

Pion-LT/Kaon-LT Collaboration Meeting

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RF Cut Studies

- Cuts applied to determine the RF cut for physics setting “ $Q2 = 3.85$, $W = 2.02$, $t = 0.49$ (2 epsilons)”

HMS Cuts (Electrons)

$$-8 < H_gtr_dp < 8$$

$$-0.08 < H_gtr_th < 0.08$$

$$-0.045 < H_gtr_ph < 0.045$$

$$HMS_Cal_etottracknorm > 0.7$$

$$H_Cer_npeSum > 1.5$$

$$H_hod_goodstarttime == 1.0$$

SHMS Cuts (Pions)

$$-10 < P_gtr_dp < 20$$

$$-0.06 < P_gtr_th < 0.06$$

$$-0.04 < P_gtr_ph < 0.04$$

$$Ctime_epCoinTime_ROC1 \text{ (Prompt \& Rand)}$$

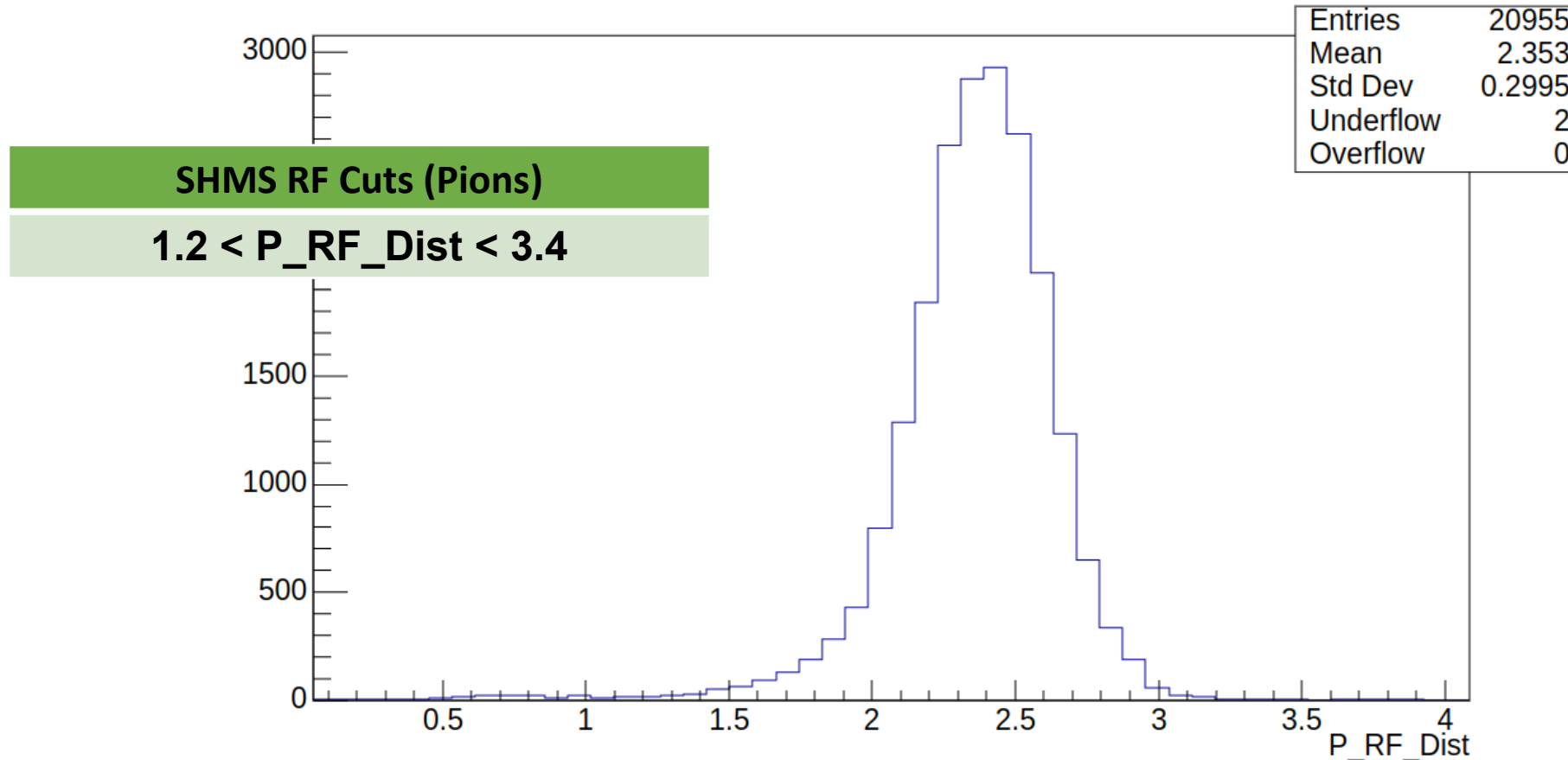
$$P_aero_npeSum > 2.5$$

$$P_hod_goodstarttime == 1.0$$

RF Cut Studies

- Finalized RF cut for physics setting “ $Q2 = 3.85$, $W = 2.02$, $t = 0.49$ (2 epsilons)”

drawing branch P_RF_Dist from Cut_Pion_Events_Prompt



RF Efficiency Studies

- Cuts applied for RF efficiency Calculation for physics setting “Q2 = 3.85, W = 2.02, t = 0.41 (2 epsilons)”**

HMS Cuts (Electrons)

$$-8 < H_gtr_dp < 8$$

$$-0.08 < H_gtr_th < 0.08$$

$$-0.045 < H_gtr_ph < 0.045$$

$$HMS_Cal_etottracknorm > 0.7$$

$$H_Cer_npeSum > 1.5$$

$$H_hod_goodstarttime == 1.0$$

SHMS Cuts (Pions)

$$-10 < P_gtr_dp < 20$$

$$-0.06 < P_gtr_th < 0.06$$

$$-0.04 < P_gtr_ph < 0.04$$

$$Ctime_epCoinTime_ROC1 \text{ (Prompt \& Rand)}$$

$$P_hgcer_npesum > 1.5$$

$$P_aero_npeSum > 2.5$$

$$P_hod_goodstarttime == 1.0$$

$$1.2 < P_RF_Dist < 3.4$$

RF Efficiency Studies

RF Efficiency Calculation:

$$\epsilon_{RF} = \frac{N_{\text{Did}}}{N_{\text{Should}}}$$

Where

N_{Did} = Number of Events with Accept cut +
Detector cut + CoinTime cut + Rf cut

N_{Should} = Number of Events with Accept cut +
Detector cut + CoinTime cut

$$\delta\epsilon_{RF} = \sqrt{\frac{(N_{\text{Did}} \times N_{\text{Should}}) - (N_{\text{Did}})^2}{(N_{\text{Should}})^3}}$$

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##### RF Efficiency Calculation #####  
RF Ndid: 618544.00  
RF Nshould: 619851.00  
RF Efficiency: 0.99789 +/- 0.00006  
Wrote RF efficiency to /group/c-pionlt/USERS/junaidd/rod_RF_efficiency.pdf  
Info in <TCanvas::Print>: pdf file /group/c-pionlt/USERS/junaidd/rod_RF_efficiency.pdf has been created  
Processing Complete
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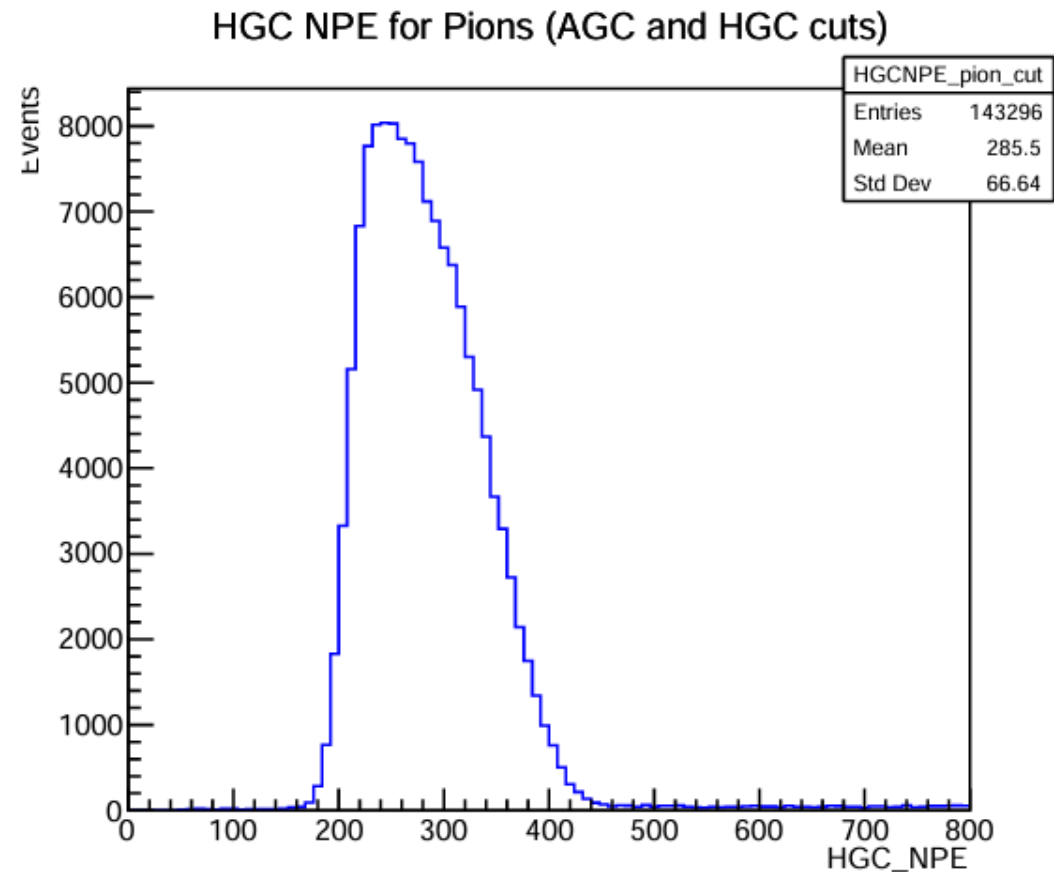
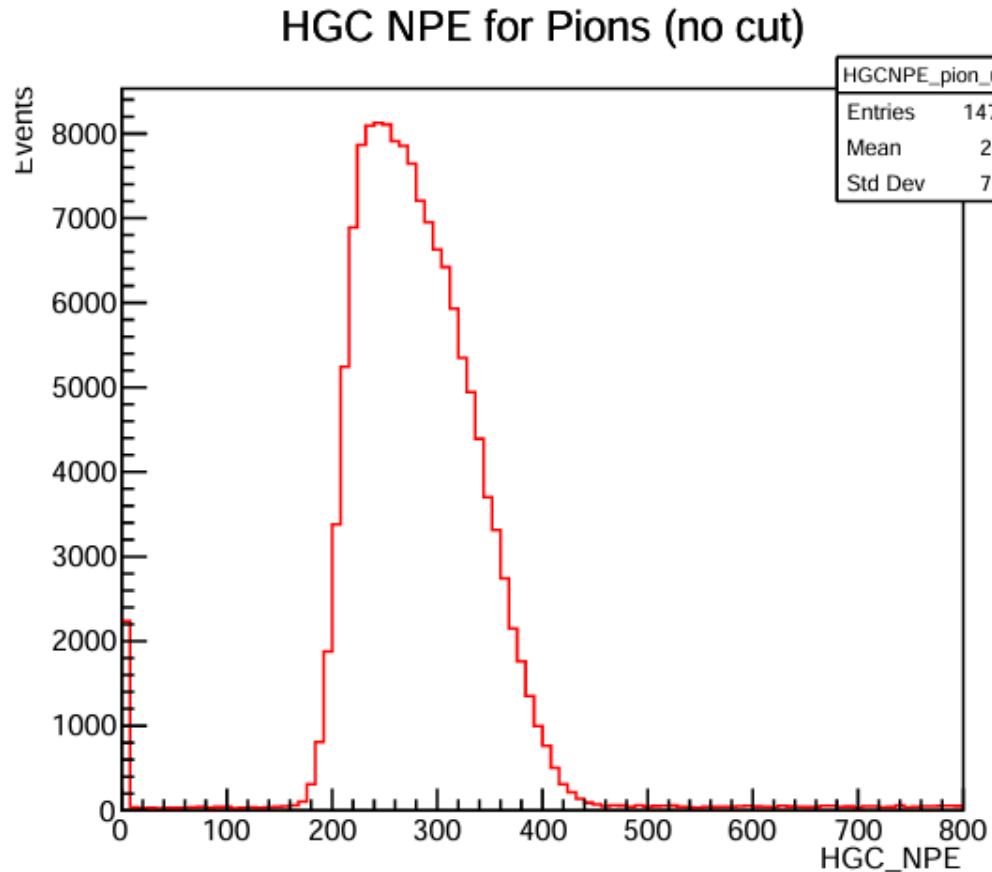
Pion Absorption Correction

- **Calculated pion absorption correction for physics setting “Q2 = 3.85, W = 2.02, t = 0.49”**
- **NGC is ON.**
- **Aerogel tray set to 11 (n=1.011)**
- **Set SHMS momentum to 3.493 GeV (Q2 = 3.85, W = 2.02, t = 0.49)**
- **Set particle type to pi+**
- **Ran for 150000 events.**
- **Calculated particle absorption factor:**
Absorption Factor (%) = ((Total events – event passed ¾ trigger) / Total events) * 100

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Total events: 150000
Missed 3/4 triggers: 2572 or 1.71%
Total stopped tracks: 9951 or 6.63%
3/4 was triggered by: 1596 p+, 143186 pi+, 791 K+, 110 e+, and 1745 contaminated tracks
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Absorption correction in percentage (by incident particle type):
Physics Setting: Q3p85 W2p02 t0p49 at Central Momentum: 3.493 GeV
pi+ Absorption: 4.543 +/- 0.006%
pi+ Absorption Correction: 0.95457 +/- 0.00006
=====
Absorption corrections saved to Q3p85_W2p02_t0p49_pion_absorption_corrections_3.493GeV.csv
Info in <TCanvas::Print>: pdf file Pion_Absorption_Corr_NPE_Distributions_Q3p85_W2p02_t0p49_3.493GeV.pdf has been created
Process completed successfully.
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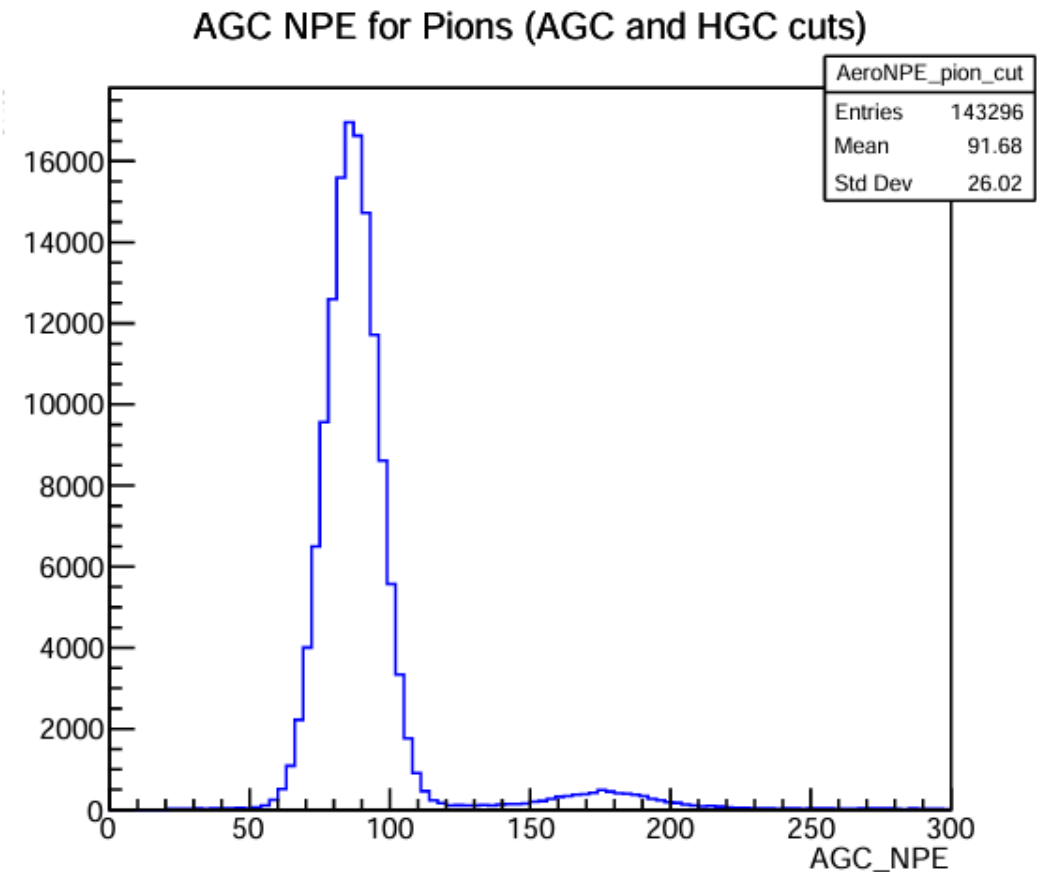
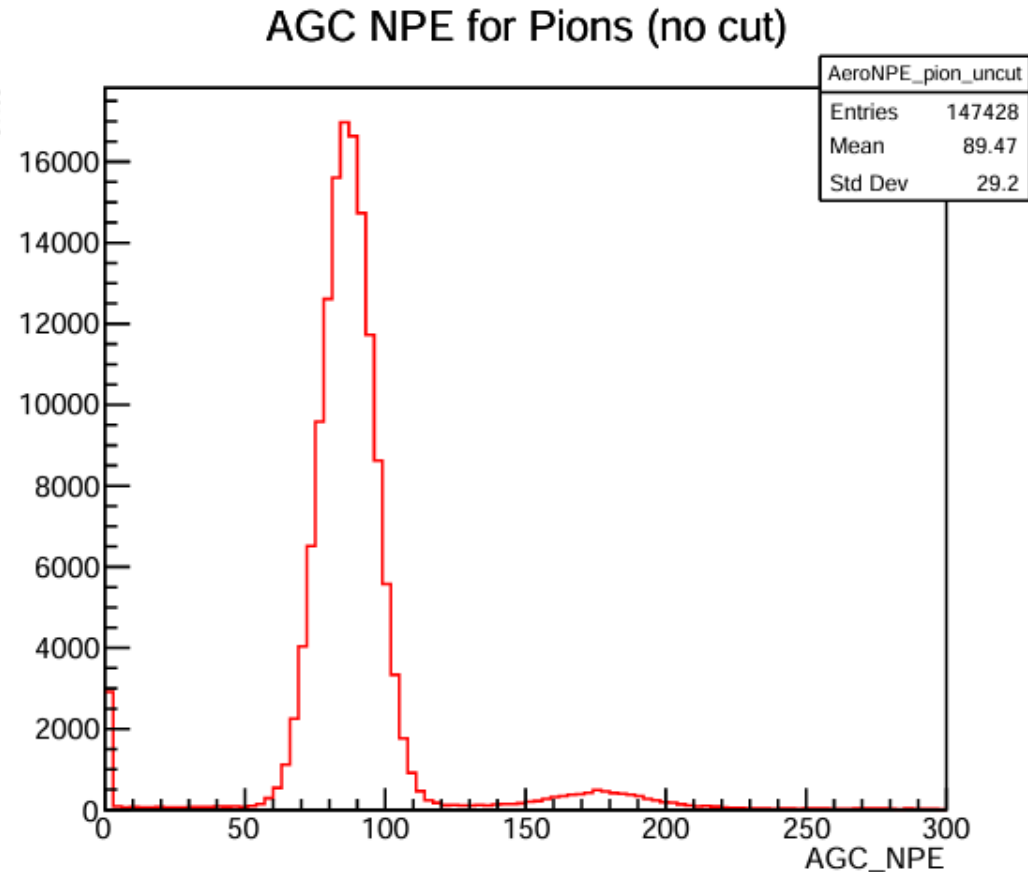
Pion Absorption Correction

❑ Applied cuts: $\text{AGC_NPE} > 20$ and $\text{HGC_NPE} > 50$



Pion Absorption Correction

❑ Applied cuts: $\text{AGC_NPE} > 20$ and $\text{HGC_NPE} > 50$



RF Efficiency Studies

- ❑ Determined RF cut and efficiency for physics setting: “ $Q2 = 3.85$, $W = 2.02$, $t = 0.49$ (2 epsilons)”
- ❑ Calculated pion absorption correction for physics setting: “ $Q2 = 3.85$, $W = 2.02$, $t = 0.49$ (2 epsilons)”
- ❑ In progress:
 - Setting SIMC for physics setting “ $Q2 = 3.85$, $W = 2.02$, $t = 0.49$ (2 epsilons)”
 - Working on missing mass cut and offset study for physics setting “ $Q2 = 3.85$, $W = 2.02$, $t = 0.49$ (2 epsilons)”