > 3.5$

$P\_aero\_npeSum > 1.0$

$P\_aero\_yAtCer < 31$

**Pion Missing Mass**



Pion missing mass b/w **First & Second Geometrical cuts.**

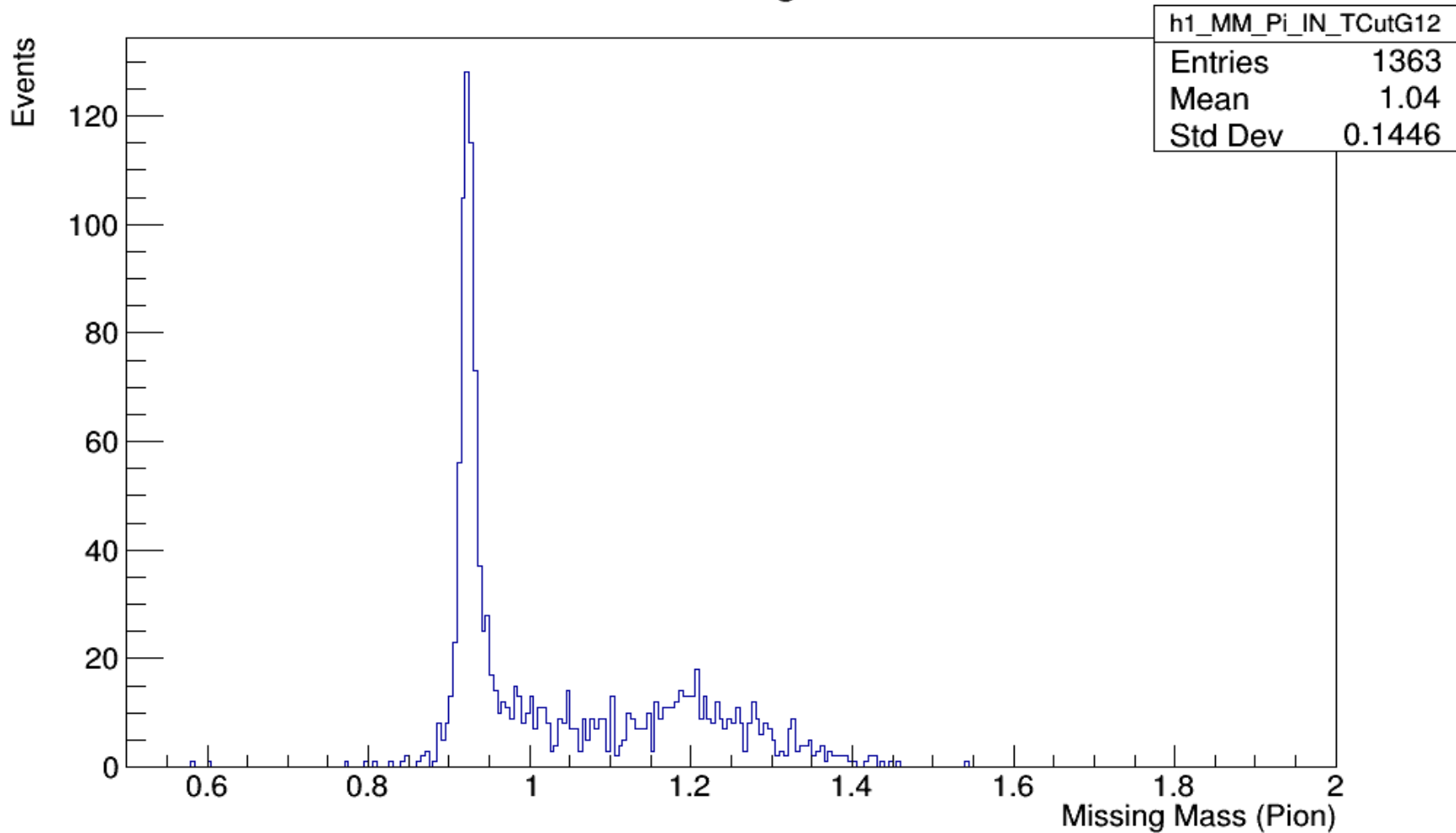
**Cuts used**

P\_hgcer\_npeSum > 1.0

P\_aero\_npeSum > 1.0

P\_aero\_yAtCer < 31

**Pion Missing Mass**



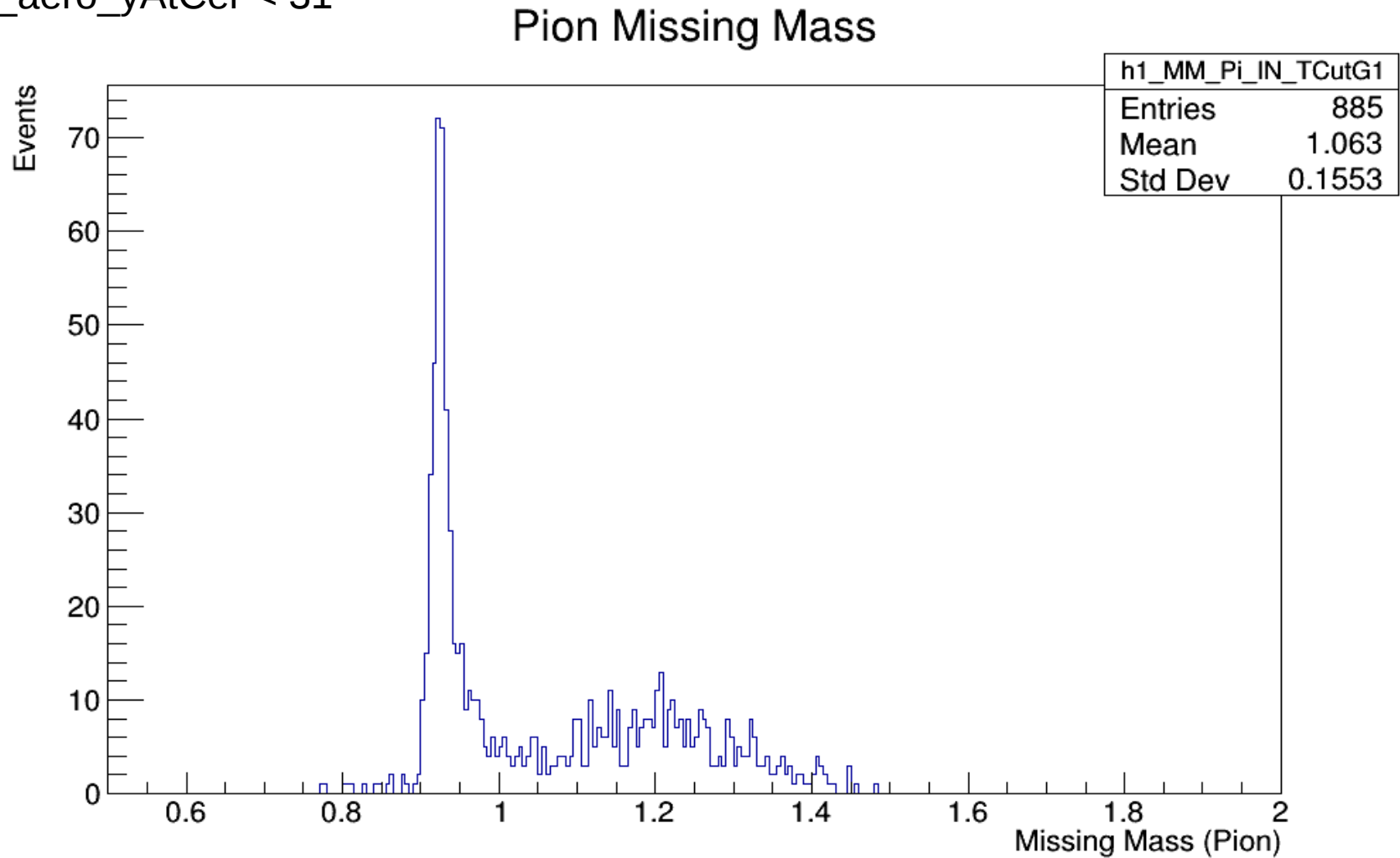
Pion missing mass inside the **First Geometrical cut**.

**Cuts used**

$P_{hgcer\_npeSum} > 1.0$

$P_{aero\_npeSum} > 1.0$

$P_{aero\_yAtCer} < 31$



Kaon missing mass outside the **Second Geometrical cut**.

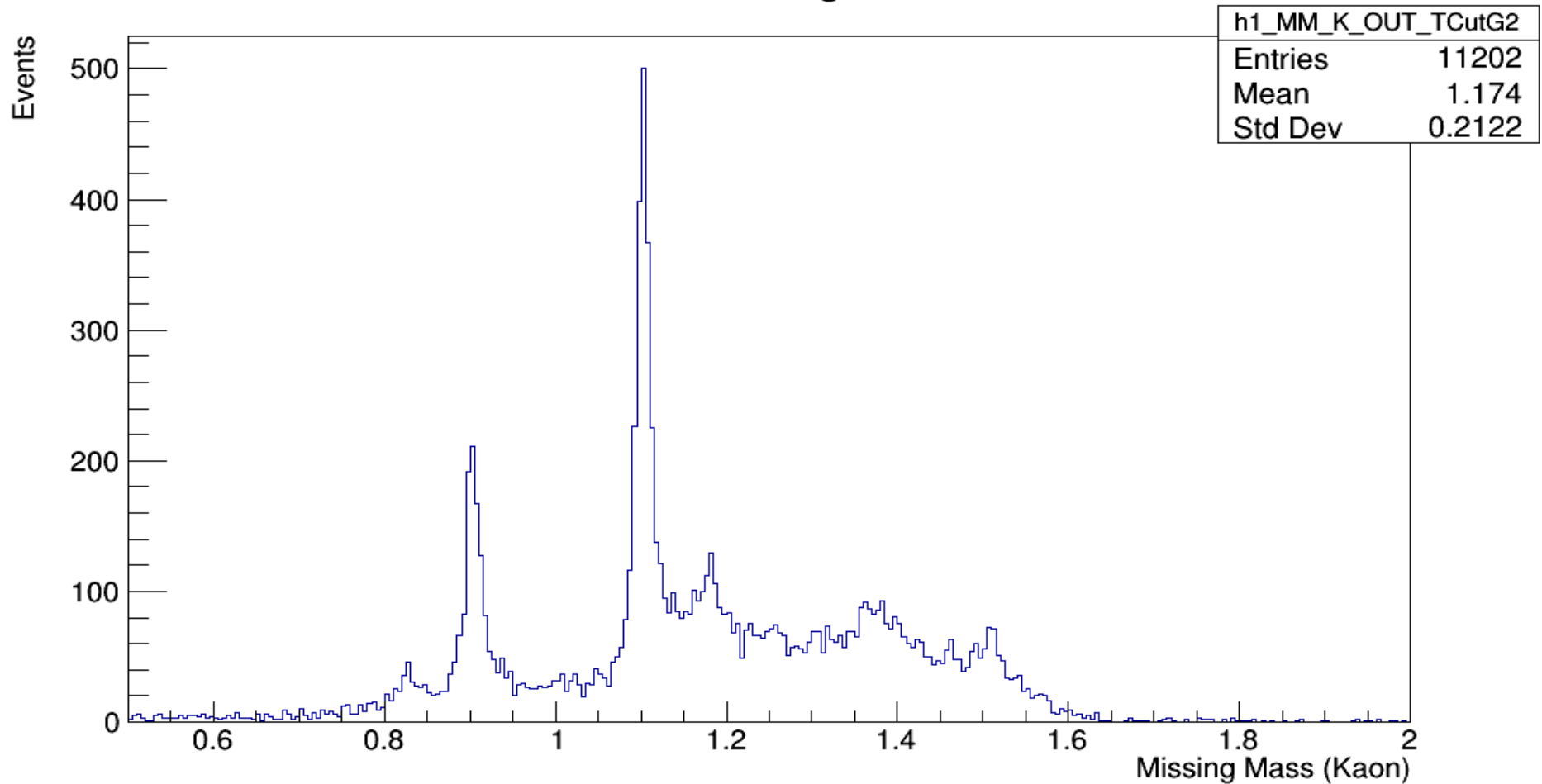
**Cuts used**

$P_{hgcer\_npeSum} < 1.5$

$P_{aero\_npeSum} > 1.0$

$P_{aero\_yAtCer} < 31$

**Kaon Missing Mass**



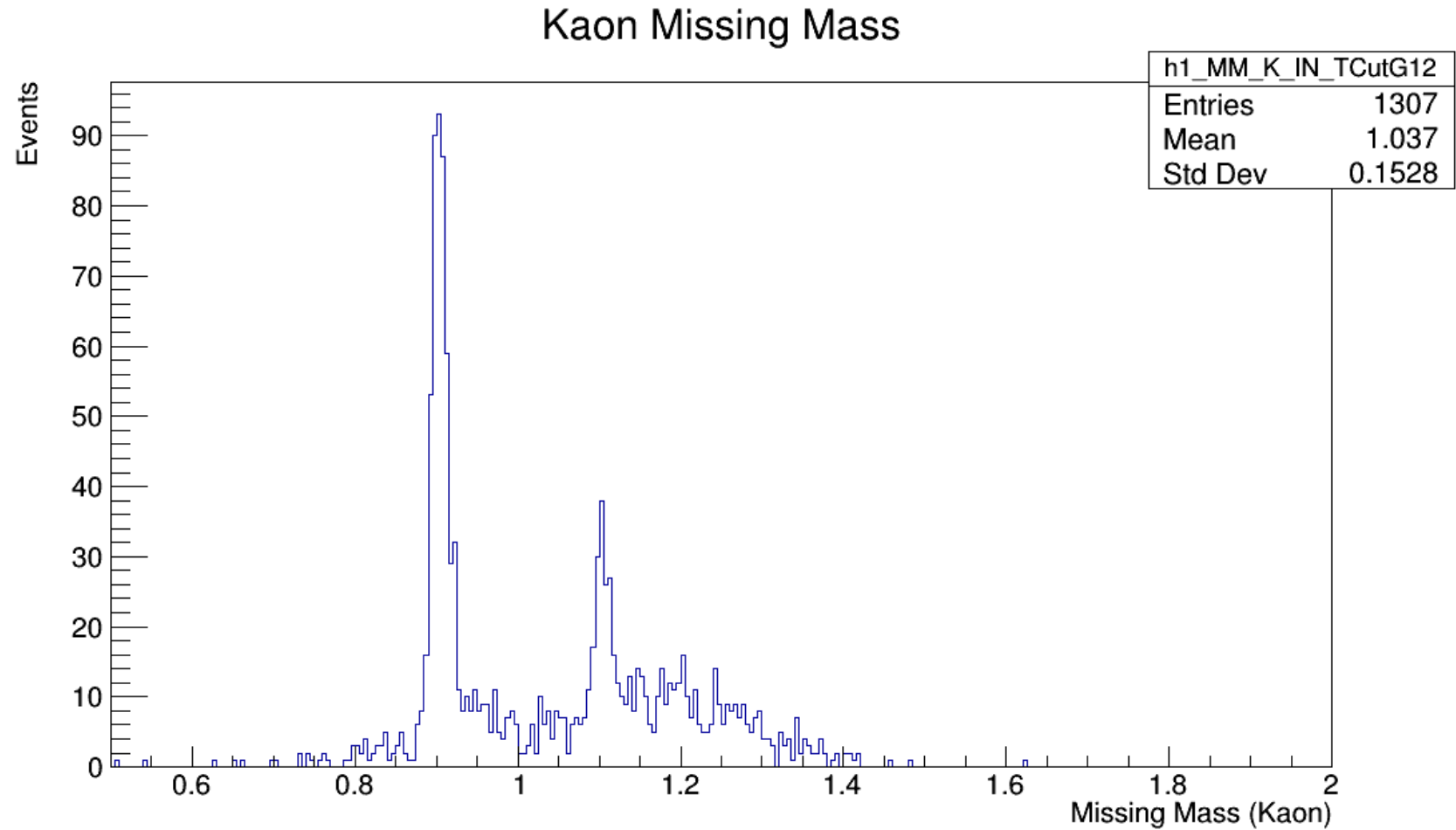
# Kaon missing mass b/w **First & Second Geometrical cuts.**

## Cuts used

$P_{hgcer\_npeSum} < 1.0$

$P_{aero\_npeSum} > 1.0$

$P_{aero\_yAtCer} < 31$





Kaon missing mass inside the **First Geometrical cut**.

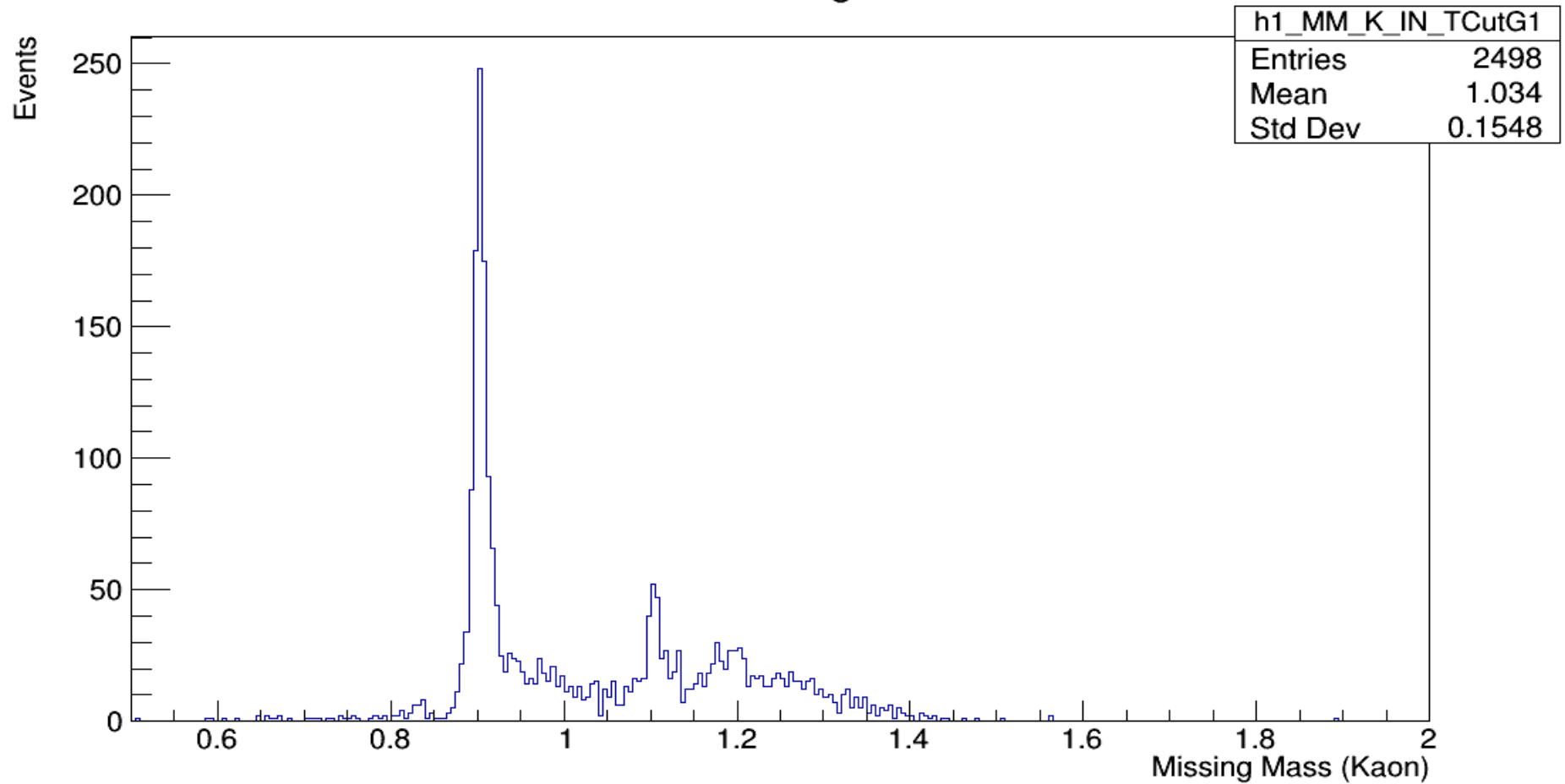
**Cuts used**

$P_{hgcer\_npeSum} < 1.0$

$P_{aero\_npeSum} > 1.0$

$P_{aero\_yAtCer} < 31$

Kaon Missing Mass



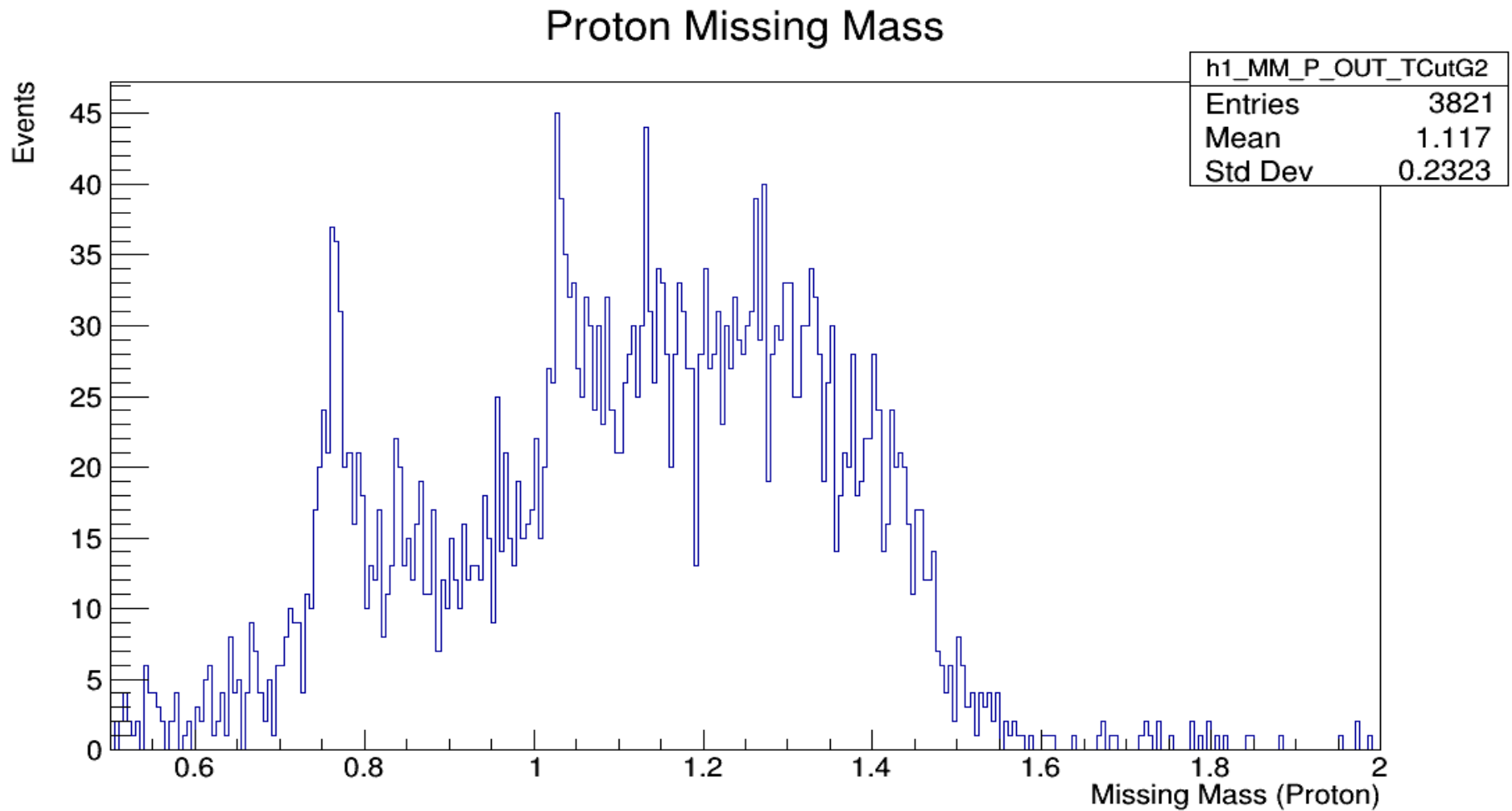
# Proton missing mass outside the **Second Geometrical cut**.

## Cuts used

$P_{hgcer\_npeSum} < 1.5$

$P_{aero\_npeSum} < 2.0$

$P_{aero\_yAtCer} < 31$



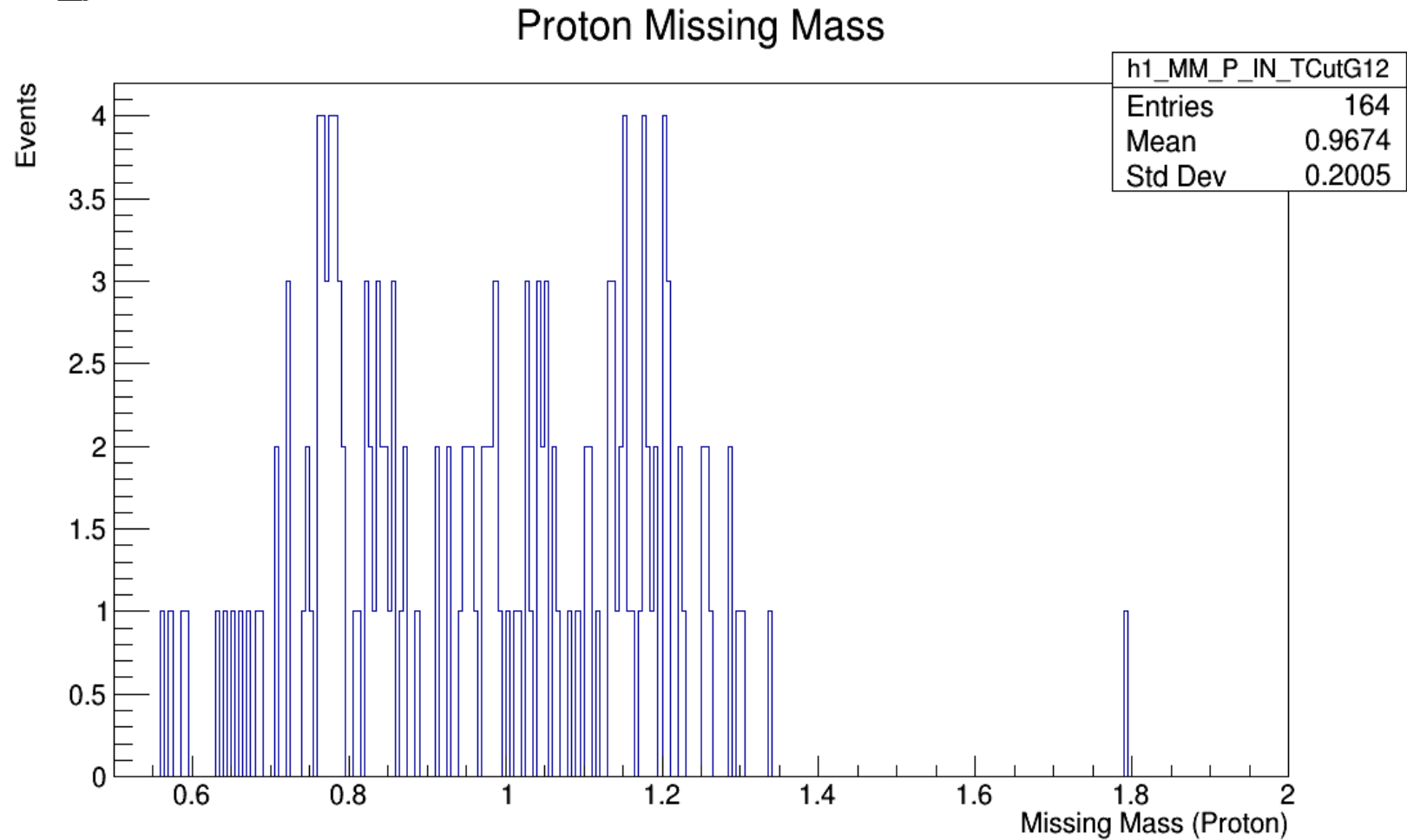
# Proton missing mass b/w **First & Second Geometrical cuts.**

## Cuts used

$P_{hgcer\_npeSum} < 1.5$

$P_{aero\_npeSum} < 2.0$

$P_{aero\_yAtCer} < 31$



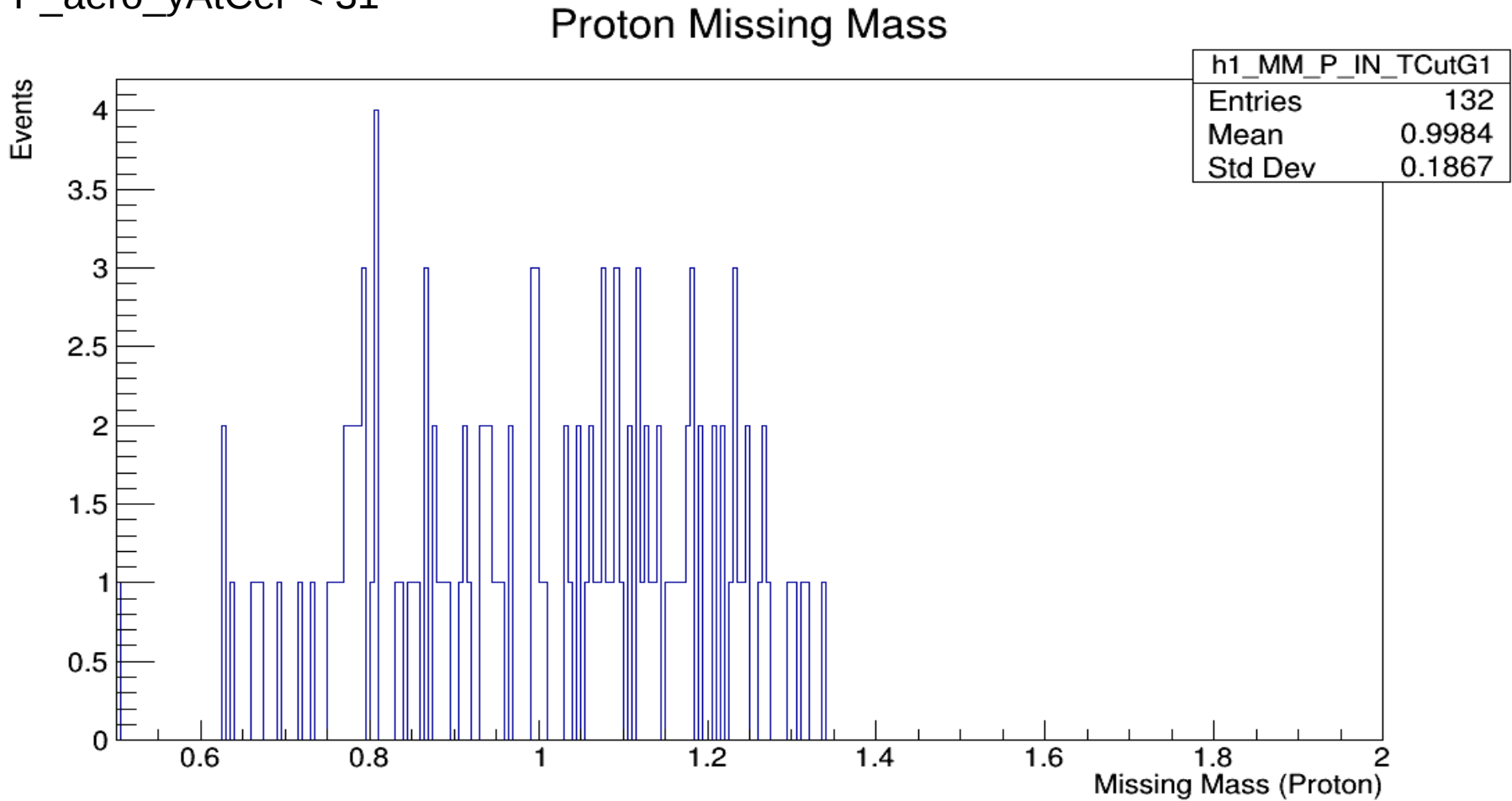
# Proton missing mass inside the **First Geometrical cut.**

## Cuts used

$P_{hgcer\_npeSum} < 1.5$

$P_{aero\_npeSum} < 1.0$

$P_{aero\_yAtCer} < 31$



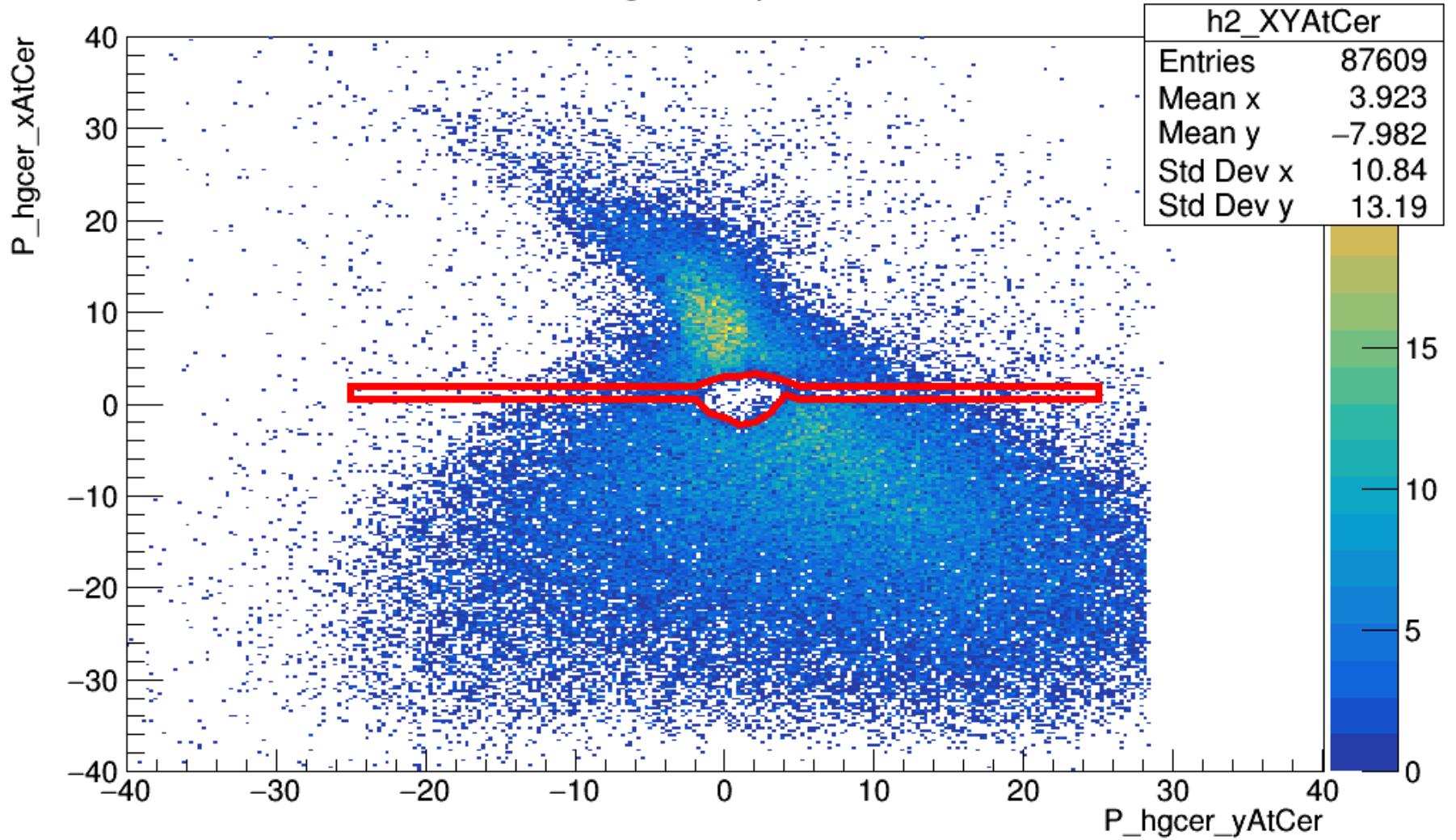
# Summary

- The study of the hole of HGC detector with the **Geometrical cuts** is showing the promising results.
- We are required to optimize the cuts to make the clean sample of particles in each region.
- I will have to calculate the efficiency for Pion, Kaon and Proton in each region separately.

# Back Up



HGC, P\_hgcer\_npeSum => 1.5



HGC, P\_hgcer\_npeSum => 5.0

