

**Basic electron cuts**

**Deuterium run 015053**

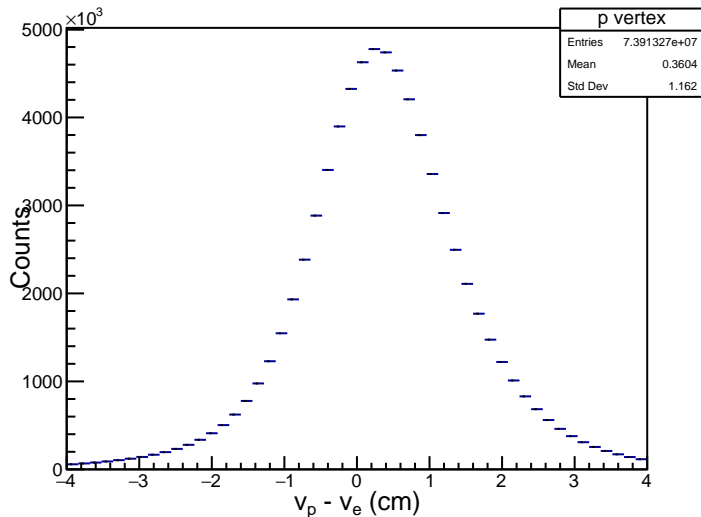
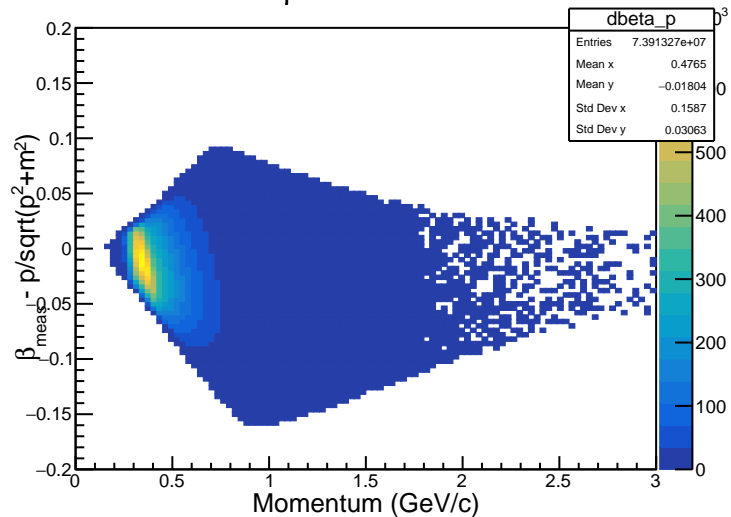
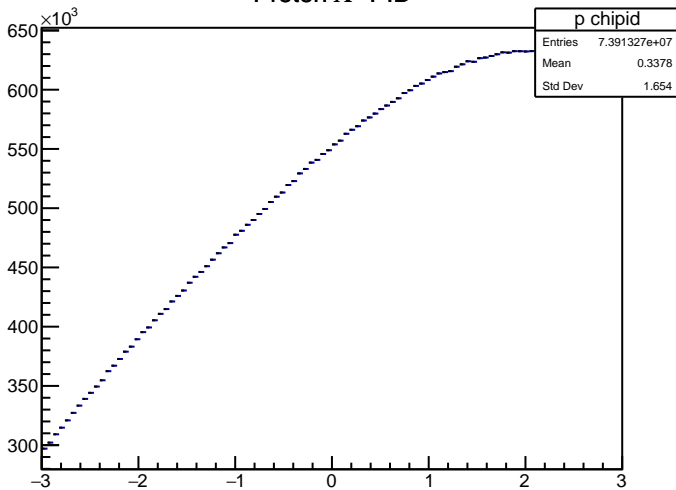
**$d(e,e'p)n$**

**allow only PID=0,11,22,2212,2112**

**exactly 1p, 1e**

**proton in FD**

Proton vertex - electron vertex

 $\Delta \beta$  vs MomentumProton  $X^2$  PID

# Basic electron cuts

Deuterium run 015053

$d(e,e'p)n$

Require proton in FTOF

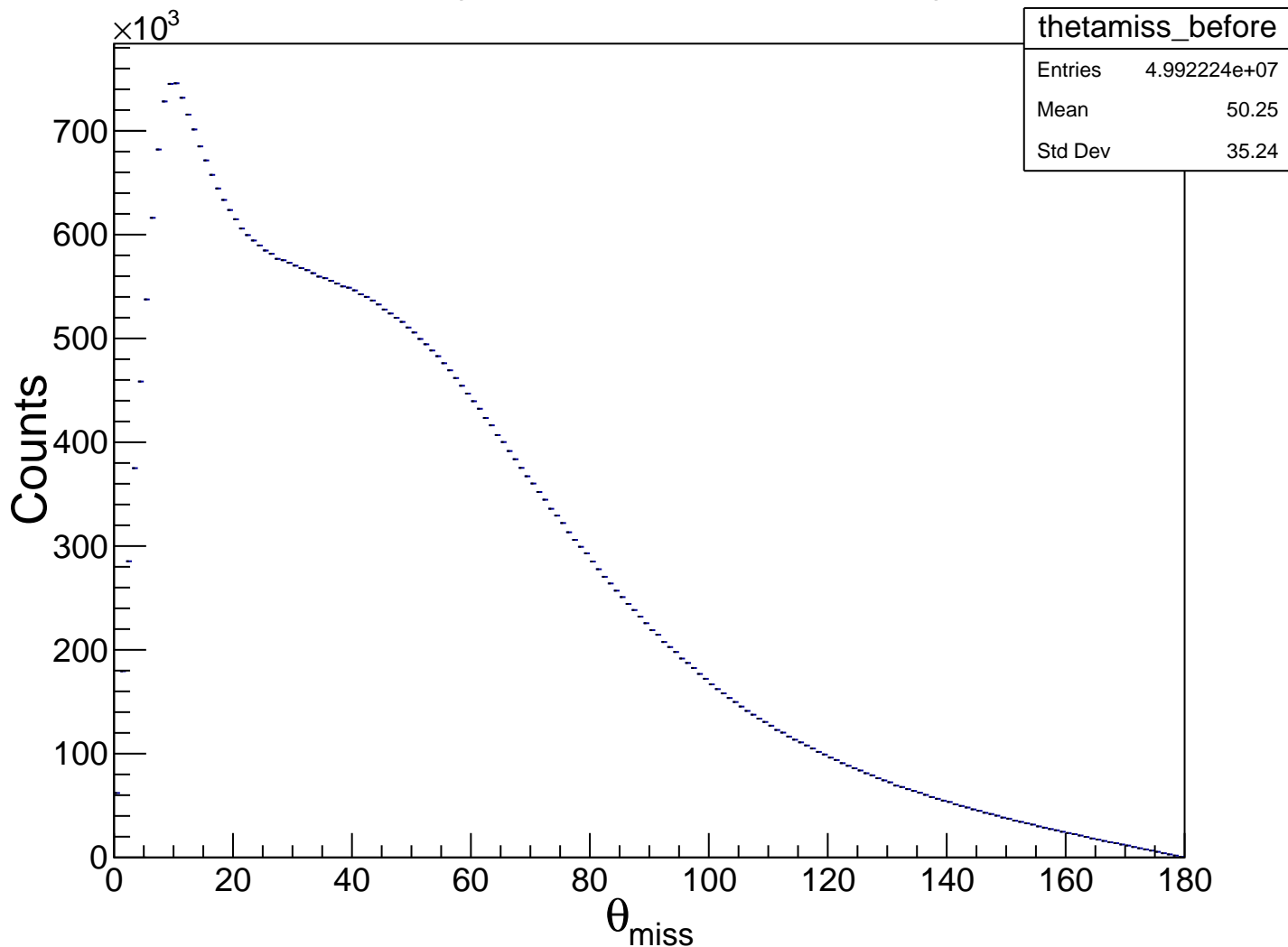
$$-4 \text{ cm} < v_p - v_e < 2 \text{ cm}$$

$$-0.02 < \Delta \beta < 0.02$$

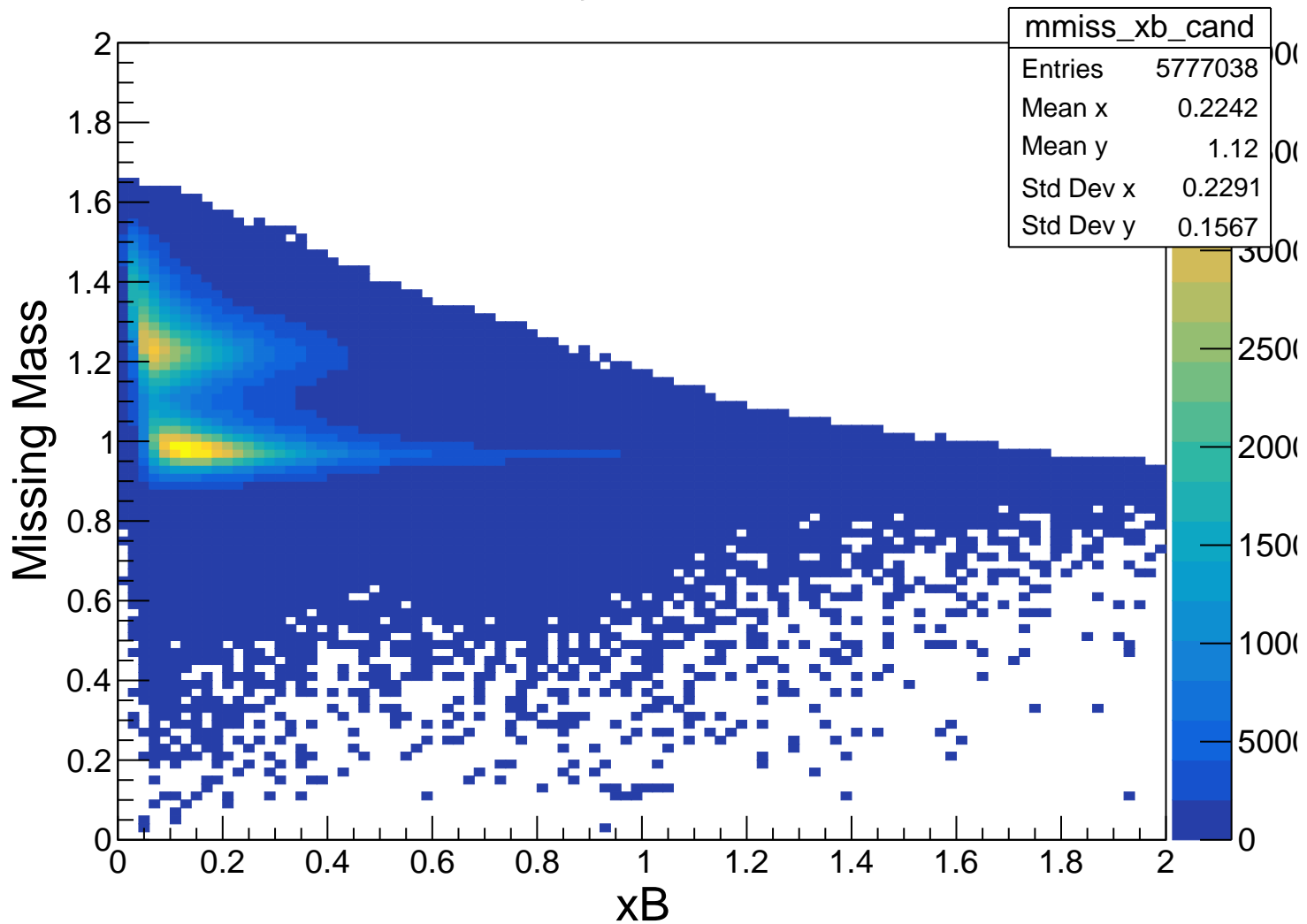
$$p_p > 0.3 \text{ GeV}/c$$

$$-3 < \text{proton } \chi^2_{\text{PID}} < 3$$

# Missing Momentum Polar Angle



# Missing Mass vs xB



**Basic electron cuts**

**Deuterium run 015053**

**d(e,e'pn)**

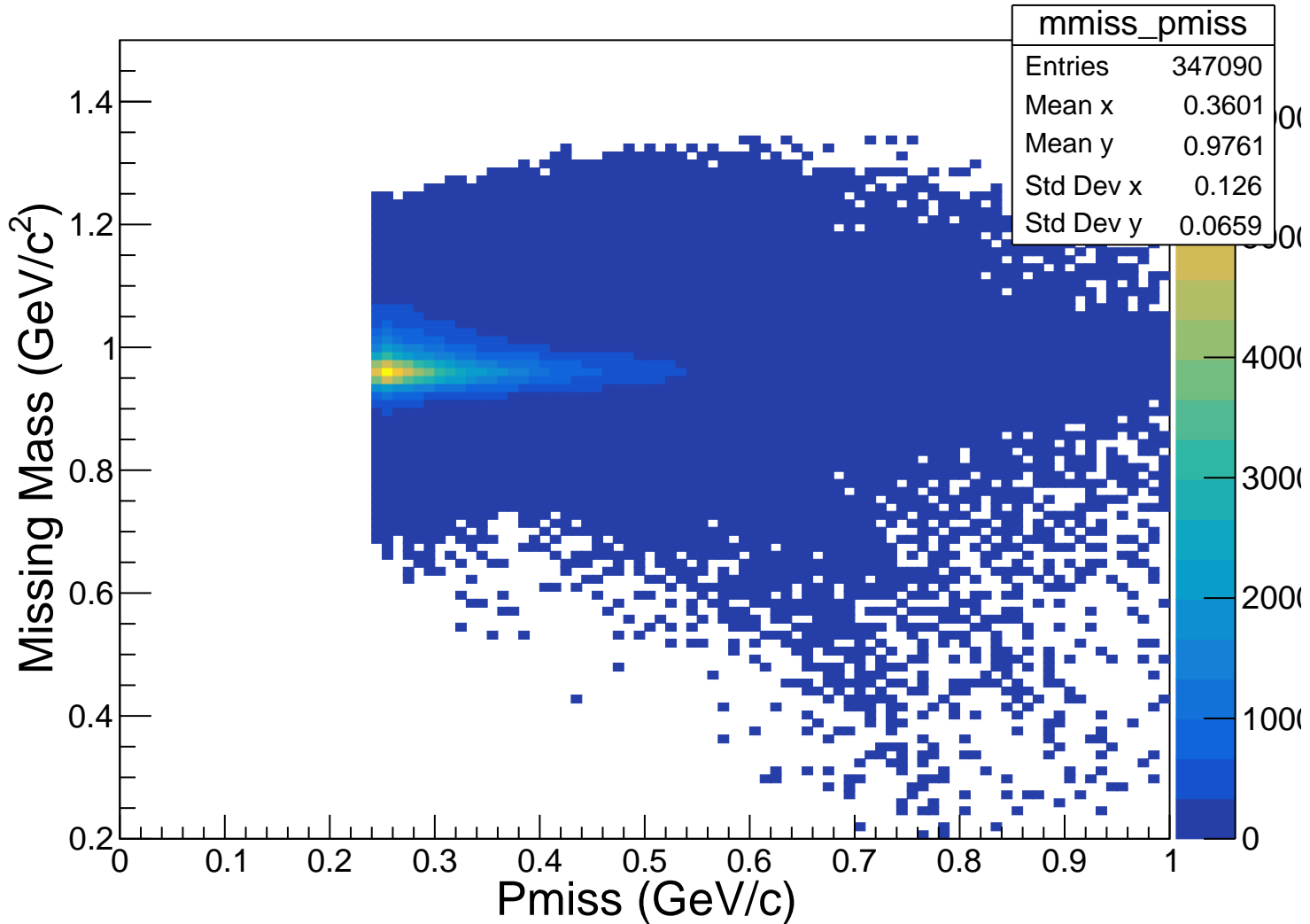
**proton cuts**

**$40 \text{ deg} < \theta_{\text{miss}} < 140 \text{ deg}$**

**$0.24 \text{ GeV}/c < p_{\text{miss}} < 1.25 \text{ GeV}/c$**

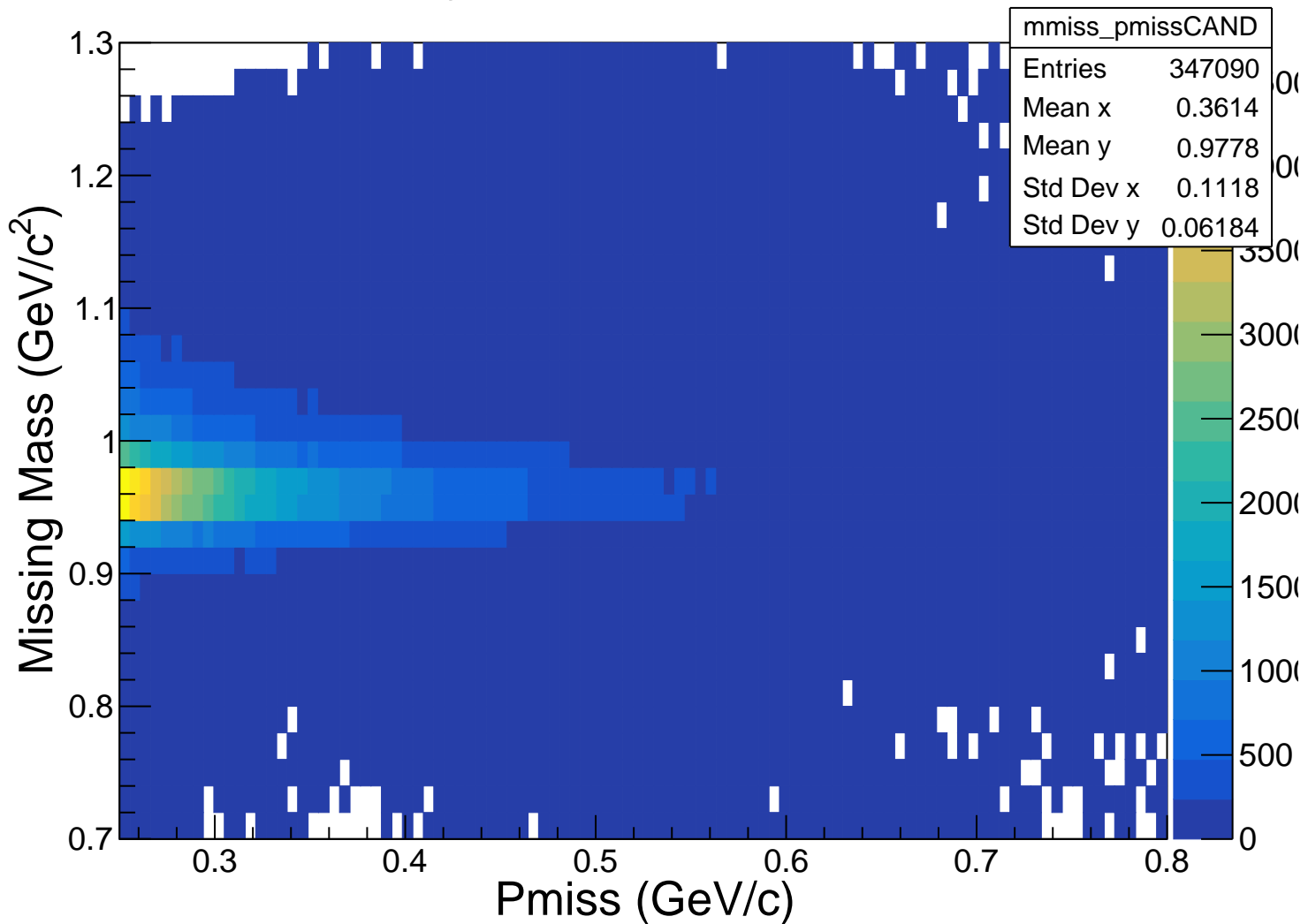
## **EFFICIENCY BY MOMENTUM - CANDIDATES**

# Missing Mass vs Pmiss d(e,e'p)n

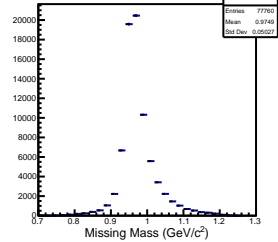




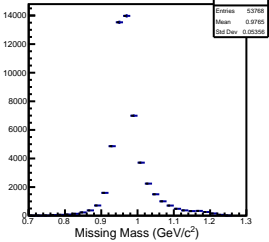
# Missing Mass vs Pmiss d(e,e'p)n



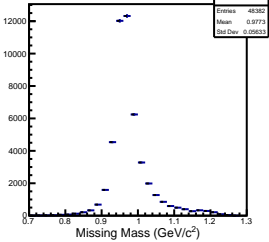
Missing Mass vs Pmiss d(e,e)p)n



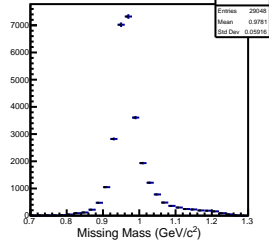
Missing Mass vs Pmiss d(e,e)p)n



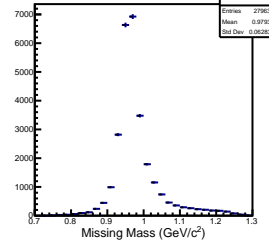
Missing Mass vs Pmiss d(e,e)p)n



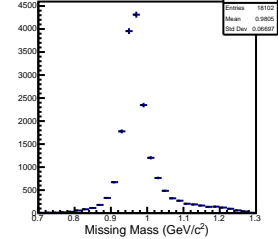
Missing Mass vs Pmiss d(e,e)p)n



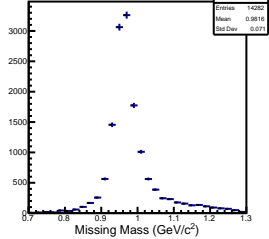
Missing Mass vs Pmiss d(e,e)p)n



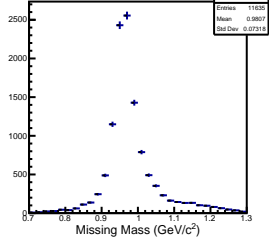
Missing Mass vs Pmiss d(e,e)p)n



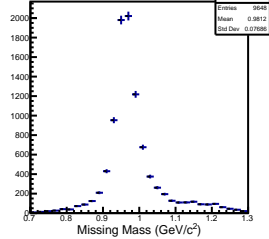
Missing Mass vs Pmiss d(e,e)p)n



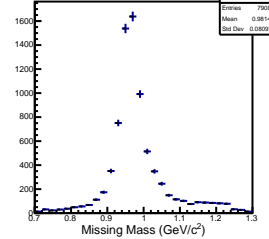
Missing Mass vs Pmiss d(e,e)p)n



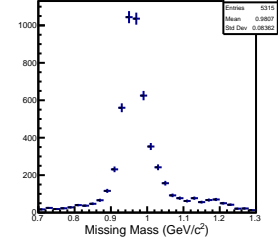
Missing Mass vs Pmiss d(e,e)p)n



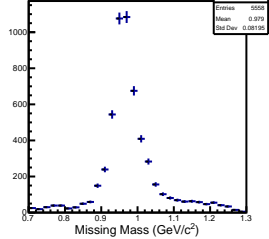
Missing Mass vs Pmiss d(e,e)p)n



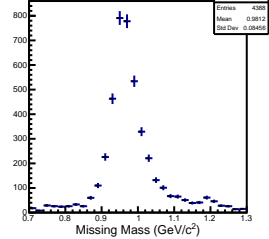
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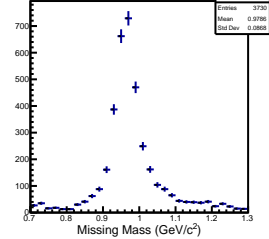
Missing Mass vs Pmiss d(e,e)p)n



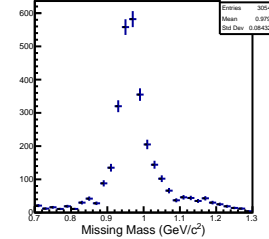
Missing Mass vs Pmiss d(e,e)p)n



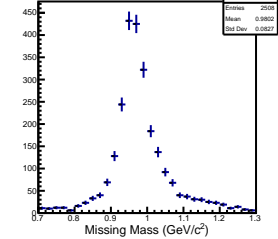
Missing Mass vs Pmiss d(e,e)p)n



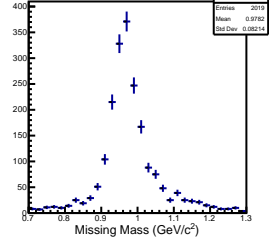
Missing Mass vs Pmiss d(e,e)p)n



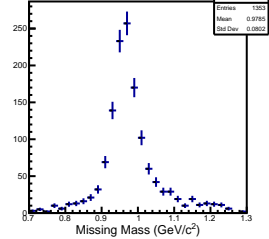
Missing Mass vs Pmiss d(e,e)p)n



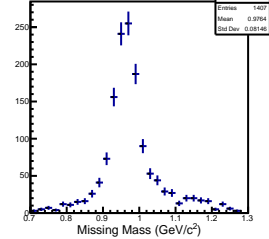
Missing Mass vs Pmiss d(e,e)p)n



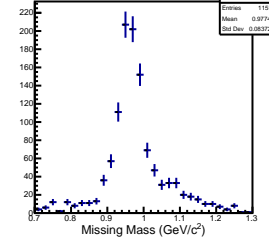
Missing Mass vs Pmiss d(e,e)p)n



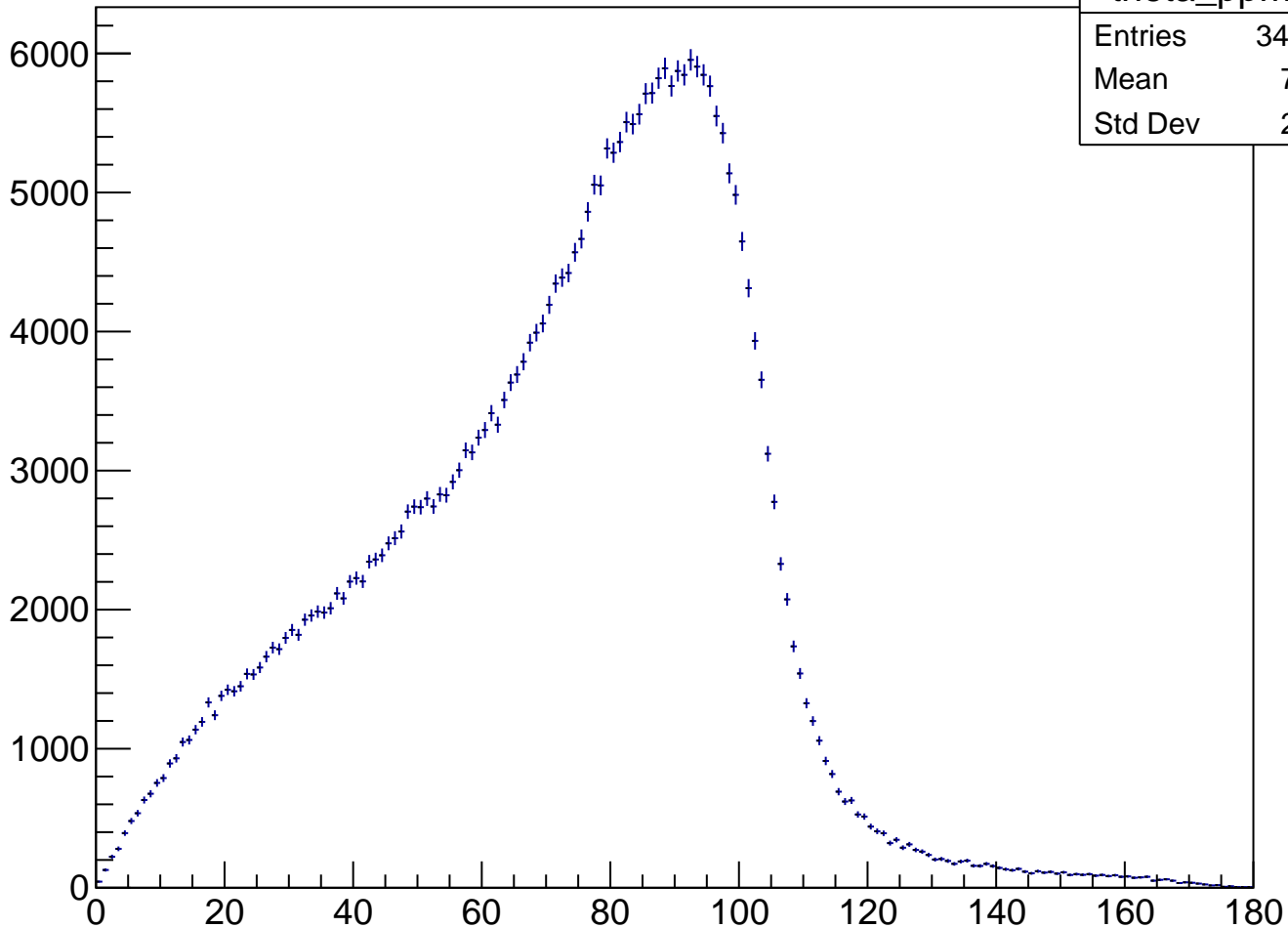
Missing Mass vs Pmiss d(e,e)p)n



Missing Mass vs Pmiss d(e,e)p)n

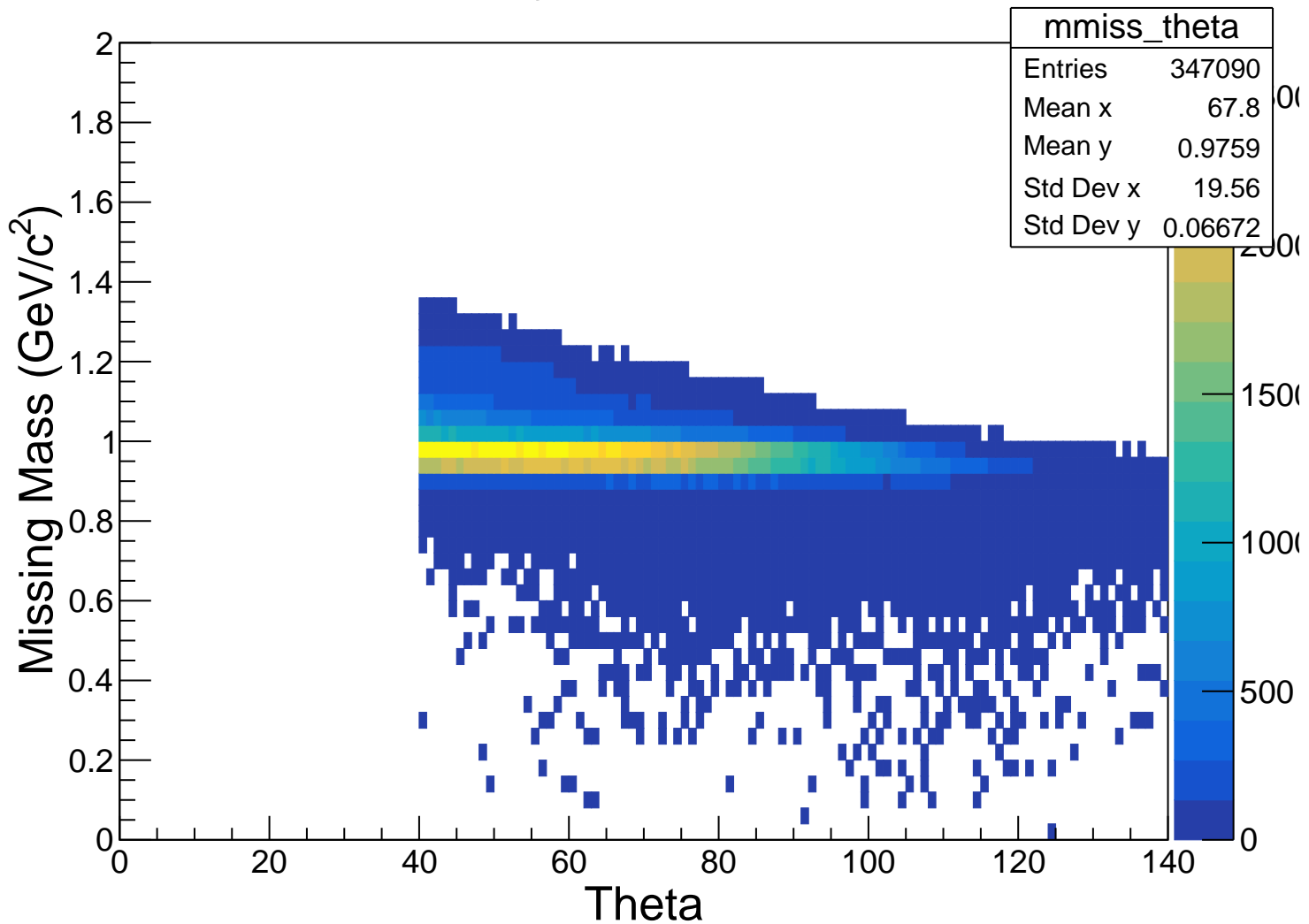


# Angle between $p_p$ and $p_{miss}$

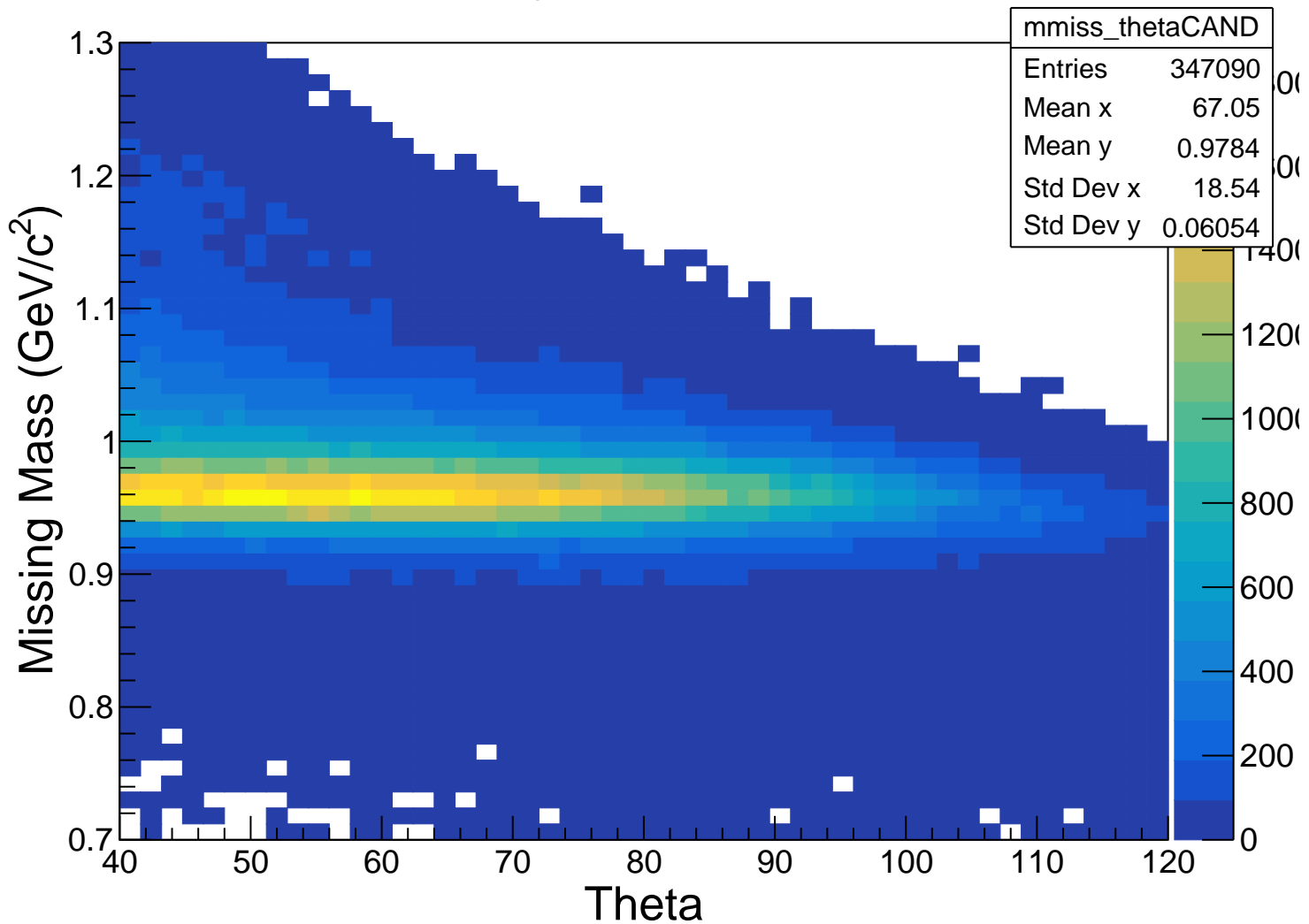


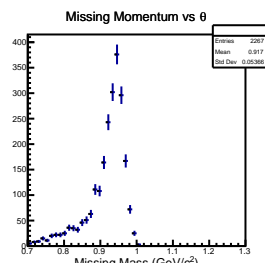
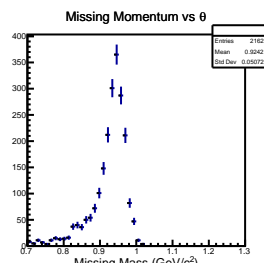
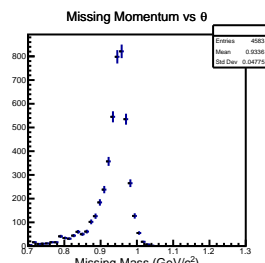
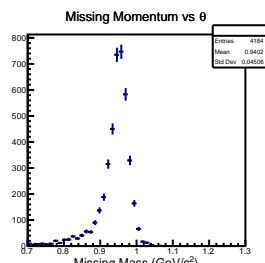
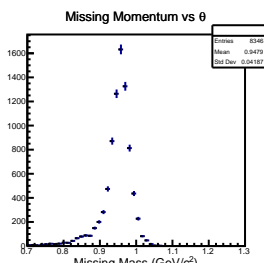
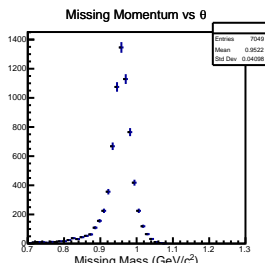
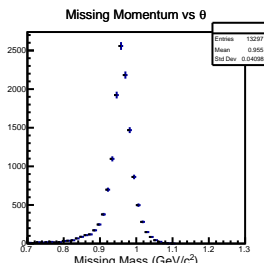
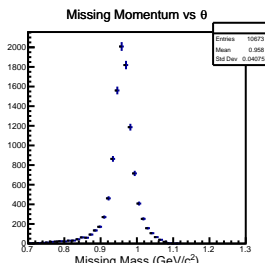
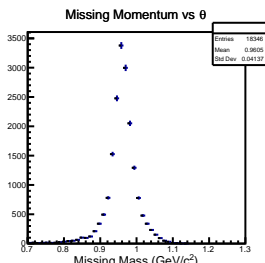
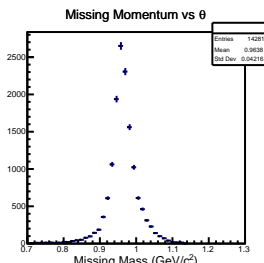
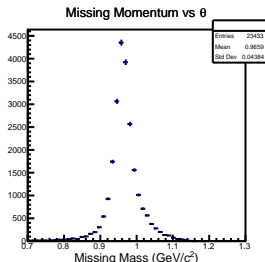
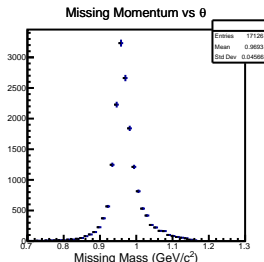
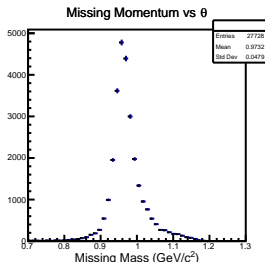
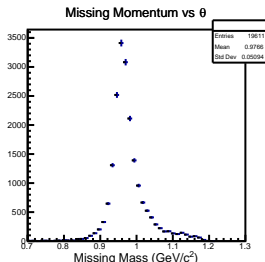
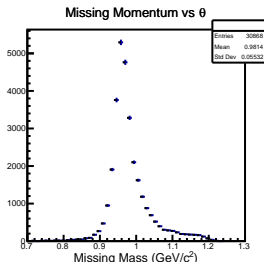
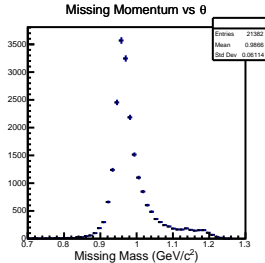
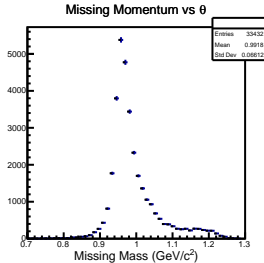
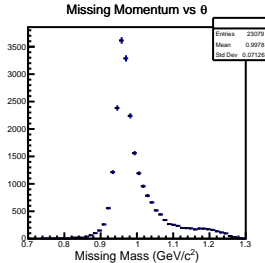
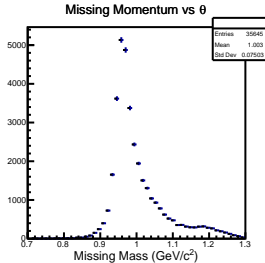
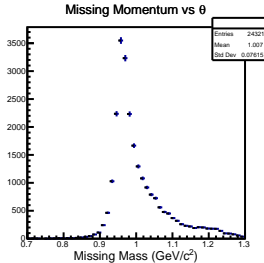
## **EFFICIENCY BY THETA - CANDIDATES**

# Missing Momentum vs $\theta$



# Missing Momentum vs $\theta$





**Basic electron cuts**

**Deuterium run 015053**

**$d(e,e'pn)$**

**proton cuts**

**$p_{\text{miss}}$  cuts**

**Require neutron in CND**

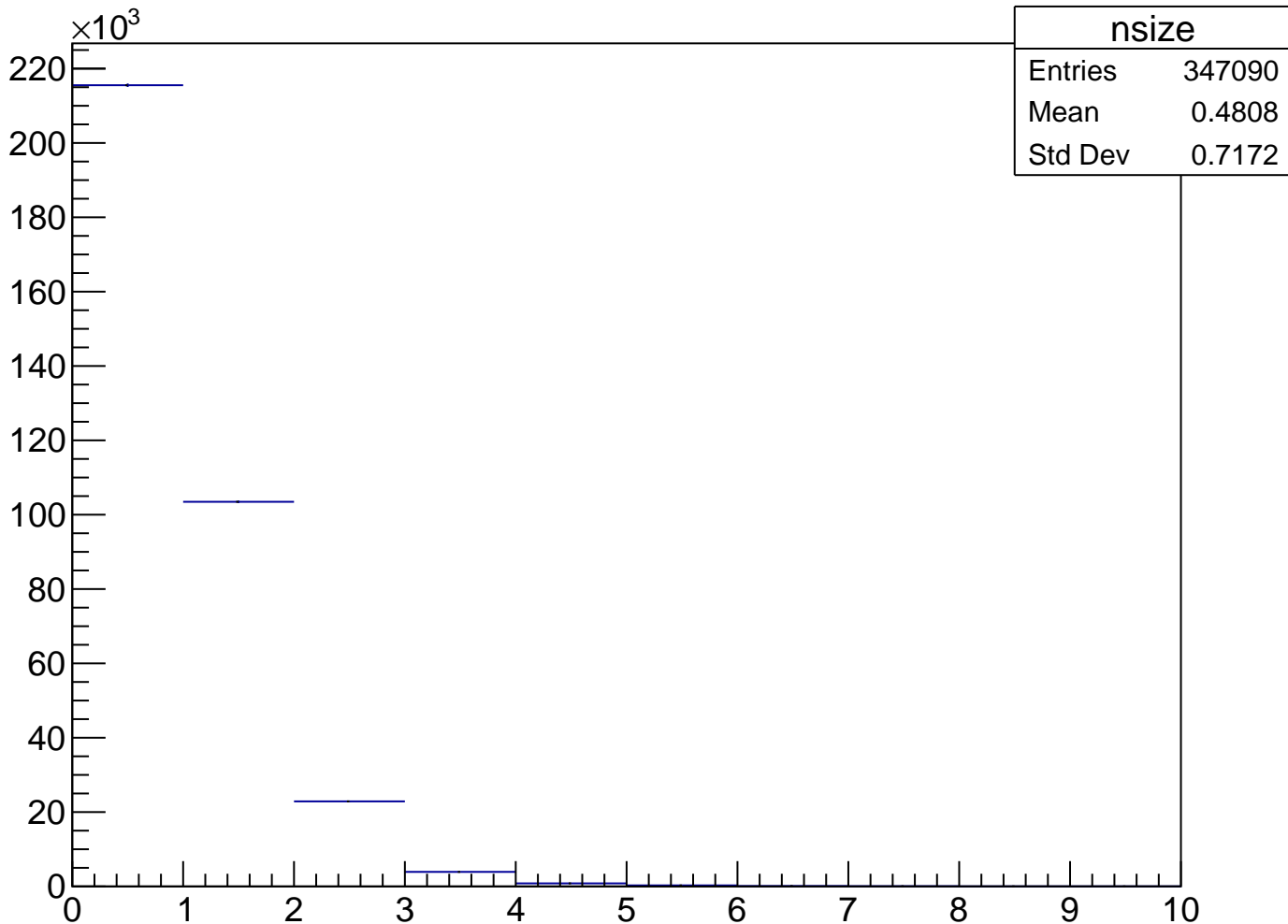
**exclude  $\theta_n=0$ ,  $\phi_n=0$**

**$40 \text{ deg} < \theta_n < 140 \text{ deg}$**

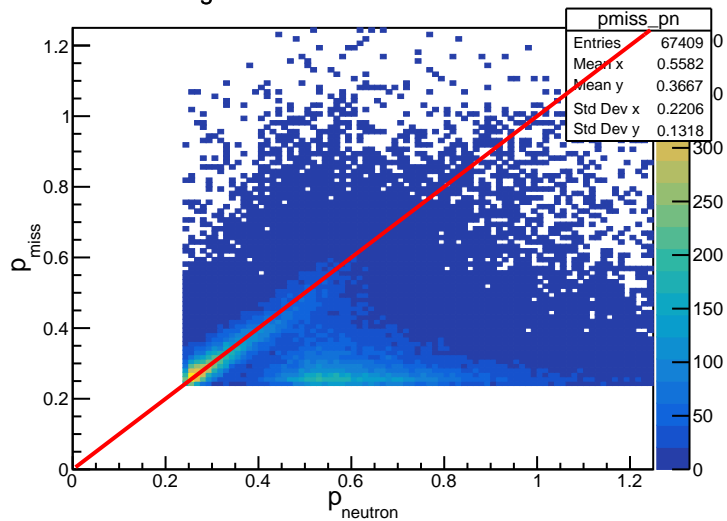
**$0.25 < \beta_n < 0.8$**



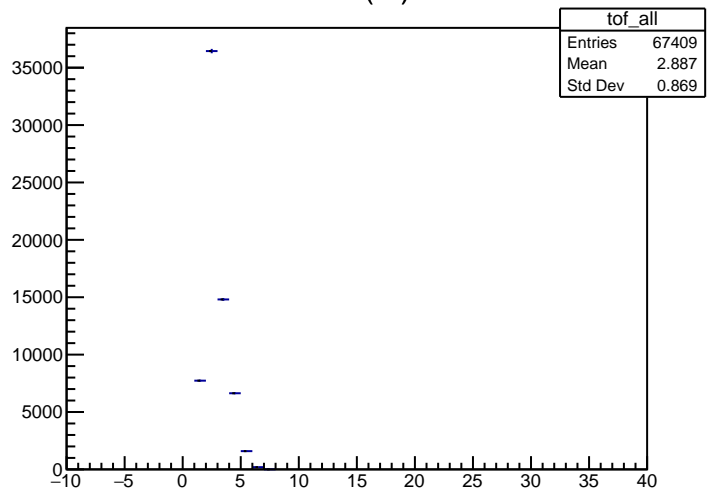
# Number of reconstructed neutrons



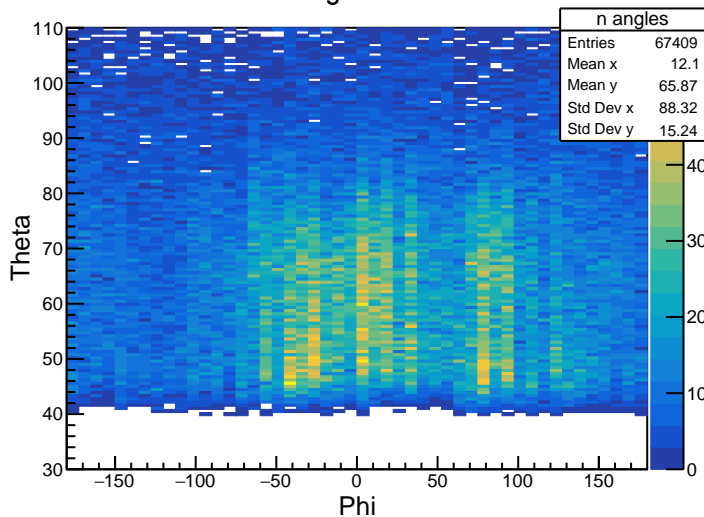
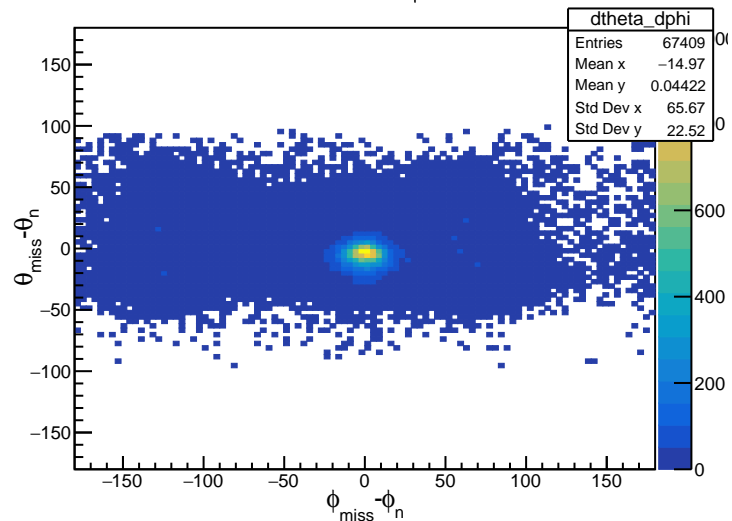
Missing Momentum vs Neutron Momentum



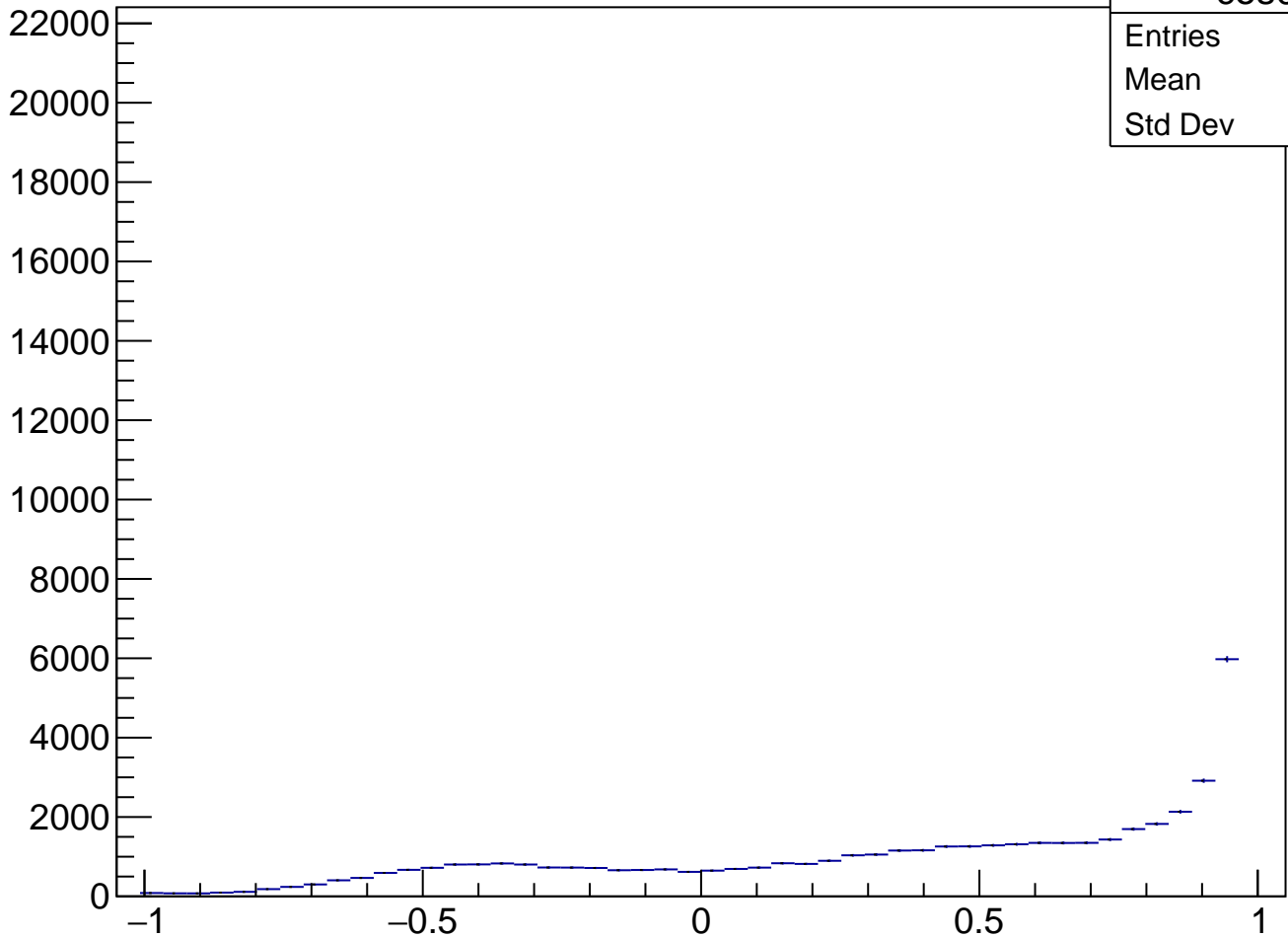
TOF (ns)



Neutron Angular Distribution

 $\Delta \theta$  vs  $\Delta \phi$ 

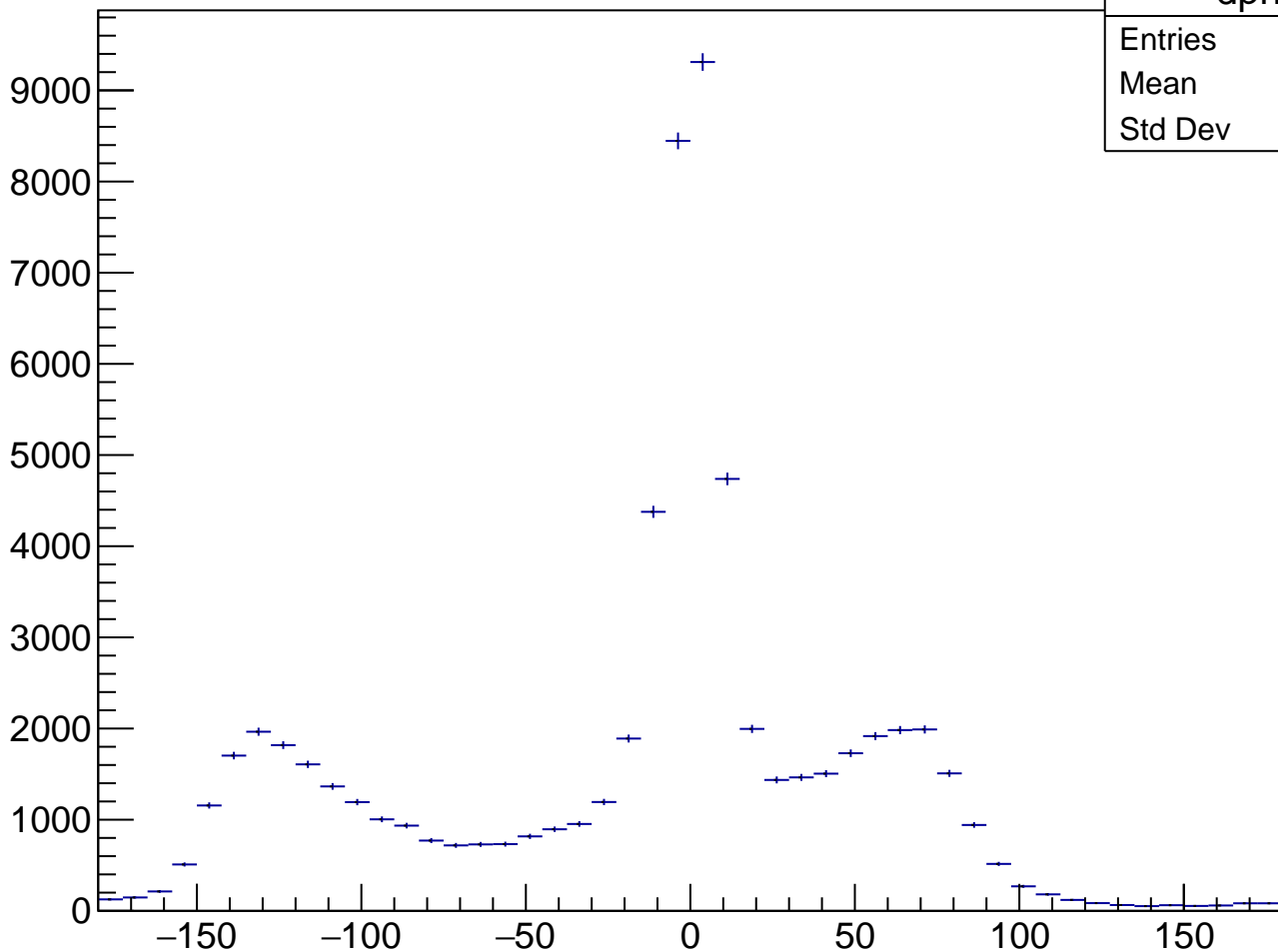
$\cos \theta_{\text{pmiss,pneutron}}$



cos0

Entries	67409
Mean	0.5612
Std Dev	0.5131

$$\Delta \phi = \phi_{\text{pmiss}} - \phi_n$$



dphi	
Entries	67409
Mean	-14.97
Std Dev	65.67

# Basic electron cuts

Deuterium run 015053

$d(e,e'pn)$

proton cuts

$p_{\text{miss}}$  cuts

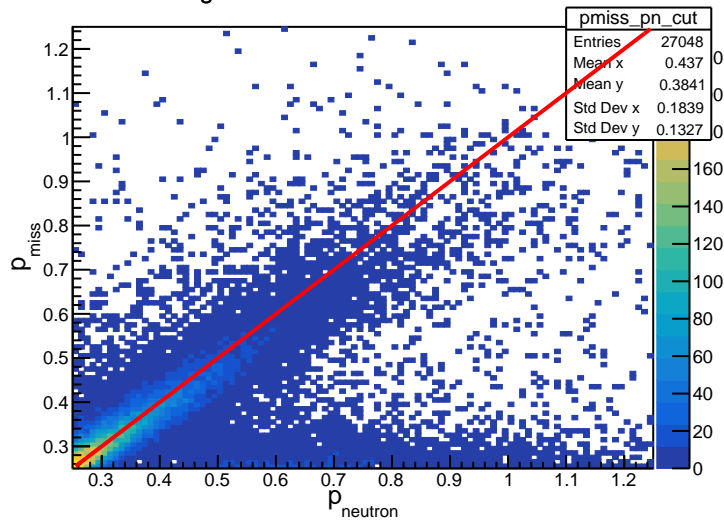
exclude  $\theta_n=0$ ,  $\phi_n=0$

$40 \text{ deg} < \theta_n < 140 \text{ deg}$

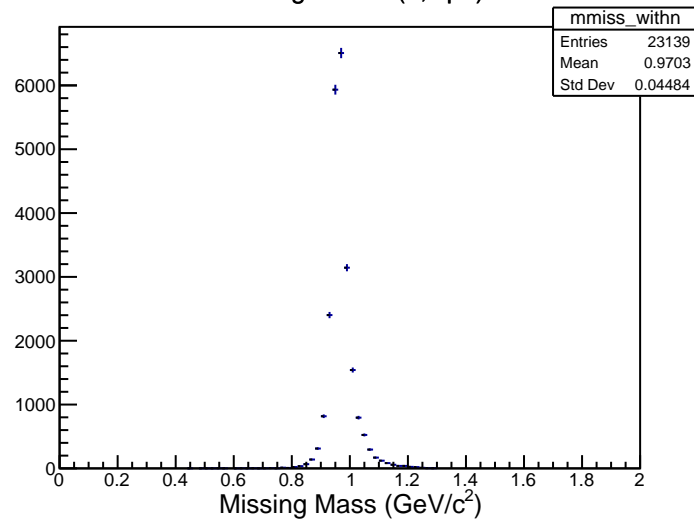
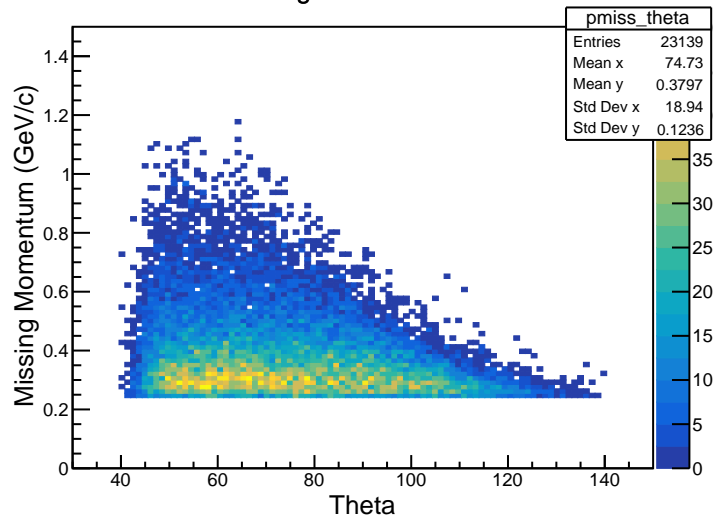
$0.25 < \beta_n < 0.8$

$\cos \theta_{p\text{miss},pn} > 0.9$ ,  $-20 < \Delta \phi < 20$

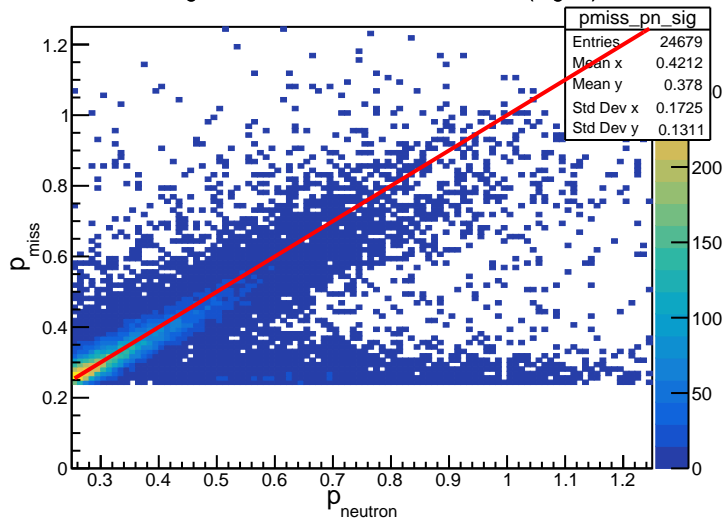
Missing Momentum vs Neutron Momentum



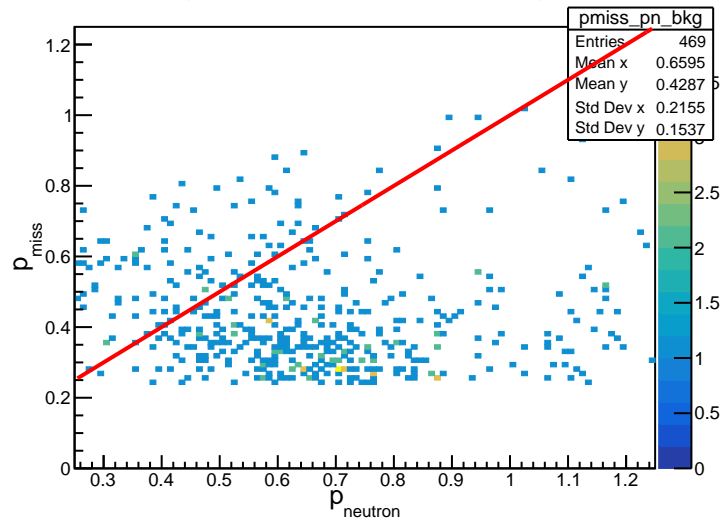
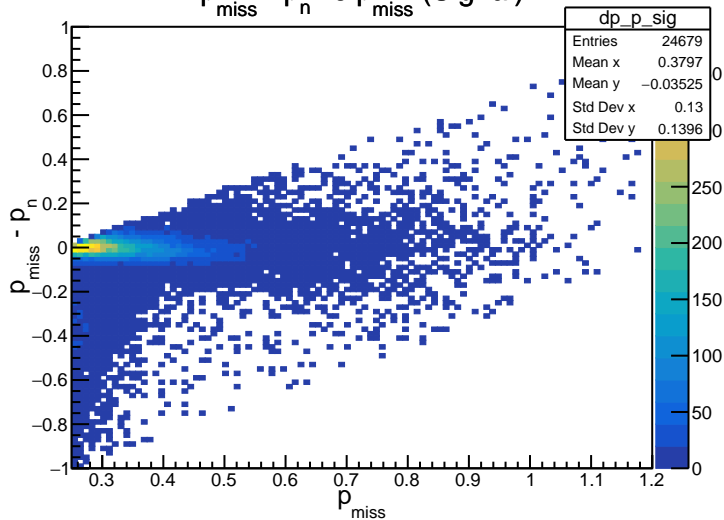
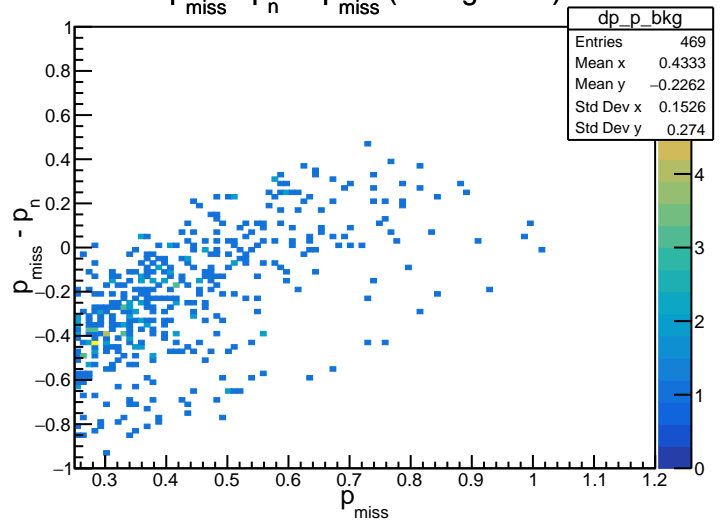
Missing Mass d(e,e'pn)

Missing Momentum vs  $\theta$ 

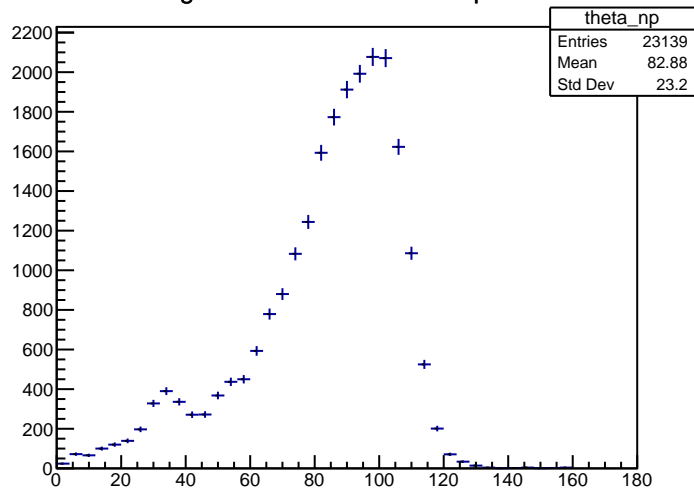
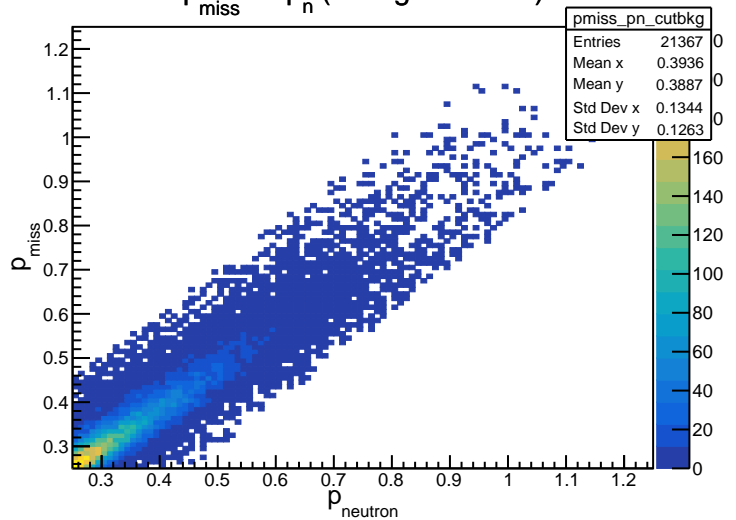
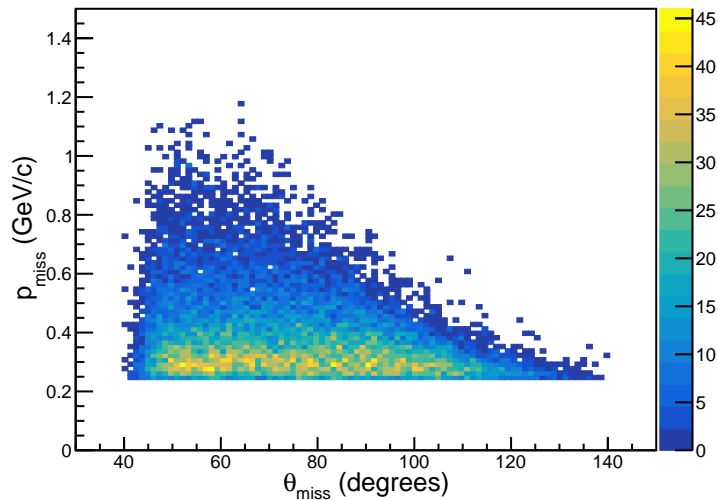
Missing Momentum vs Neutron Momentum (Signal)



Missing Momentum vs Neutron Momentum (Background)

 $p_{\text{miss}} - p_n$  vs  $p_{\text{miss}}$  (Signal) $p_{\text{miss}} - p_n$  vs  $p_{\text{miss}}$  (Background)

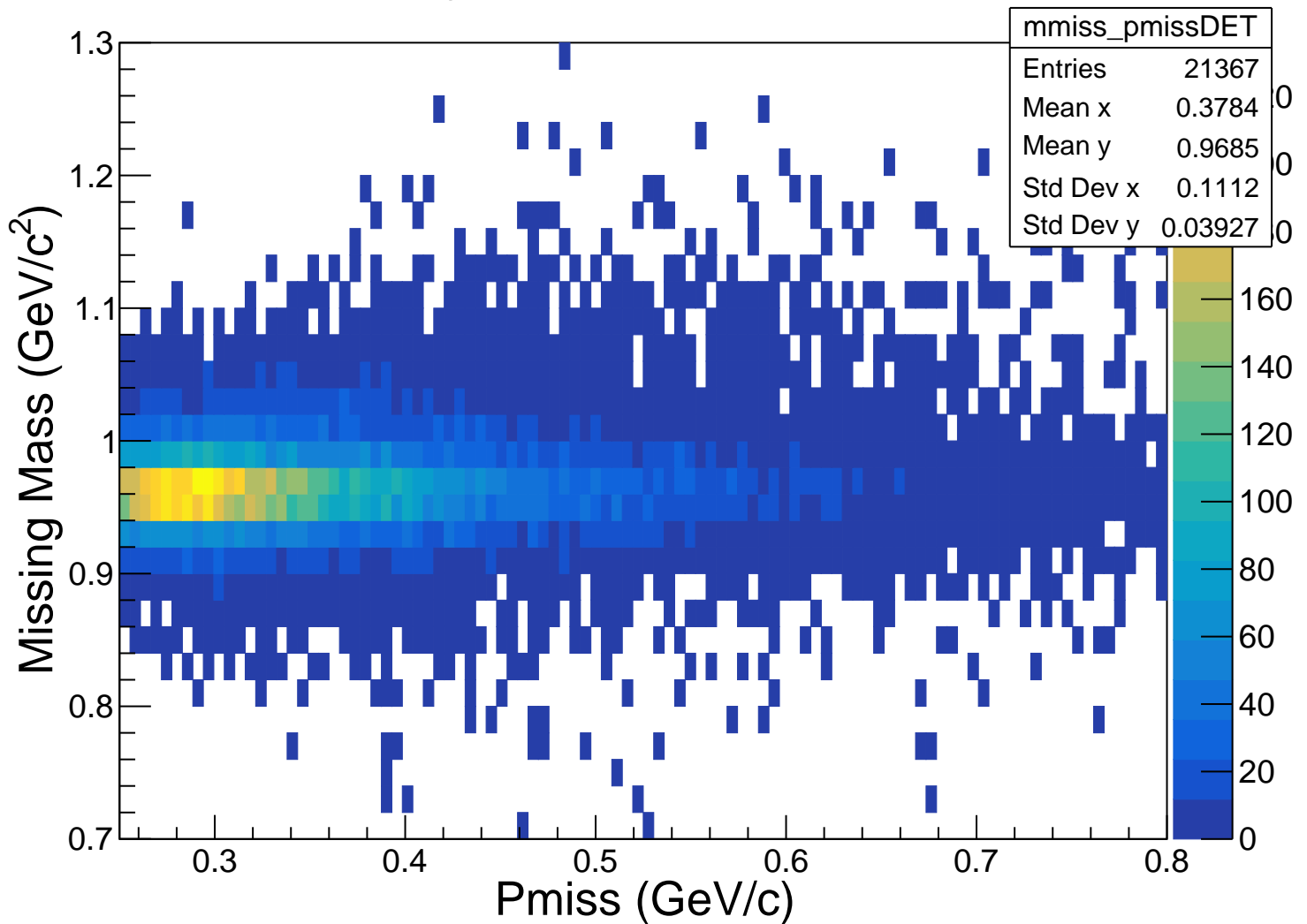
Angle between neutron and proton

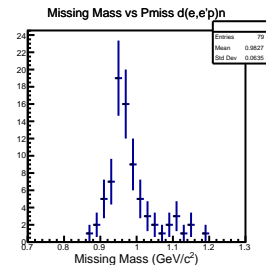
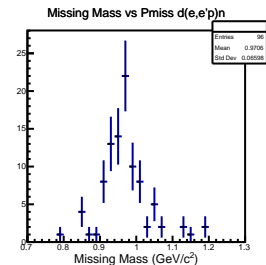
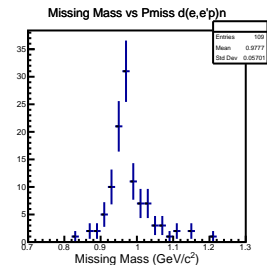
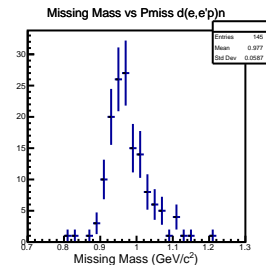
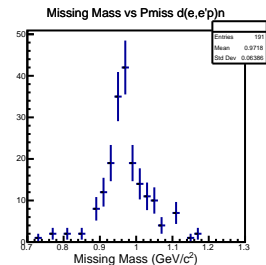
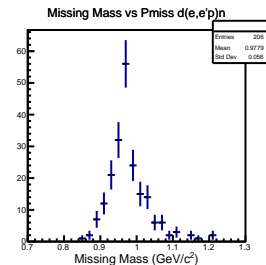
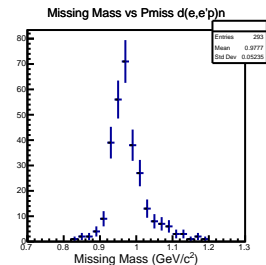
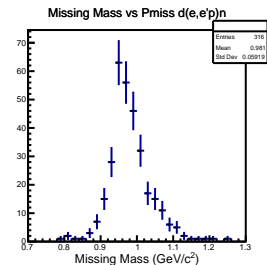
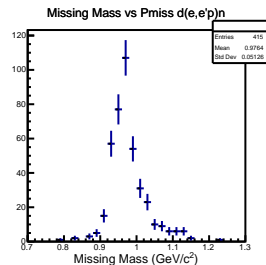
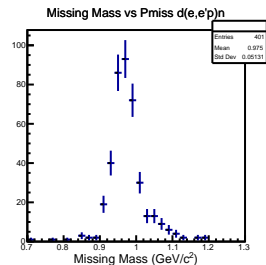
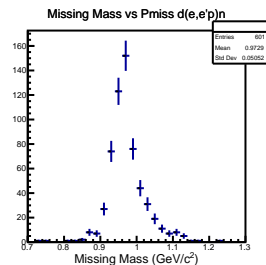
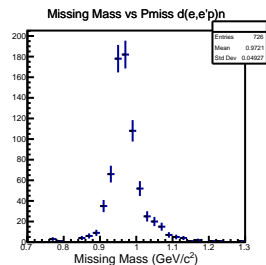
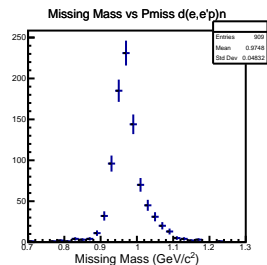
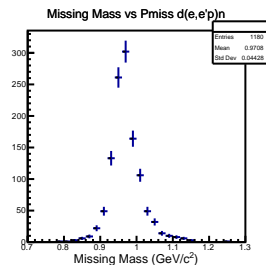
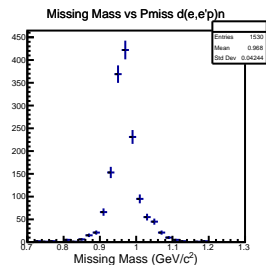
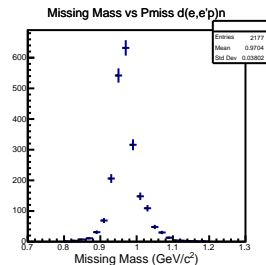
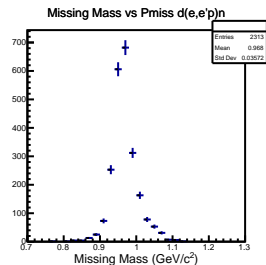
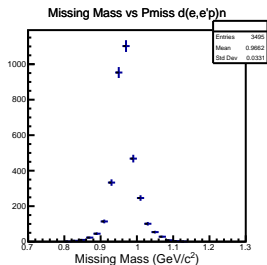
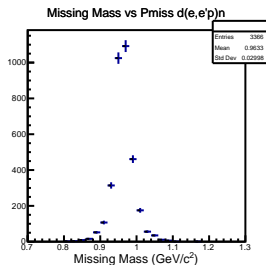
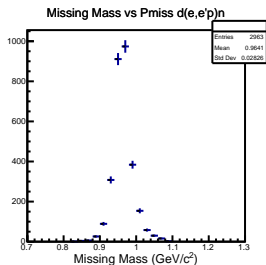
 $p_{\text{miss}}$  vs  $p_n$  (background cut)Missing Momentum vs  $p_{\text{miss}}$  Polar Angle



**EFFICIENCY BY MOMENTUM - DETECTED**

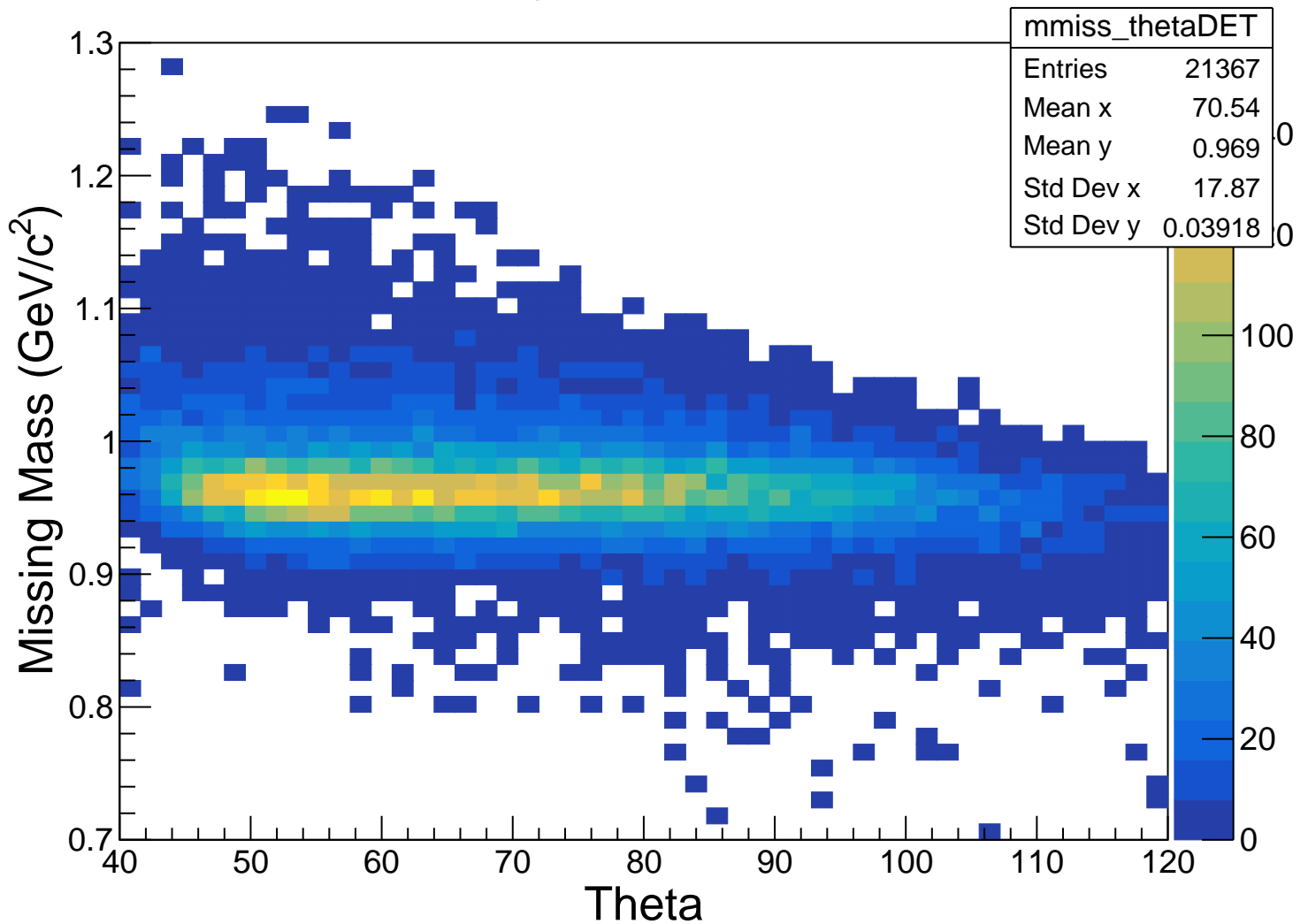
# Missing Mass vs Pmiss d(e,e'p)n

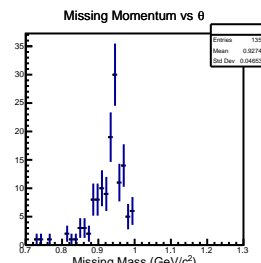
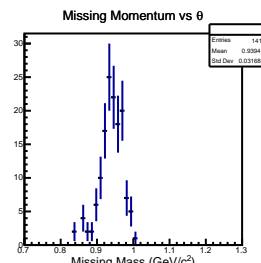
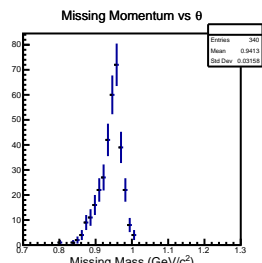
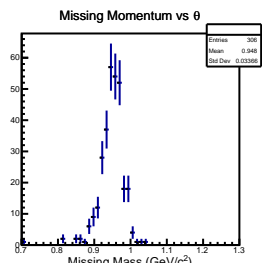
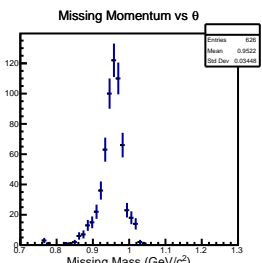
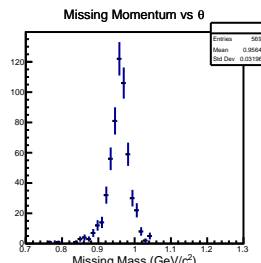
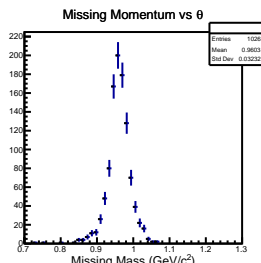
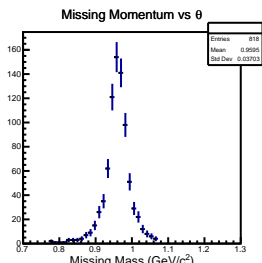
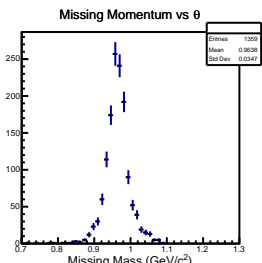
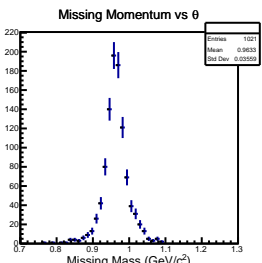
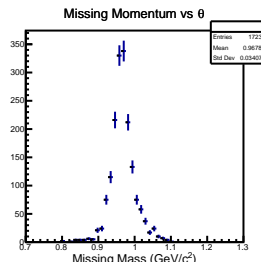
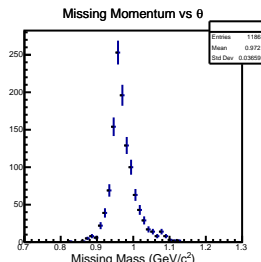
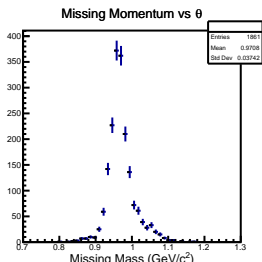
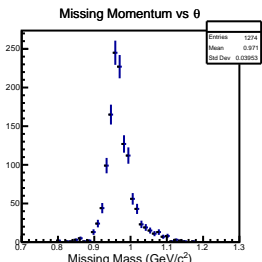
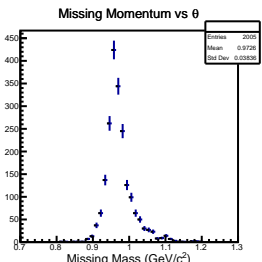
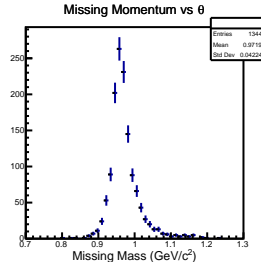
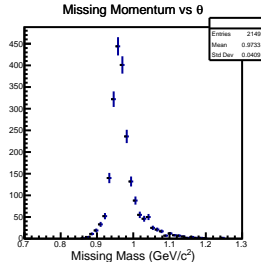
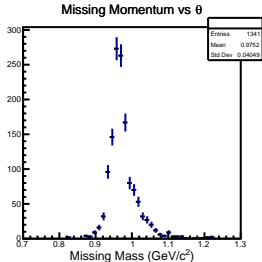
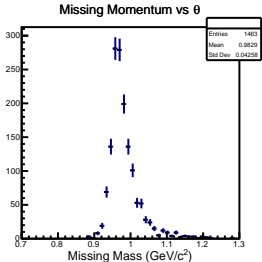
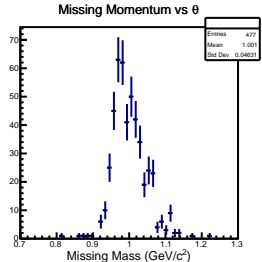




**EFFICIENCY BY THETA - DETECTED**

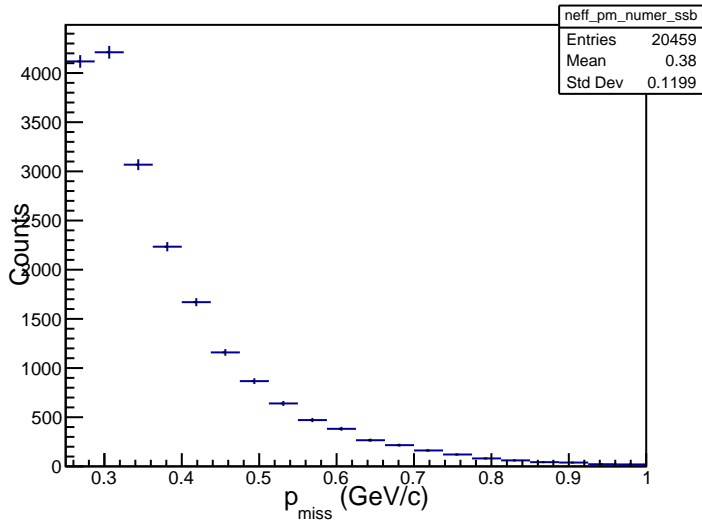
# Missing Momentum vs $\theta$



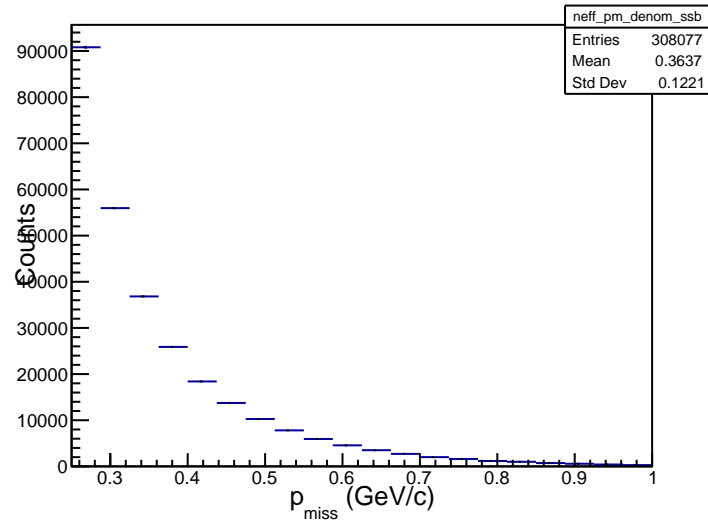


## **EFFICIENCY RESULTS**

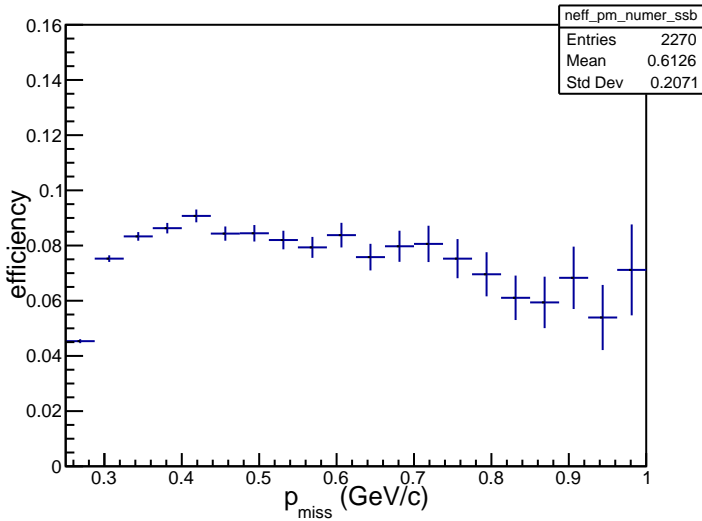
Neutrons



Neutron Candidates

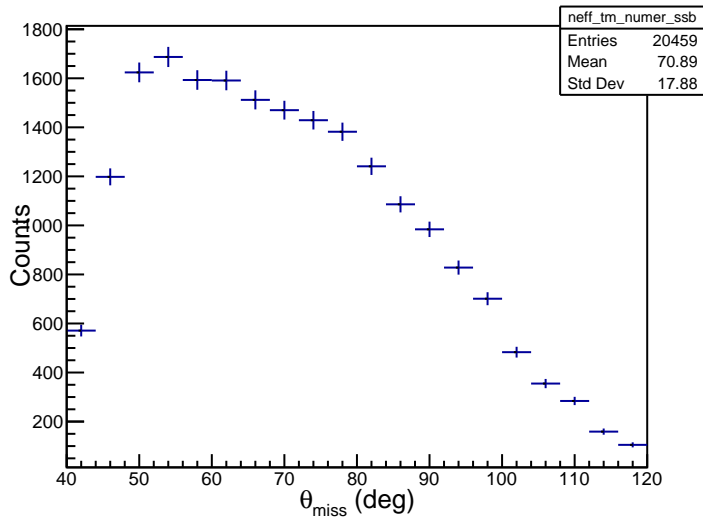


Neutrons

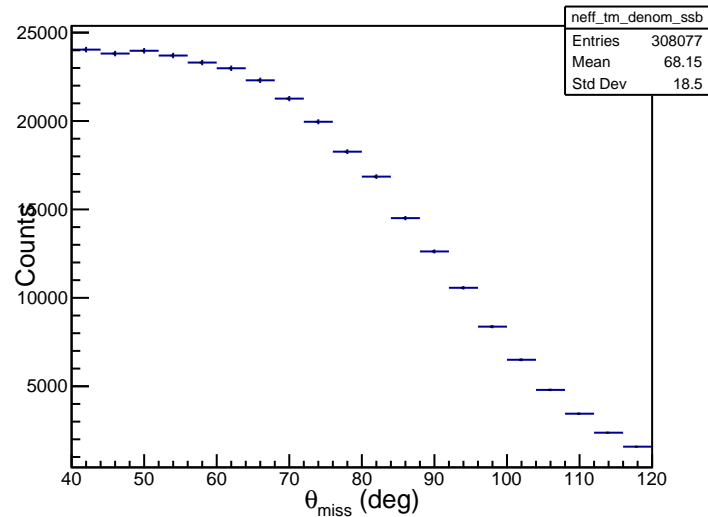




Detected Neutrons



Neutron Candidates



Detected Neutrons

