

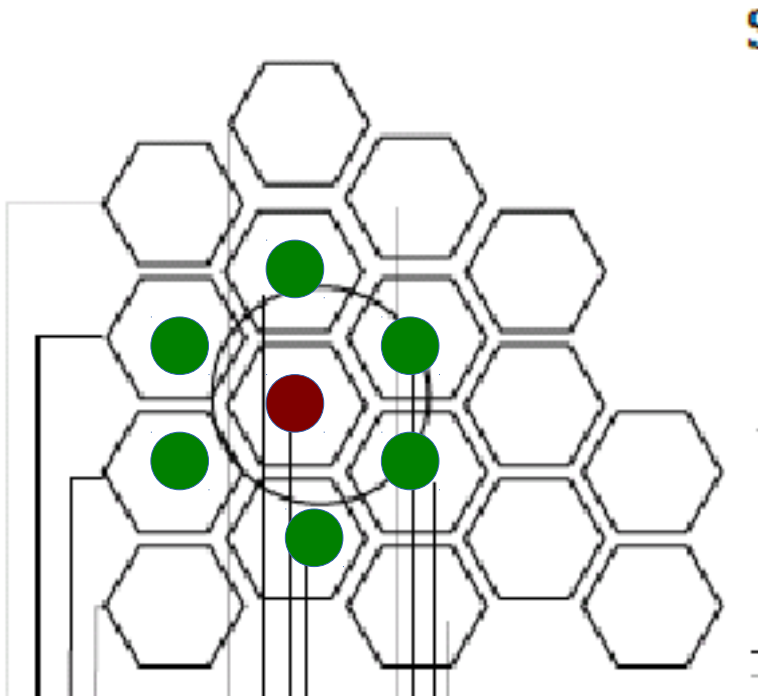
# Simulation Summary

- Using remoll simulation
- Baffles : Lead babar\_more1
- Wiser DIS and pions inputs
- Full EM calorimeter included

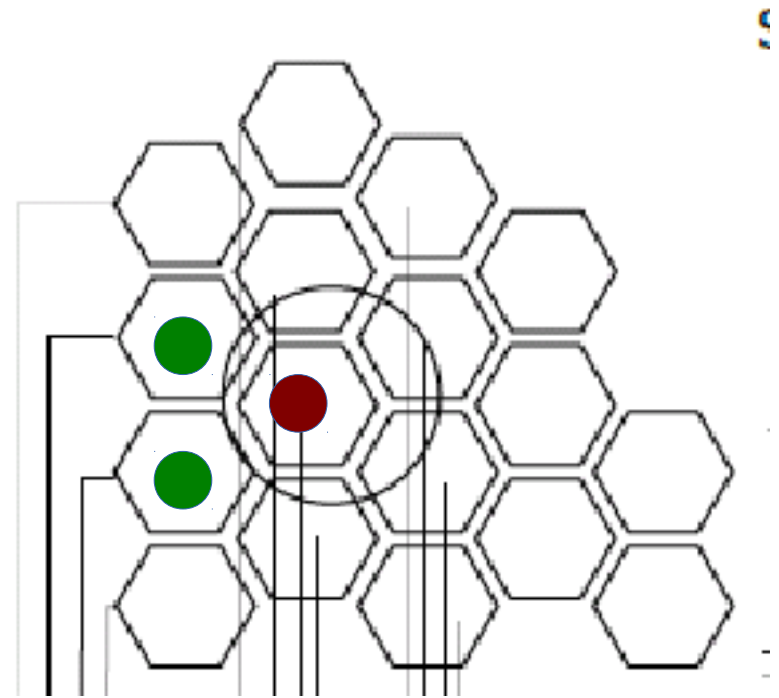
# Analysis Summary

- For DIS  $e$  , pions ( $\pm$ ) simulations
  - Summed photons produced by the ecal block scintillators for two trigger algorithms
    - 6+1 sum and 2+1 sum
- Computed trigger rates for two schemes using full ECAL

# ECAL Summing Schemes

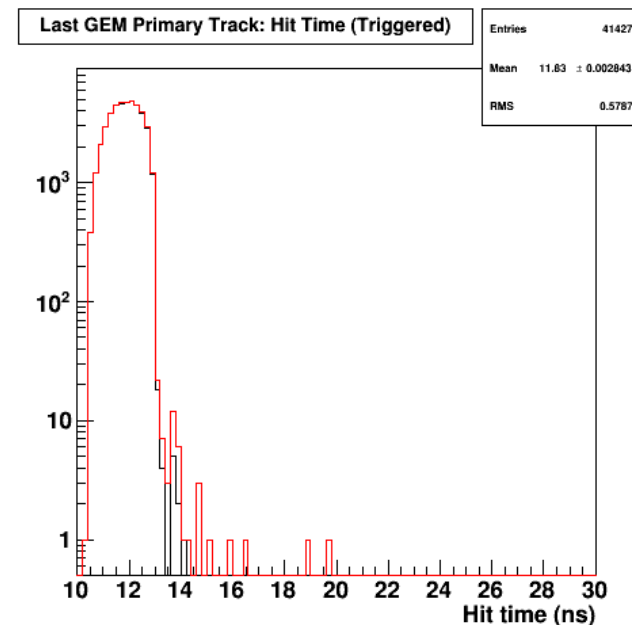
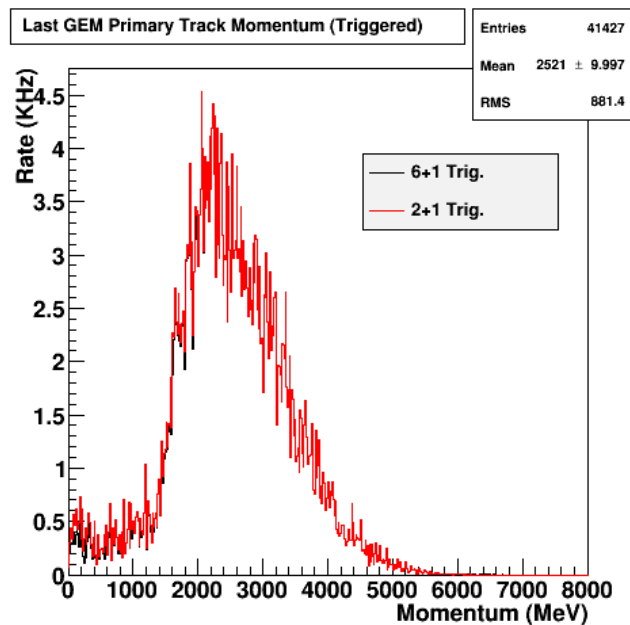
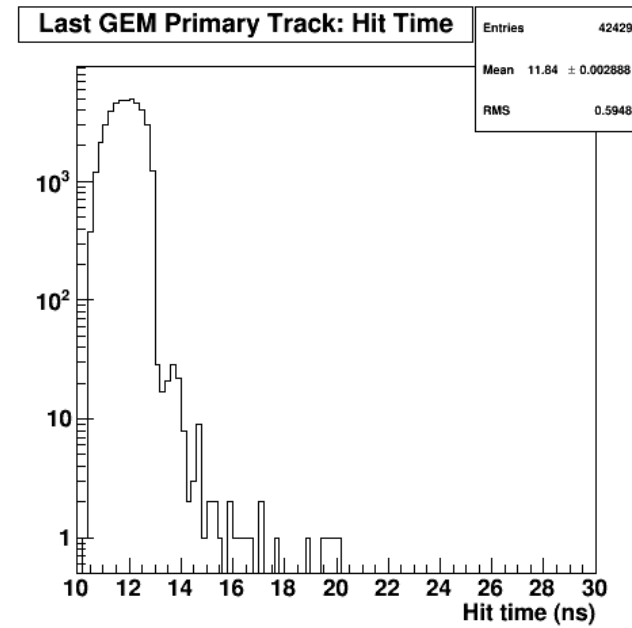
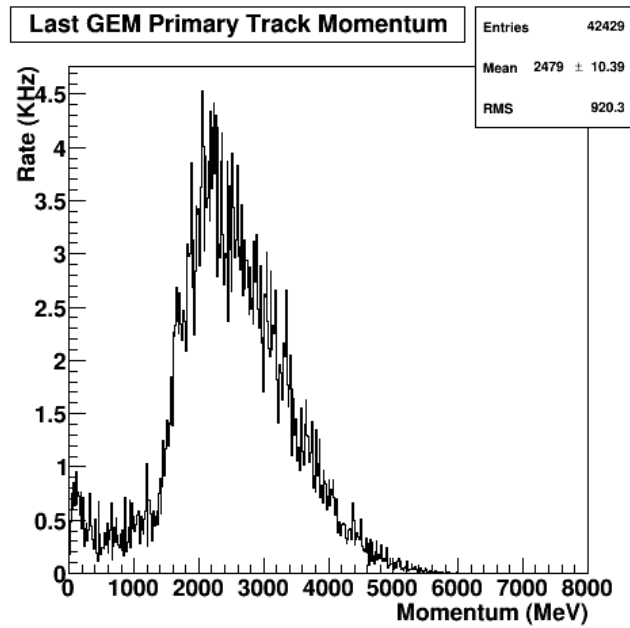


**6 + 1** Summing Scheme

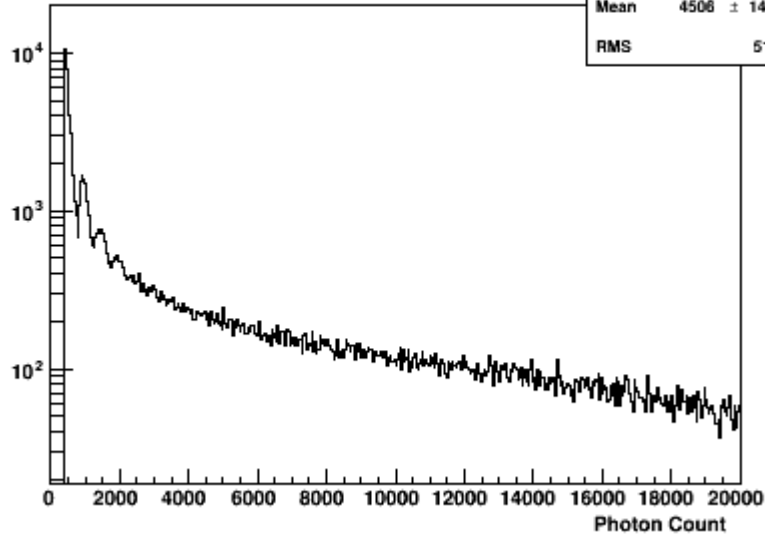


**2 + 1** Summing Scheme

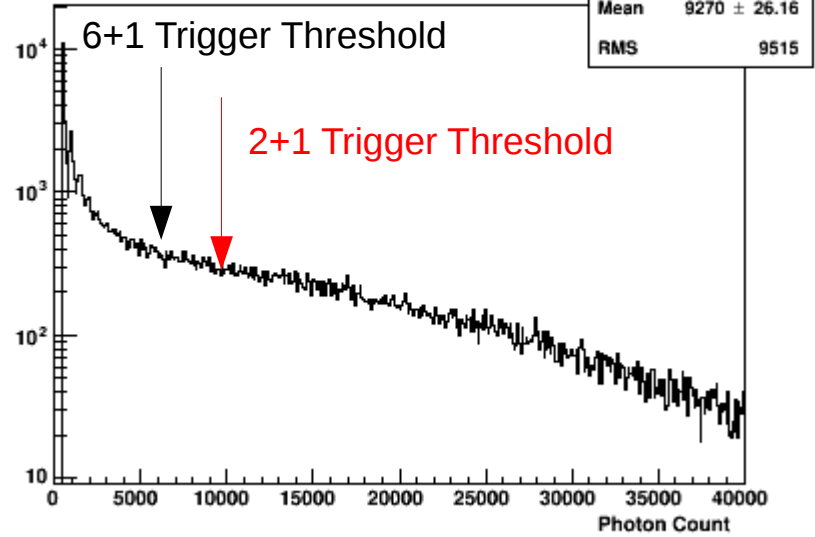
# Rates and Timing at the GEM



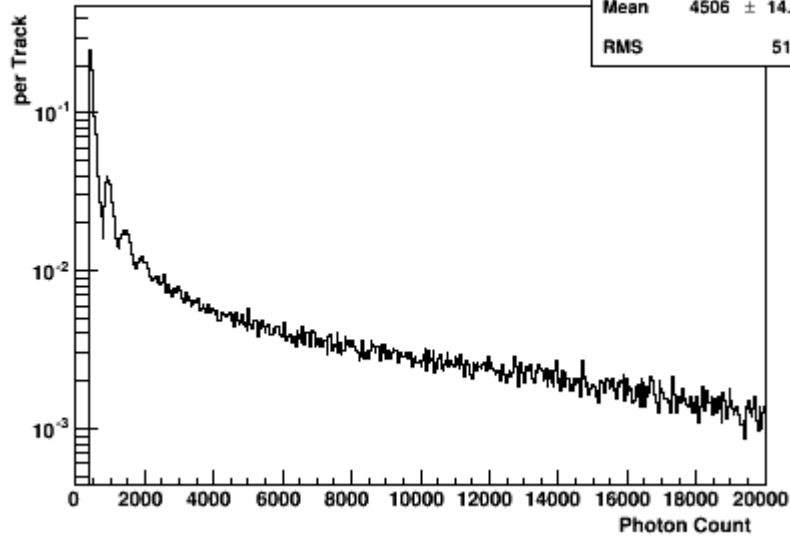
Photon Count per Block from All the Tracks



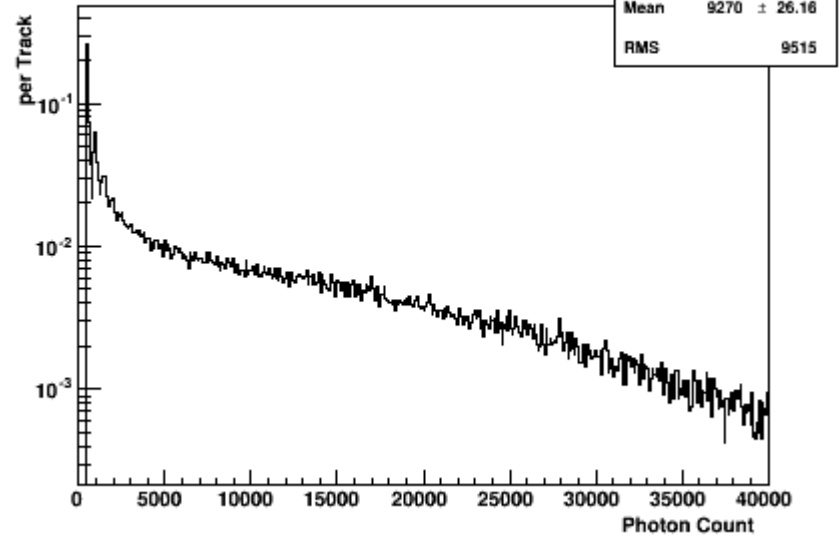
6+1 Blocks Photon Count from All the Tracks



Photon Count Normalized by Total Tracks

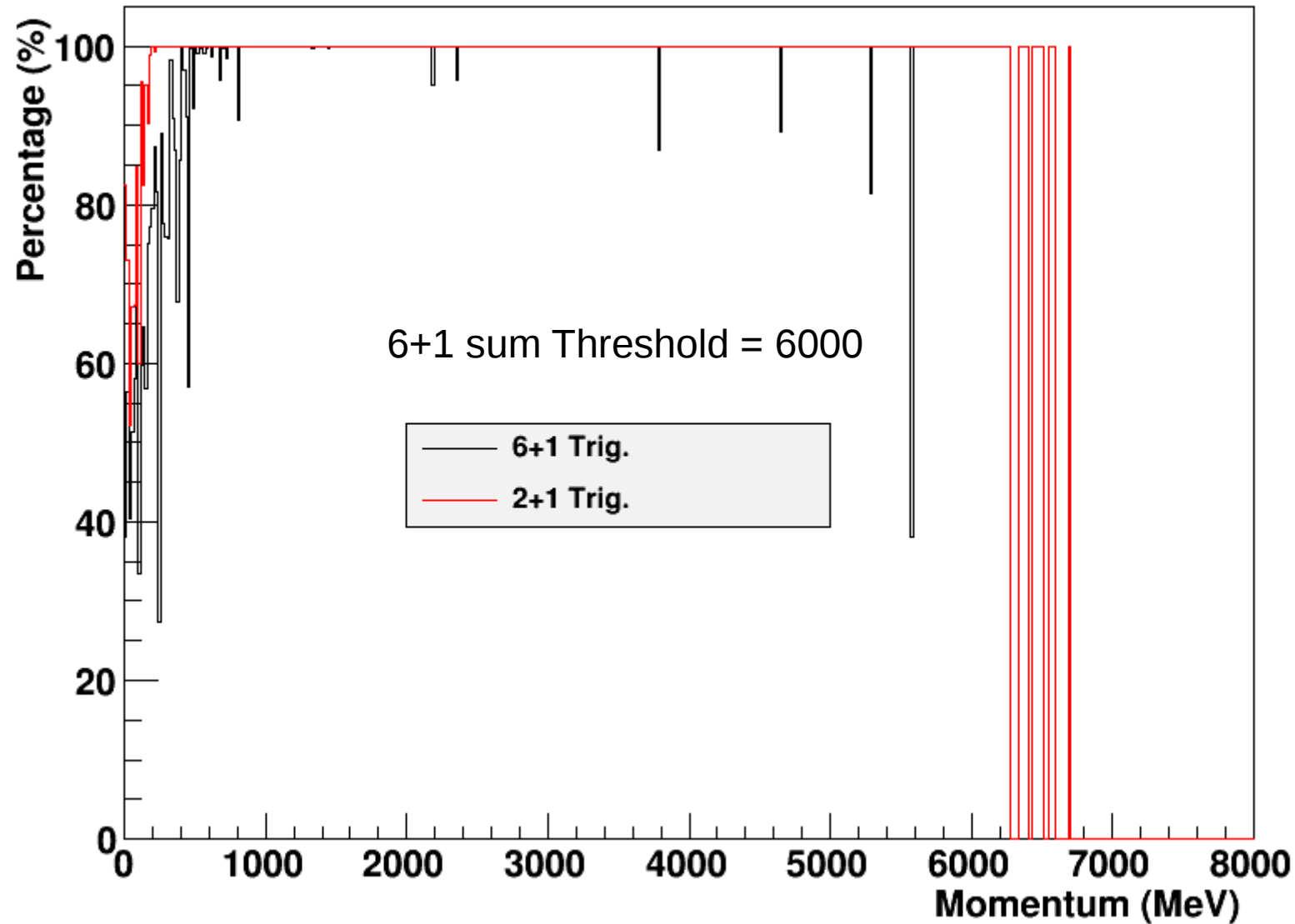


6+1 Block Photon Count Normalized by Total Tracks



# DIS Electrons : 6 + 1 Sum

Trigger Efficiency (%)



- Total DIS Rate = 442.9 kHz

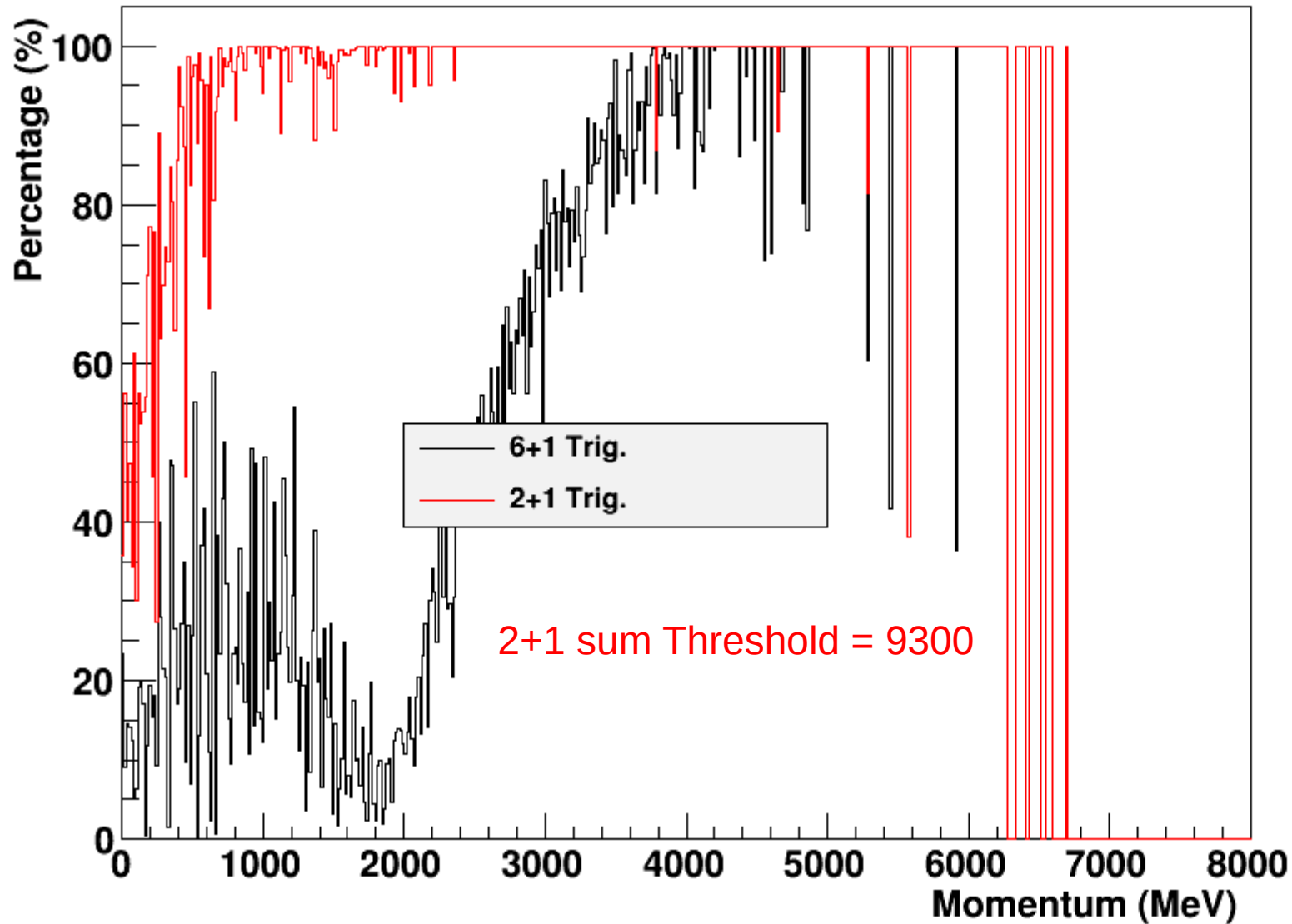
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- DIS Trigger Rate = 437.5 kHz (6+1 sum)

# DIS Electrons : 2 + 1 Sum

Trigger Efficiency (%)



- Total DIS Rate = 442.897 kHz

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- DIS Trigger Rate = 434.161 kHz (2+1 sum)

# Rate Summary

## Primary Pions Only

	Total Rate	6 + 1 Trigger Rate	2 + 1 Trigger Rate
e- (DIS)	442.9 kHz	437.5 kHz	434.2 kHz
$\pi^-$	473.6 MHz	93.5 MHz	32.5 MHz
$\pi^+$	263.4 MHz	14.6 MHz	1.1 MHz

## Primary and Secondary Pions

	Total Rate	6 + 1 Trigger Rate	2 + 1 Trigger Rate
e- (DIS)	442.9 kHz	437.5 kHz	434.2 kHz
$\pi^-$	947.2 MHz	186.9 MHz	64.9 MHz
$\pi^+$	526.8 MHz	29.2 MHz	2.2 MHz



# Current Issues to Resolve

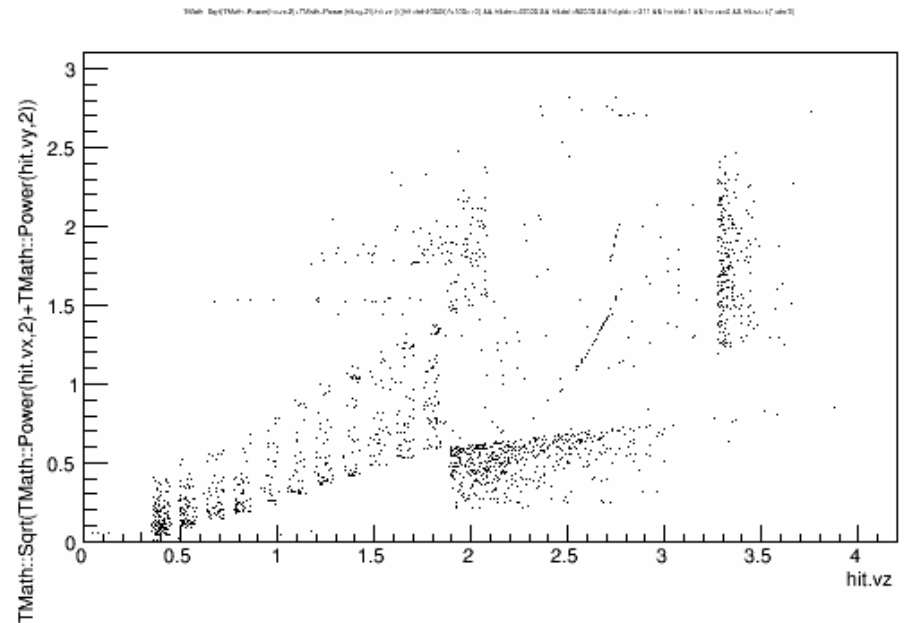
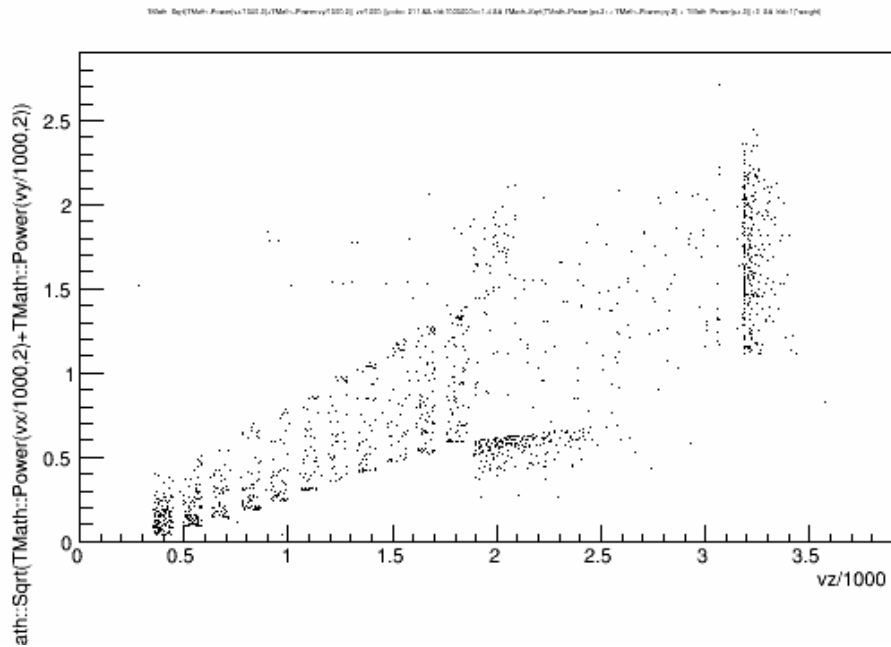
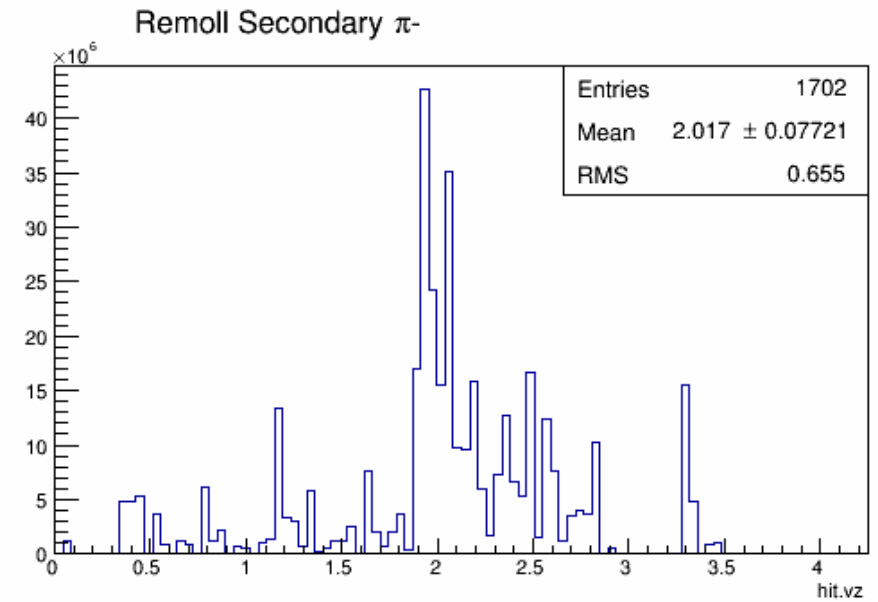
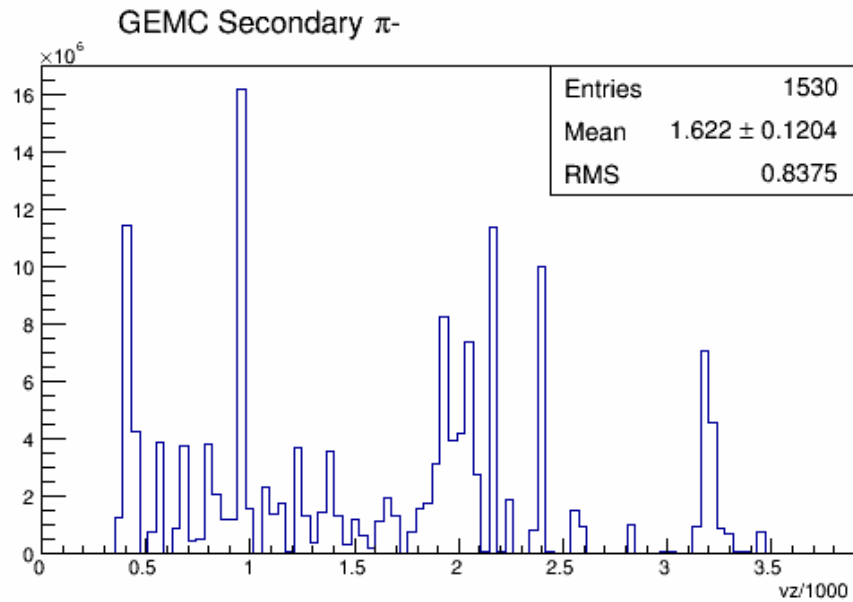
# Secondary Pion Rates Remoll vs. GEMC

Sec. $\pi^-$ Rate	Up-to Baffles (MHz)	After Baffles (MHz)	Total (MHz)
GEMC	84.7	70.2	154.9
Remoll	87.9	290.7	378.6

Sec. $\pi^+$ Rate	Up-to Baffles (MHz)	After Baffles (MHz)	Total (MHz)
GEMC	52.1	34.2	86.3
Remoll	56.1	166.3	222.4

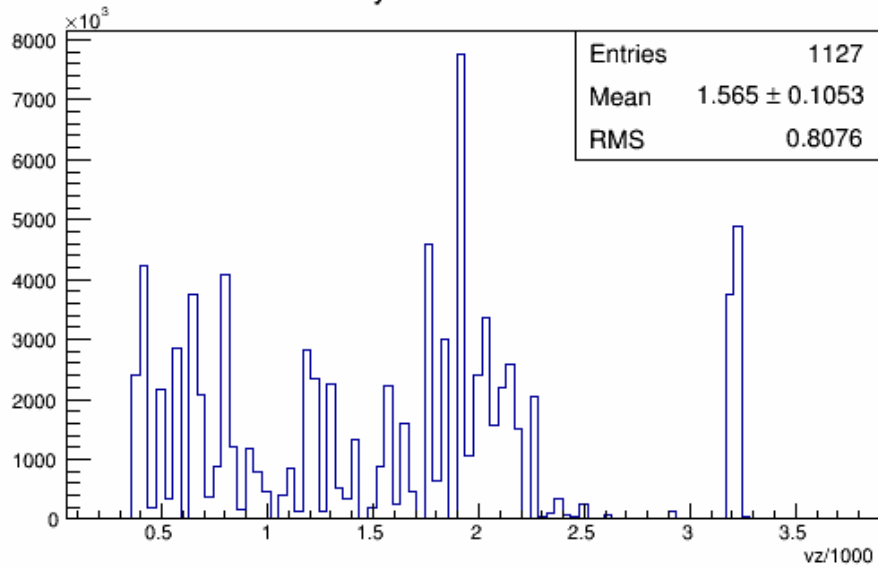
Looking at how cerenkov and ecal implemented in GEMC and Remoll to understand this.

# Secondary Pion Rates Remoll vs. GEMC

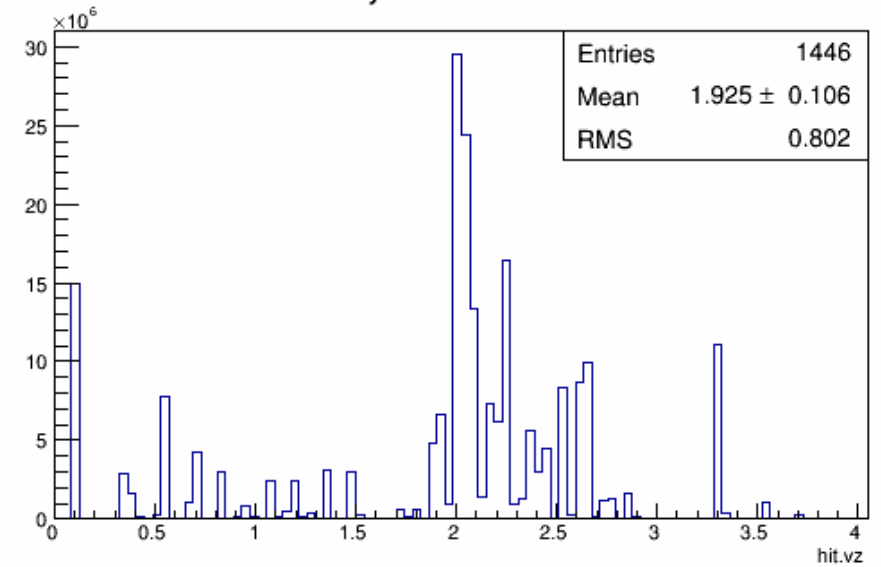


# Secondary Pion Rates Remoll vs. GEMC

GEMC Secondary  $\pi^+$

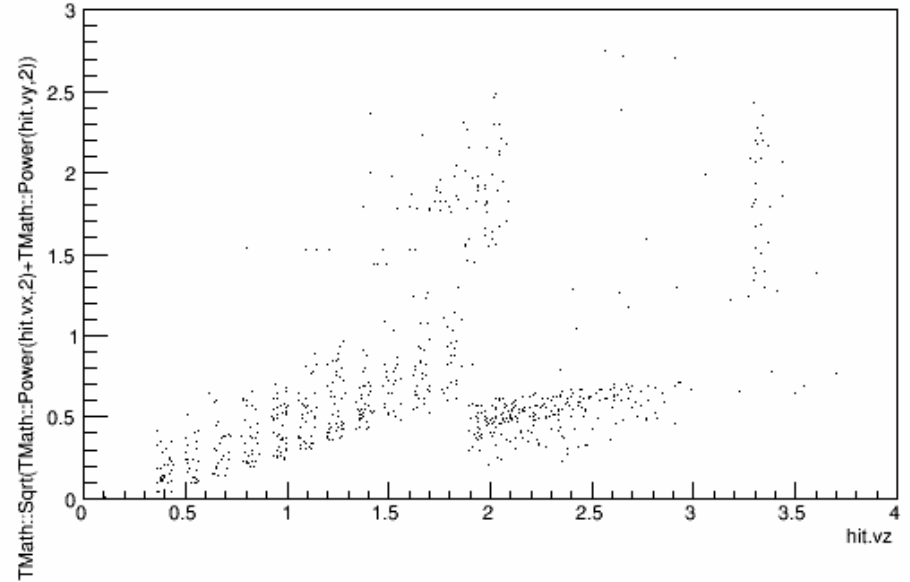
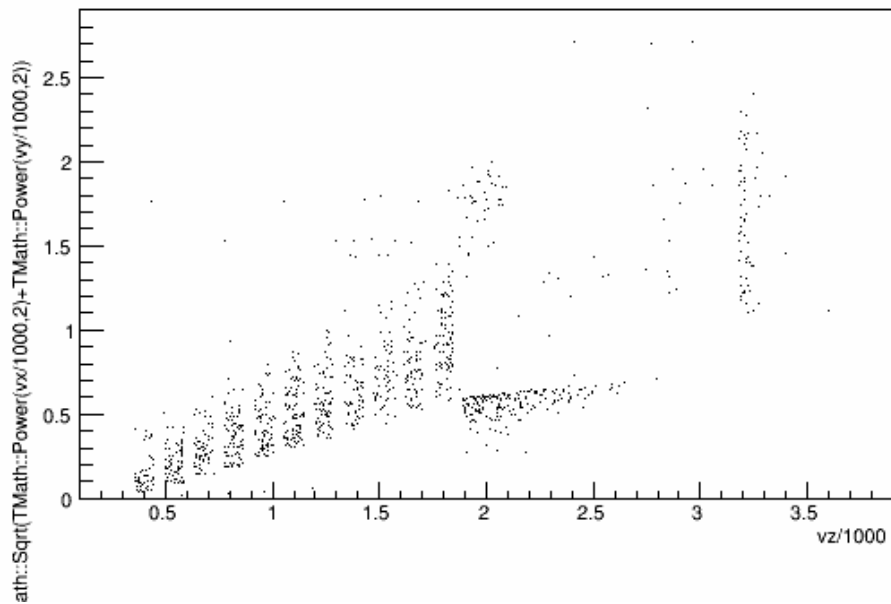


Remoll Secondary  $\pi^+$



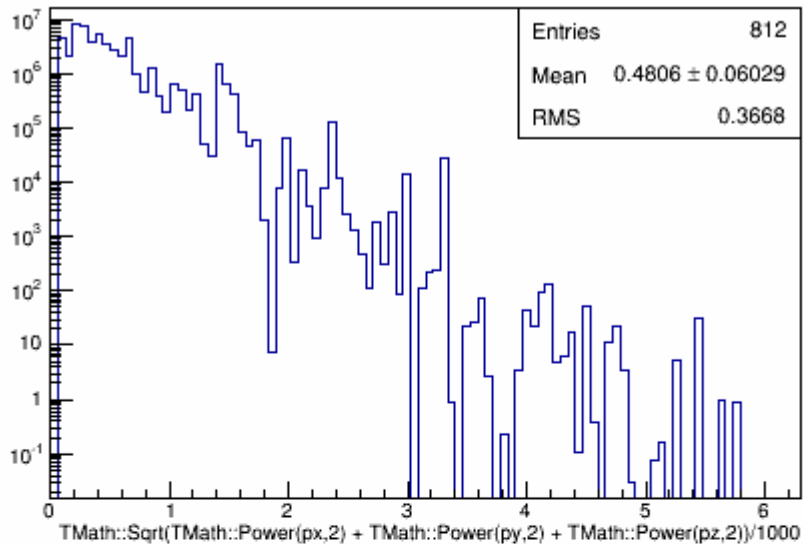
Total SpT(Math::Power(vx/1000,2)+TMath::Power(vy/1000,2)) < 1.00 (pilot1.88 v0702020) v1.88 TMath::Sqrt(Math::Power(vx,2) + TMath::Power(vy,2)) < 0.85 (v0702020)

Total SpT(Math::Power(hit.vx,2)+TMath::Power(hit.vy,2)) < 1.00 (v0702020) v1.925 TMath::Sqrt(Math::Power(hit.vx,2) + TMath::Power(hit.vy,2)) < 0.802 (v0702020)

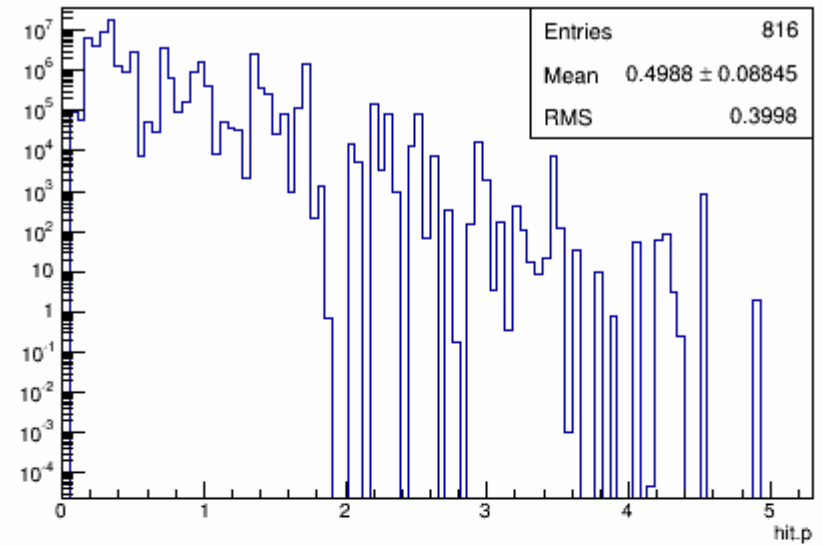


# Secondary Pion Rates Remoll vs. GEMC

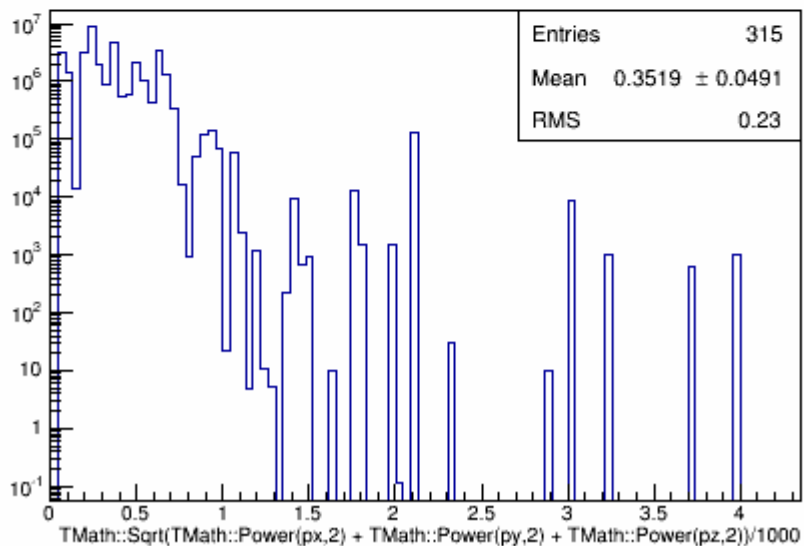
GEMC Secondary  $\pi^+$  Momentum From Baffles



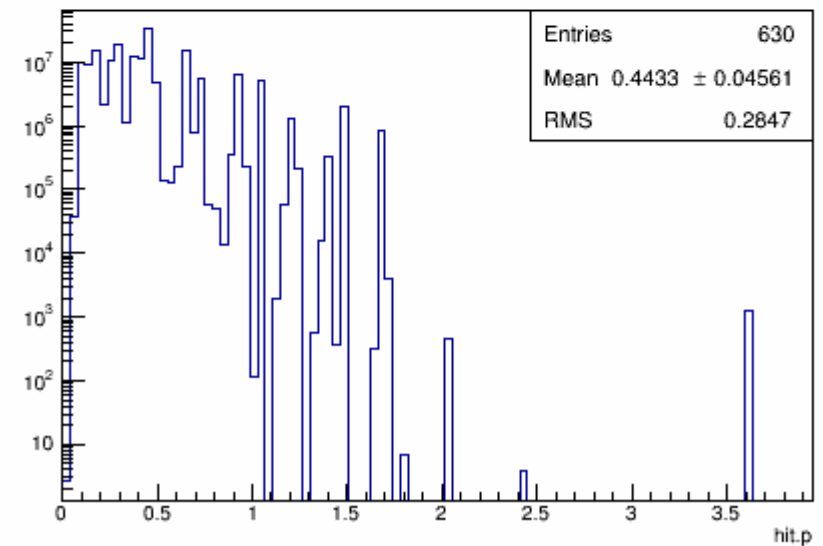
Remoll Secondary  $\pi^+$  Momentum From Baffles



GEMC Secondary  $\pi^+$  Momentum After Baffles

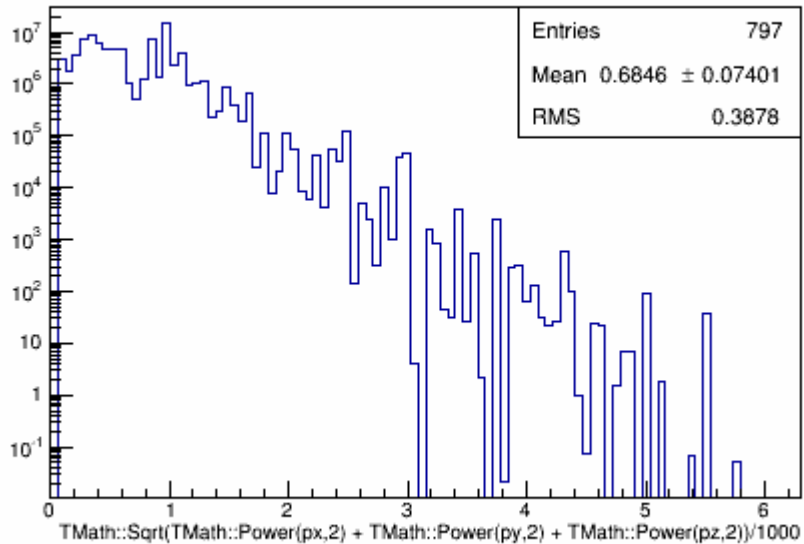


Remoll Secondary  $\pi^+$  Momentum After Baffles

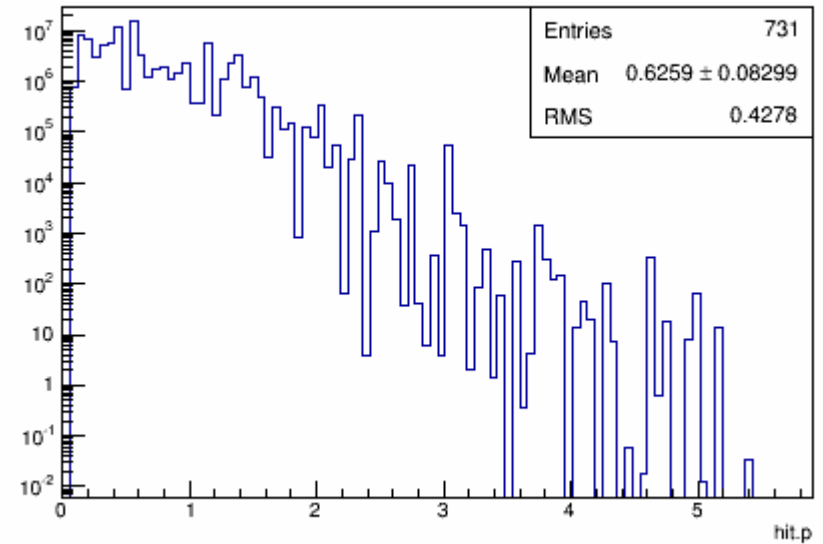


# Secondary Pion Rates Remoll vs. GEMC

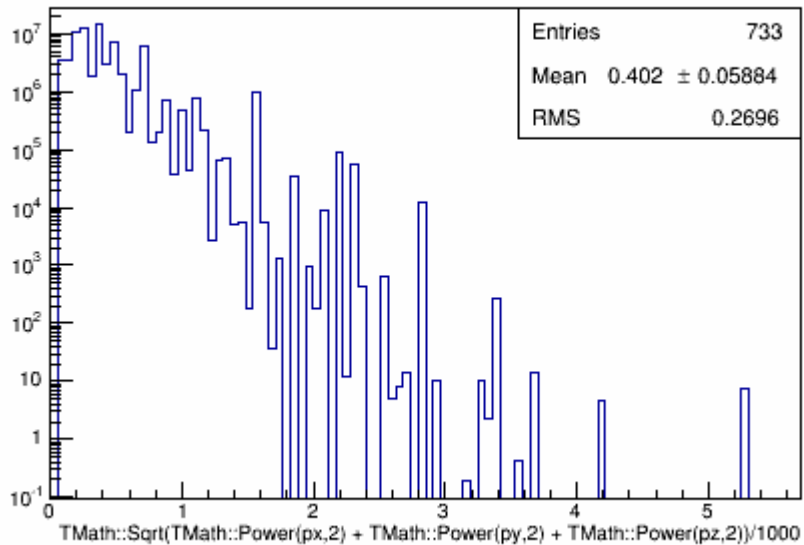
GEMC Secondary  $\pi$ - Momentum From Baffles



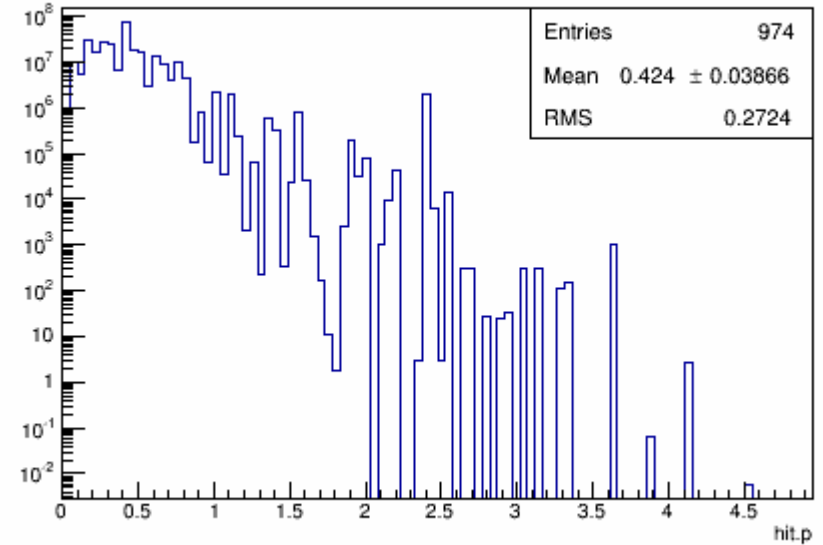
Remoll Secondary  $\pi$ - Momentum From Baffles



GEMC Secondary  $\pi$ - Momentum After Baffles



Remoll Secondary  $\pi$ - Momentum After Baffles

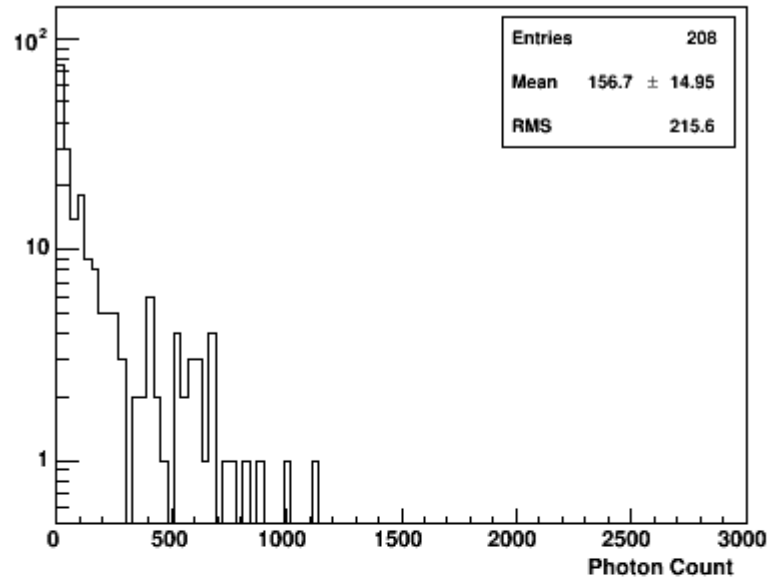


# Rest of the Plots

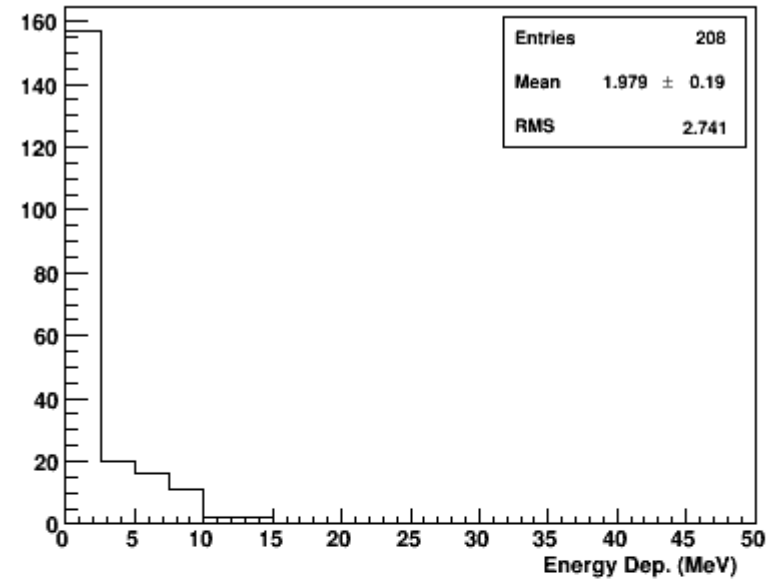
# DIS-e Single Event

Energy deposition for a single event with Pb baffles

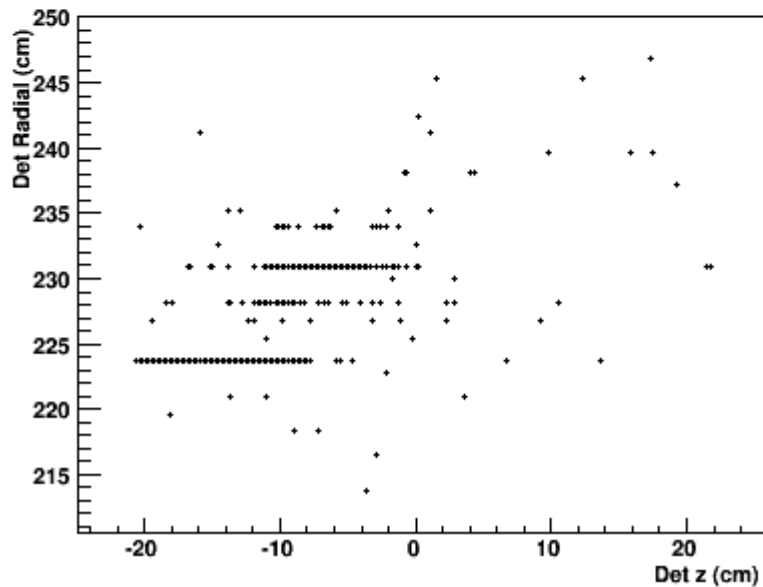
Generated Photon on Scint. from Single Primary DIS-e Track



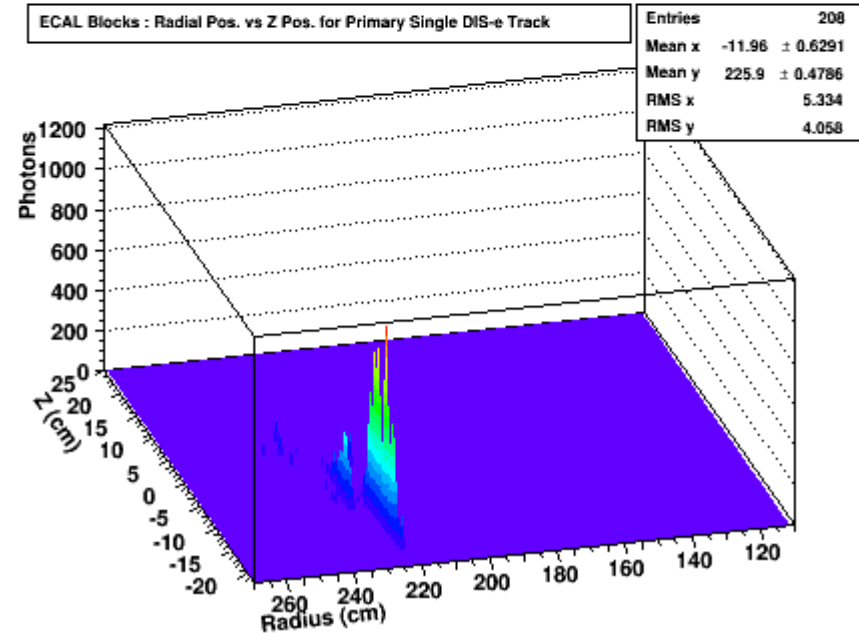
Energy Deposited on Scint. from Single Primary DIS-e Track



ECAL Blocks : Radial Pos. vs Z Pos. for Primary Single DIS-e Track



ECAL Blocks : Radial Pos. vs Z Pos. for Primary Single DIS-e Track

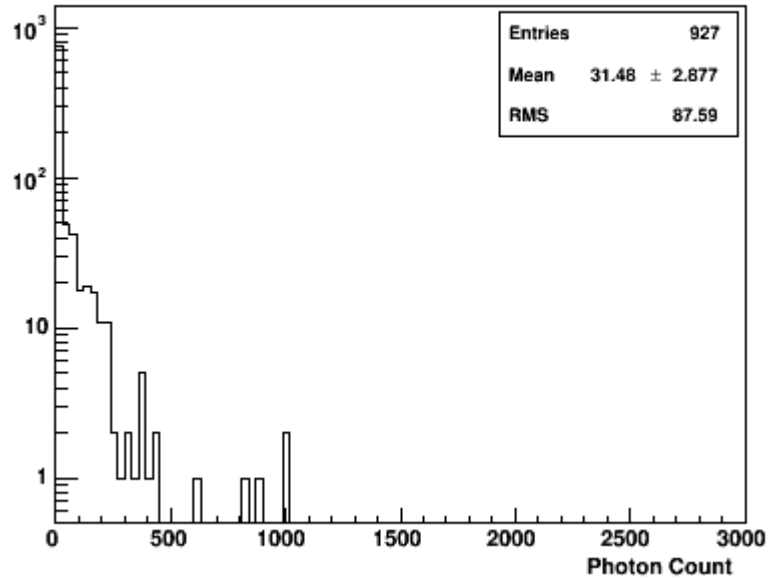




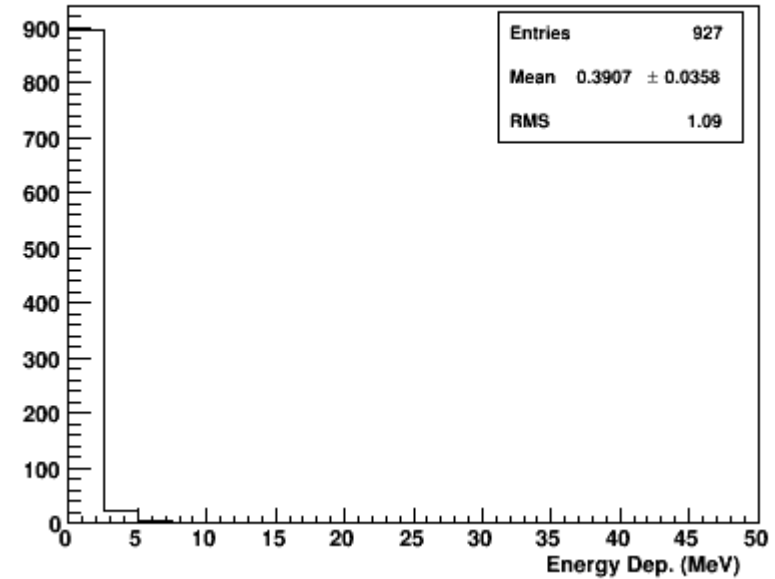
# $\pi^-$ Single Event

## Energy deposition for a single event with Pb baffles

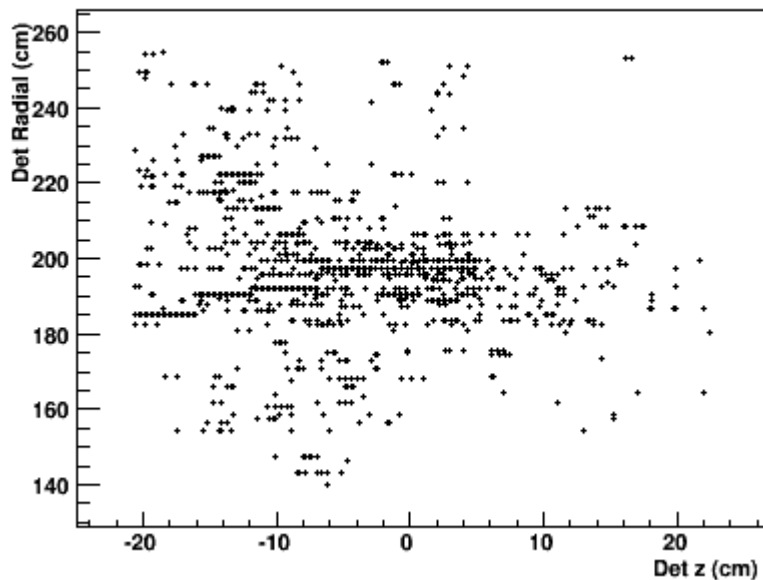
Generated Photon on Scint. from Single Primary  $\pi^-$  Track



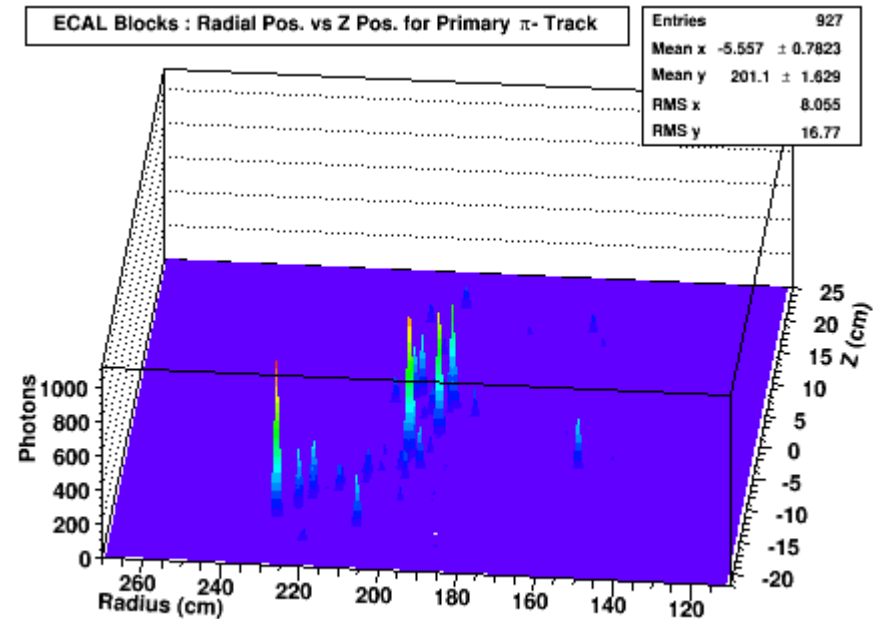
Energy Deposited on Scint. from Single Primary  $\pi^-$  Track



ECAL Blocks : Radial Pos. vs Z Pos. for Single Primary  $\pi^-$  Track

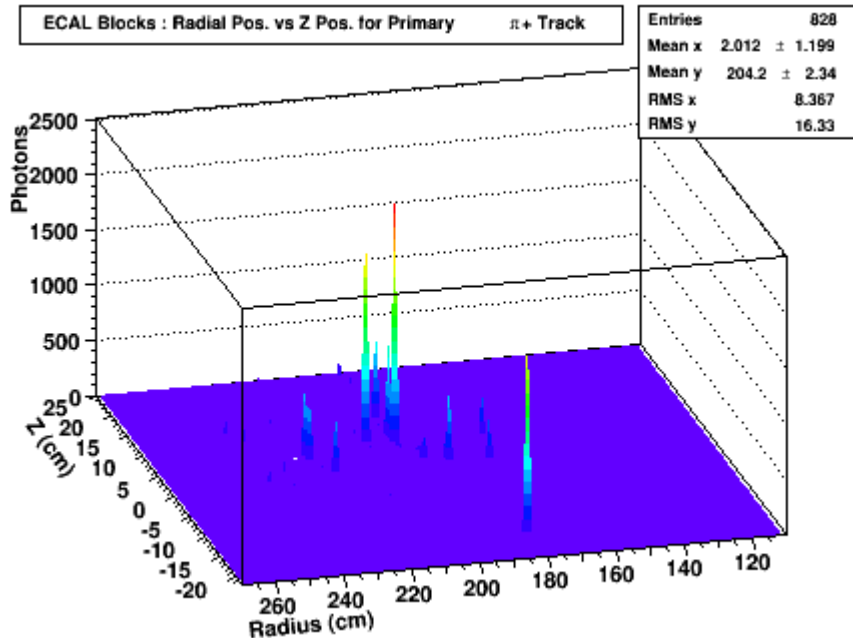
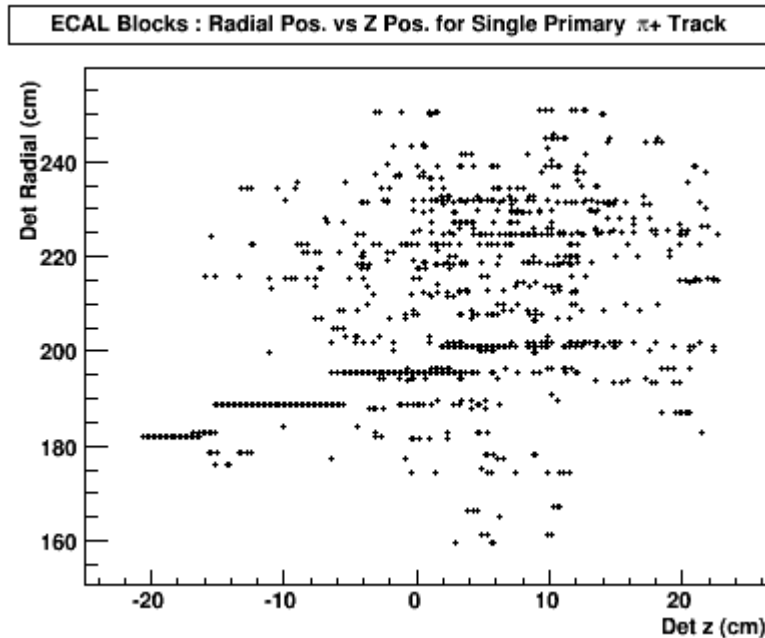
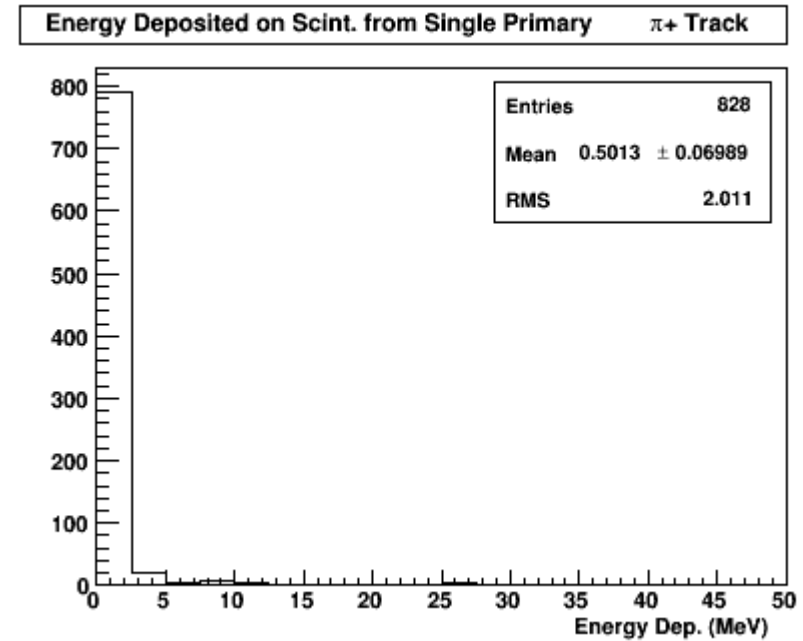
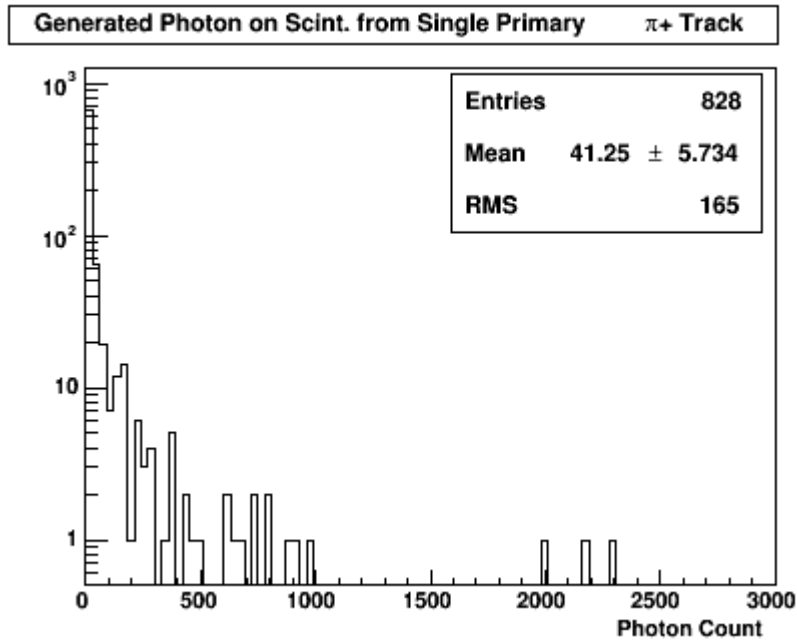


ECAL Blocks : Radial Pos. vs Z Pos. for Primary  $\pi^-$  Track



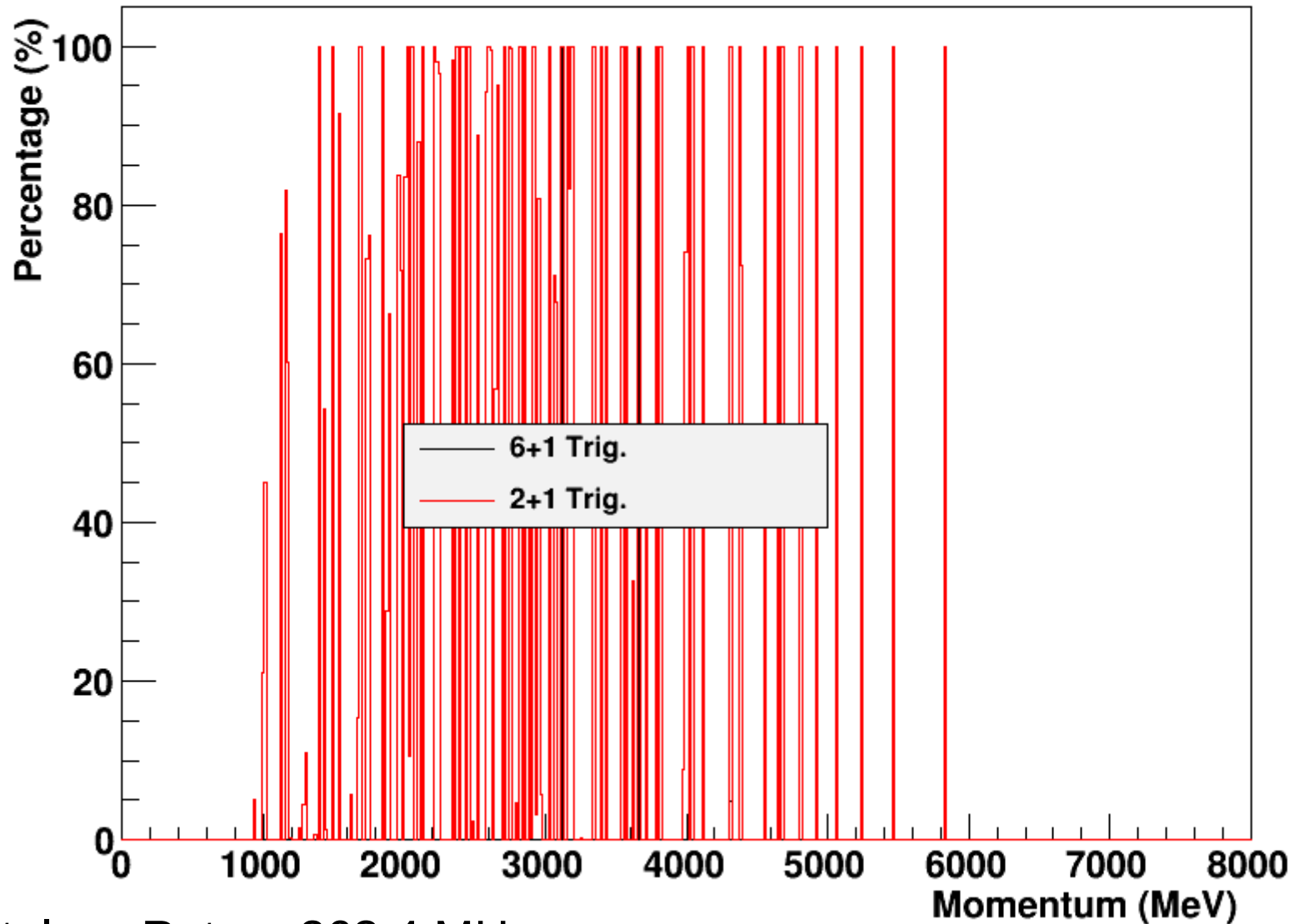
# $\pi^+$ Single Event

## Energy deposition for a single event with Pb baffles



# Primary $\pi^+$ : 6 + 1 Sum

Trigger Efficiency (%)



- Total  $\pi^+$  Rate = 263.4 MHz

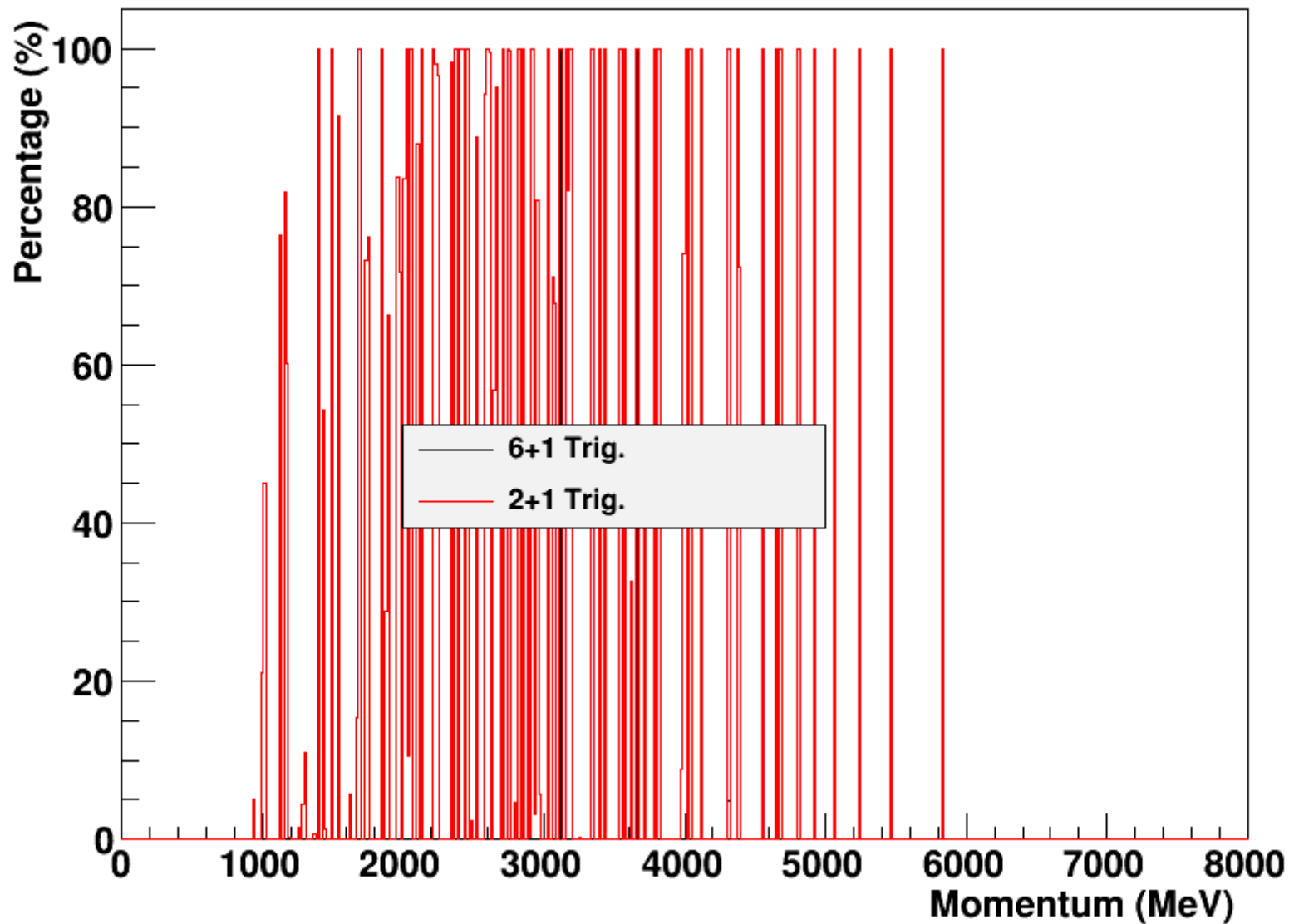
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- $\pi^+$  Trigger Rate = 14.6 MHz (6+1 sum)

# Primary $\pi^+$ : 2 + 1 Sum

Trigger Efficiency (%)



- Total  $\pi^+$  Rate = 263.4 MHz

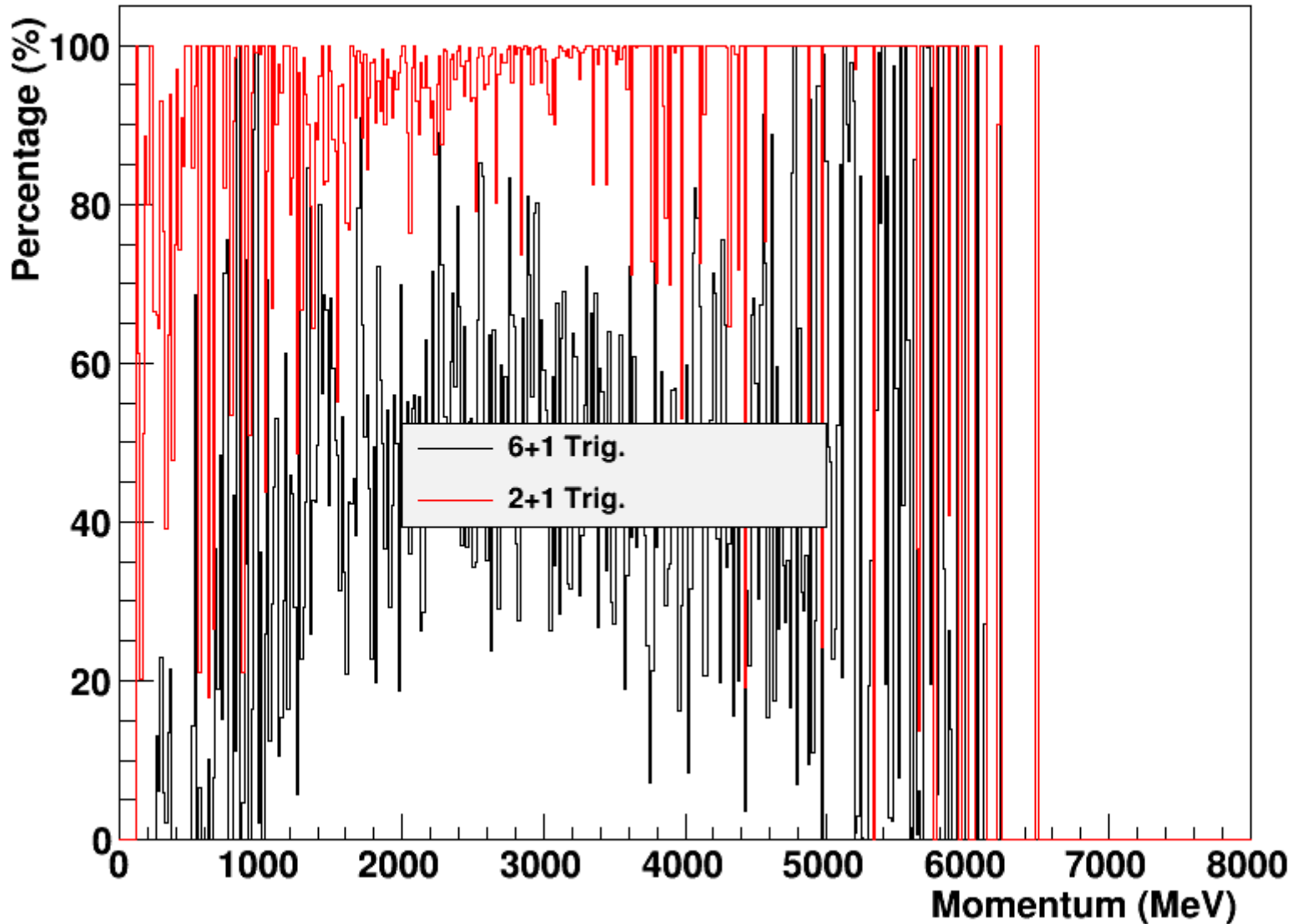
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- $\pi^+$  Trigger Rate = 1.1 MHz (2+1 sum)

# Primary $\pi^-$ : 6 + 1 Sum

Trigger Efficiency (%)

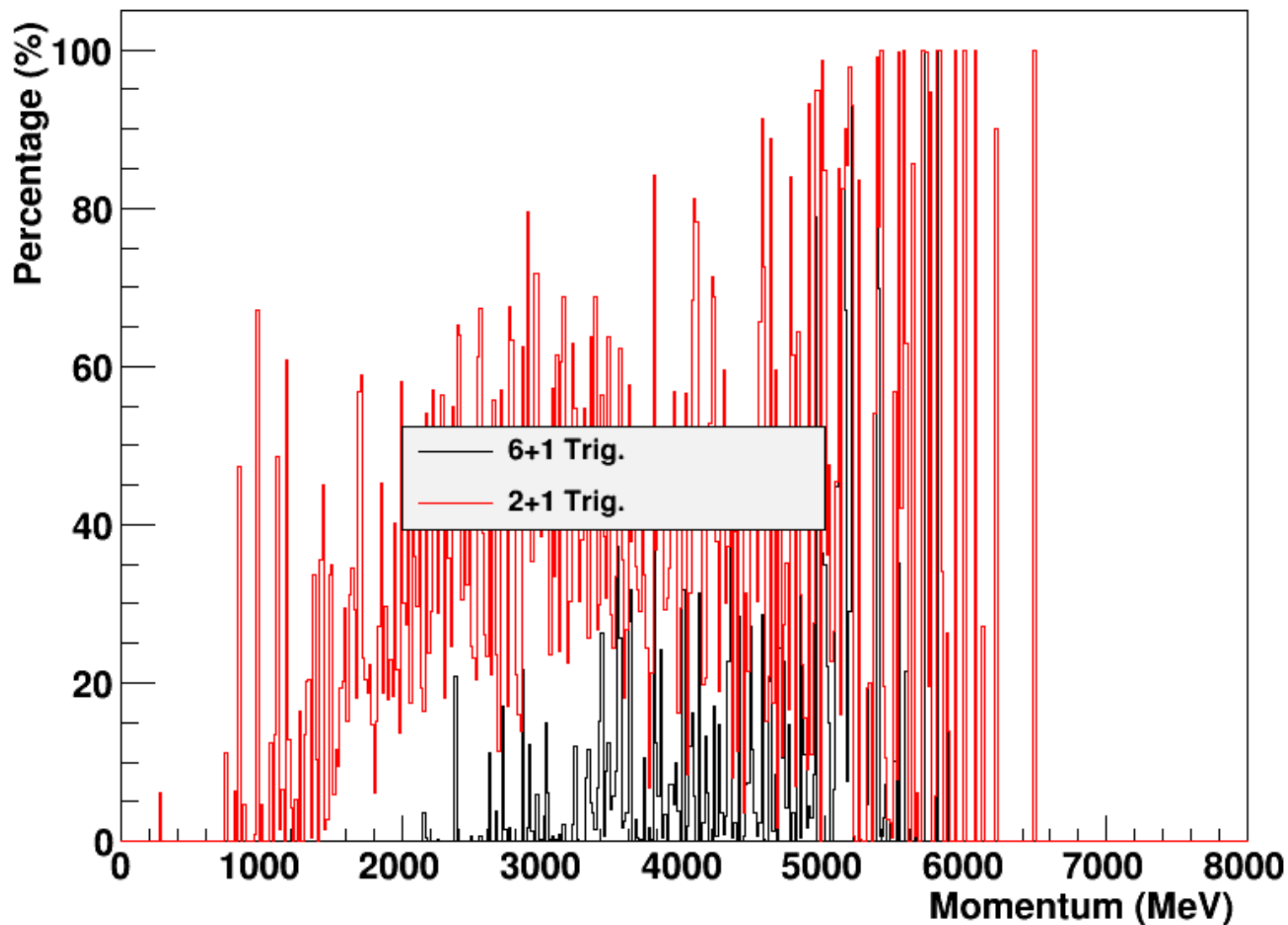


- Total  $\pi^-$  Rate = 473.6 MHz

- $\pi^-$  Trigger Rate = 93.5 MHz (6+1 sum)

# Primary $\pi^-$ : 2 + 1 Sum

Trigger Efficiency (%)



- Total  $\pi^-$  Rate = 473.6 MHz

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- $\pi^-$  Trigger Rate = 32.5 MHz (2+1 sum)