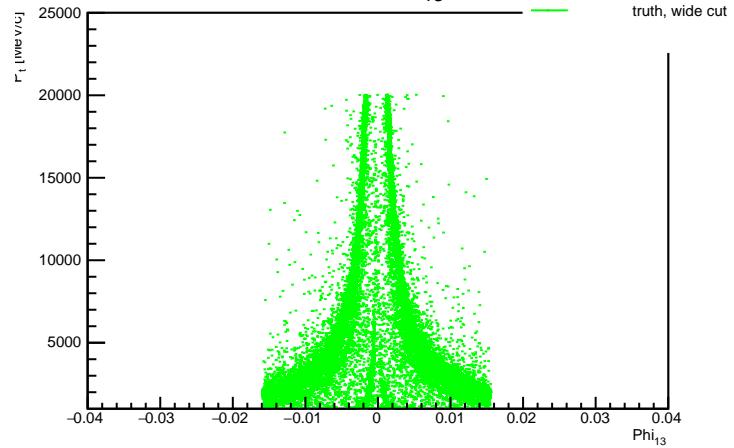
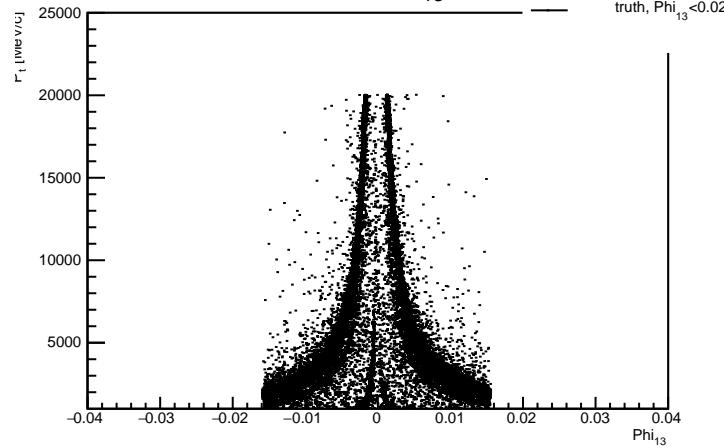
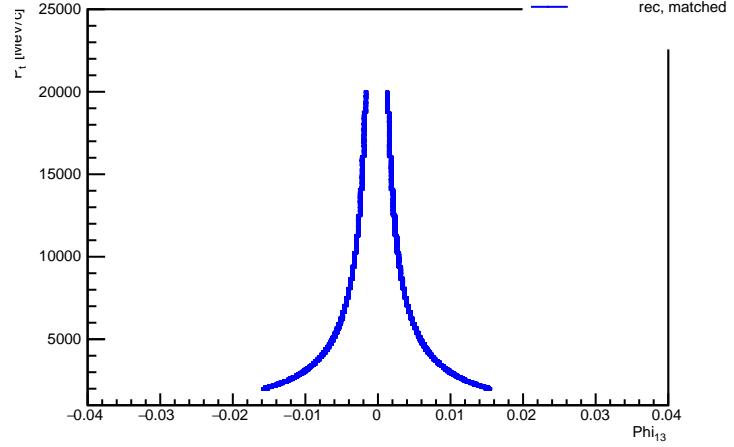
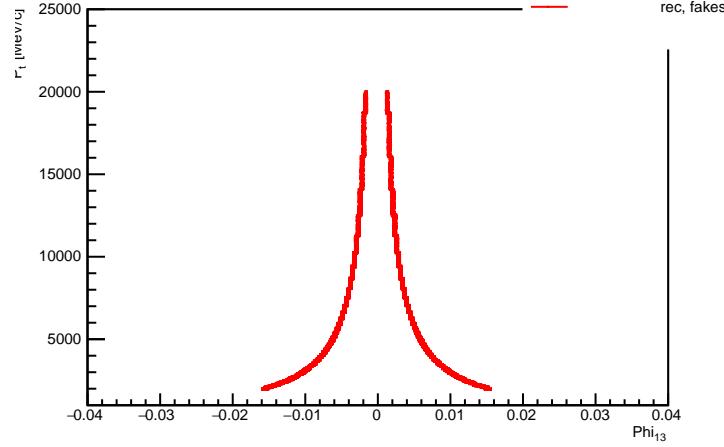
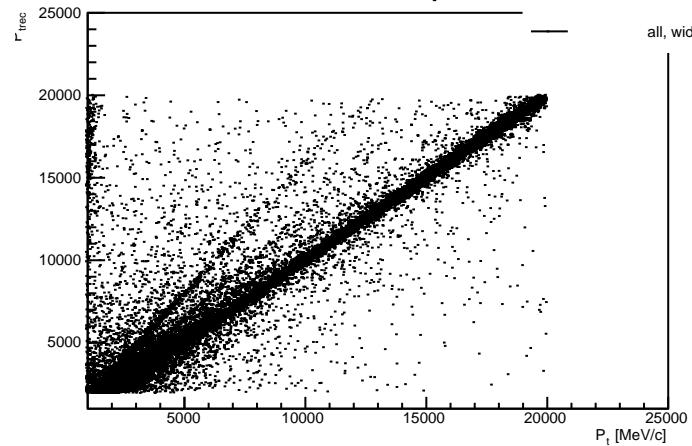
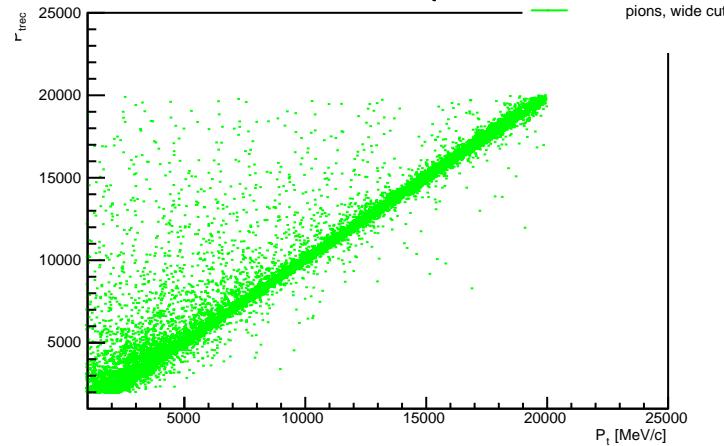


$P_t$  Vs  $\Phi_{13}$  $P_t$  Vs  $\Phi_{13}$  $P_t$  Vs  $\Phi_{13}$  $P_t$  Vs  $\Phi_{13}$ 

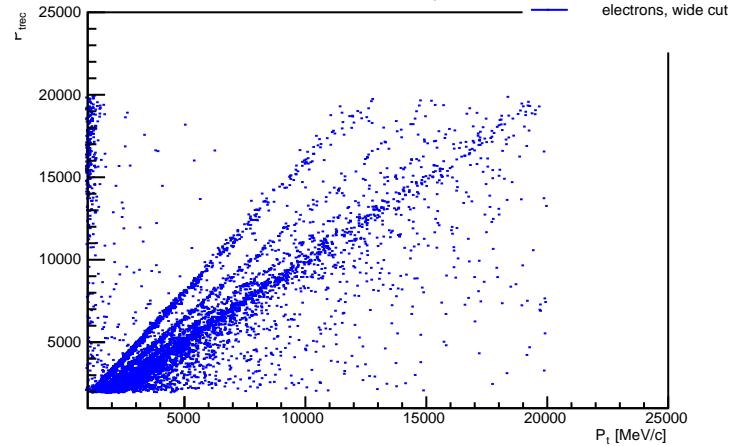
$P_{\text{trec}}$  Vs  $P_t$



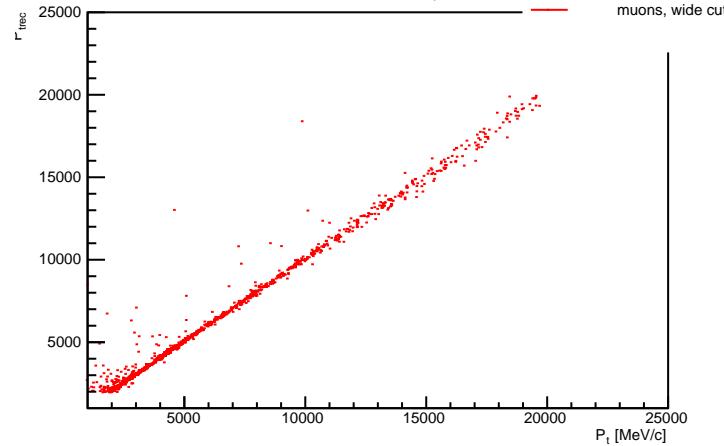
$P_{\text{trec}}$  Vs  $P_t$



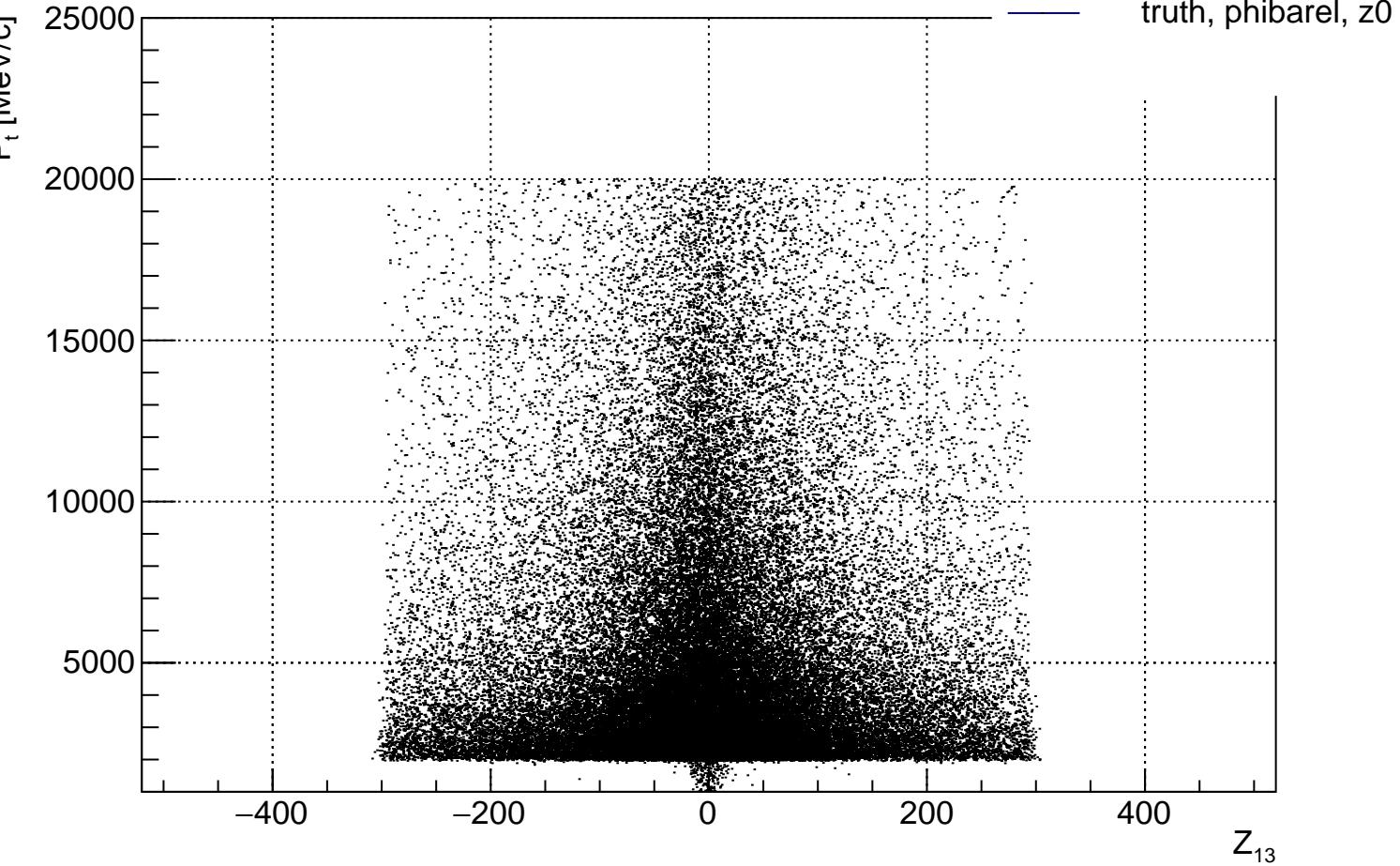
$P_{\text{trec}}$  Vs  $P_t$

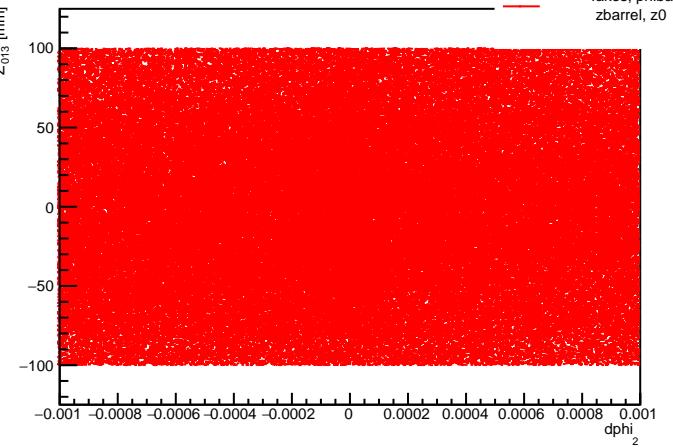
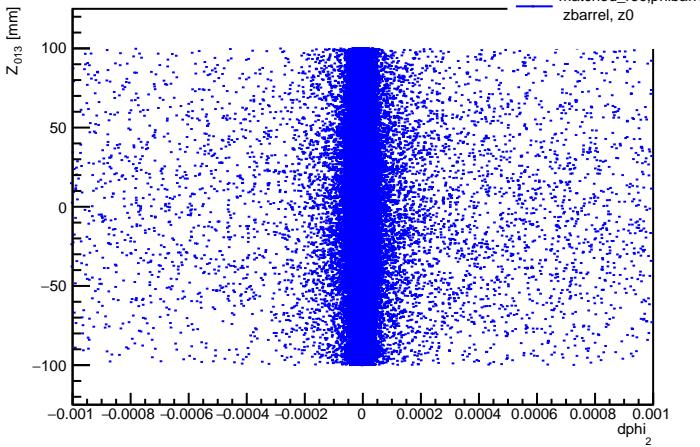
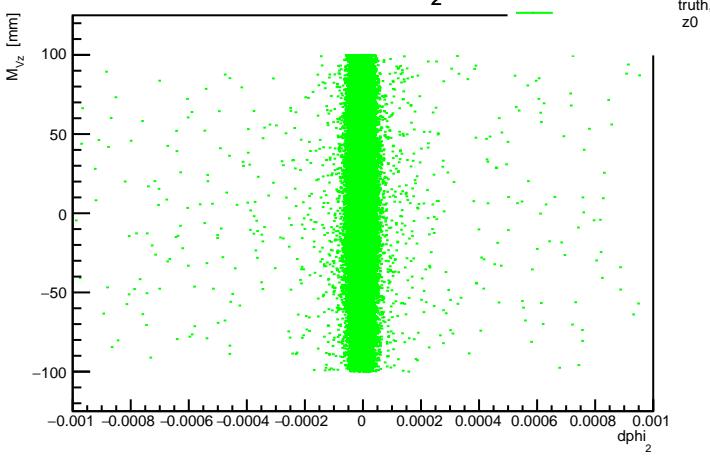
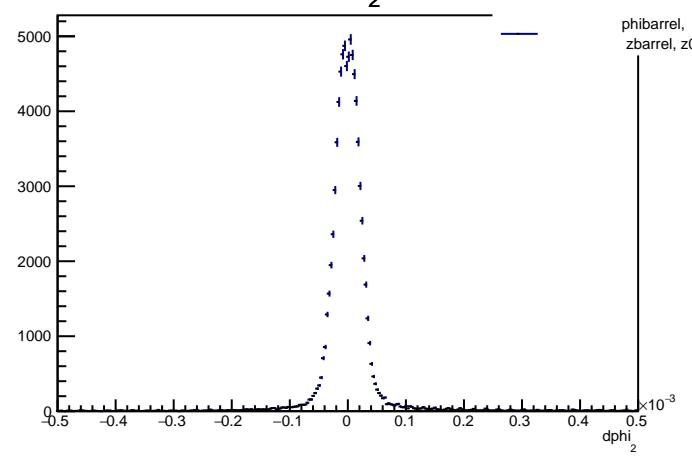


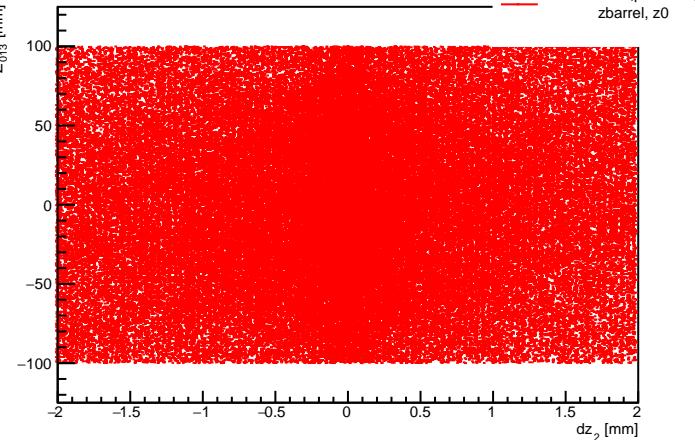
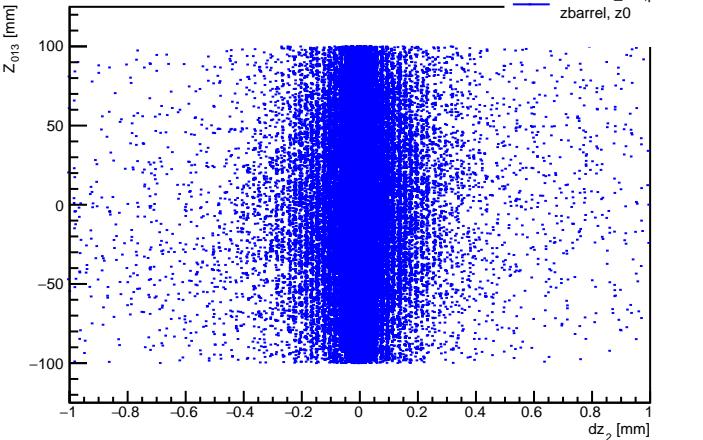
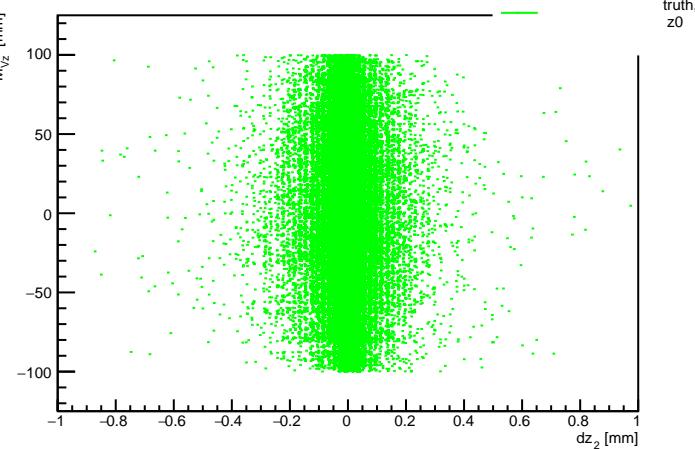
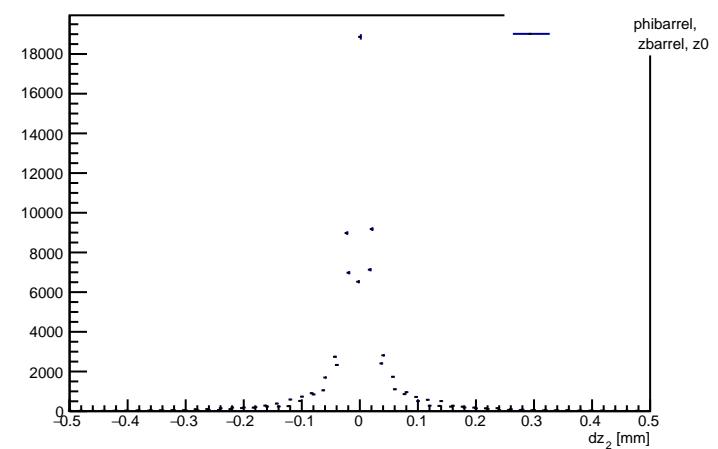
$P_{\text{trec}}$  Vs  $P_t$



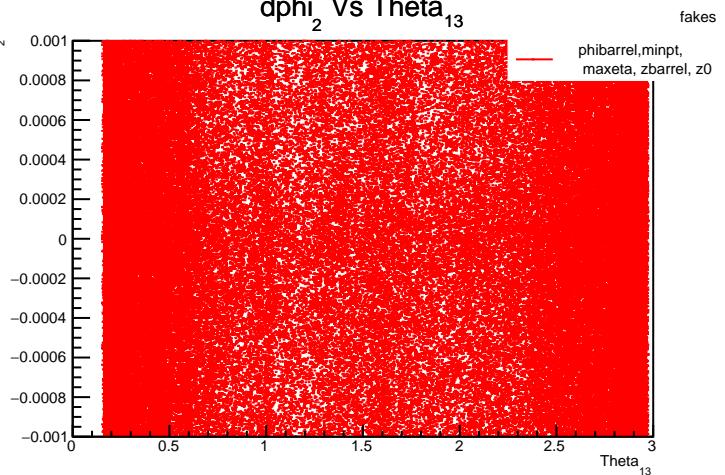
# $P_t$ Vs $Z_{13}$



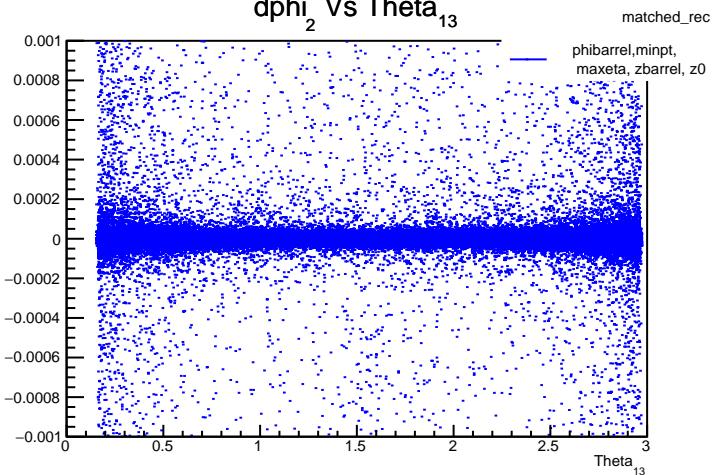
$Z_{013}$  Vs  $d\phi_i$  $Z_{013}$  Vs  $d\phi_i$  $M_{vz}$  Vs  $d\phi_i$  $d\phi_i$ 

$Z_{013}$  Vs  $dz_2$  $Z_{013}$  Vs  $dz_2$  $M_{vz}$  Vs  $dz_2$  $dz_2$ 

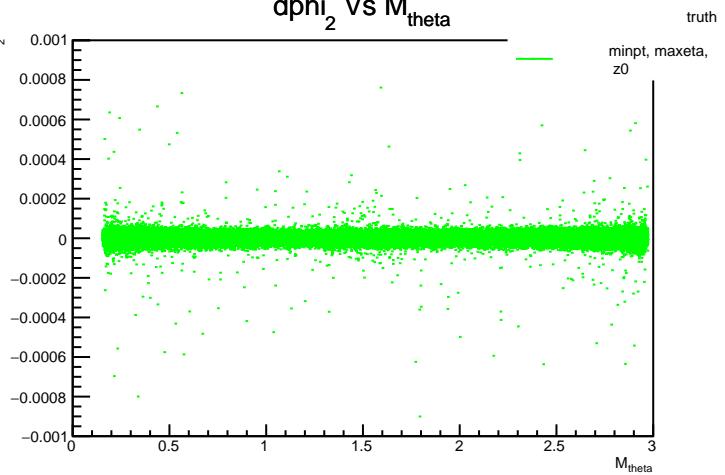
dphi<sub>2</sub> Vs Theta<sub>13</sub>



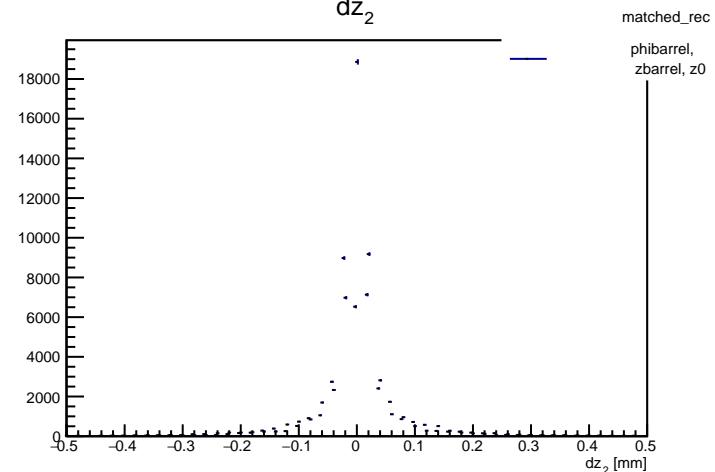
dphi<sub>2</sub> Vs Theta<sub>13</sub>



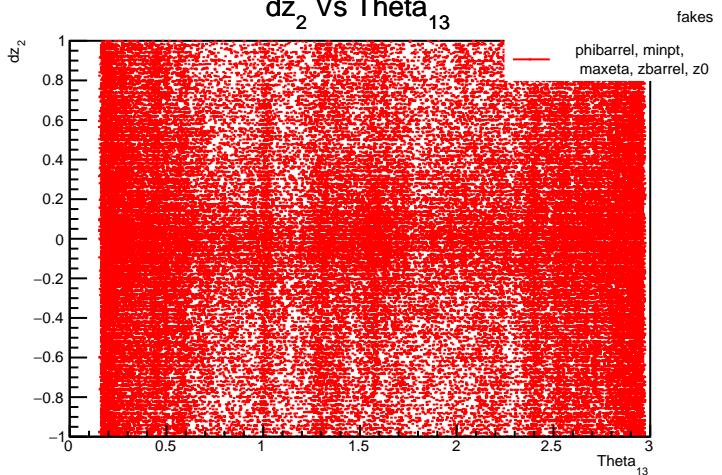
dphi<sub>2</sub> Vs M<sub>theta</sub>



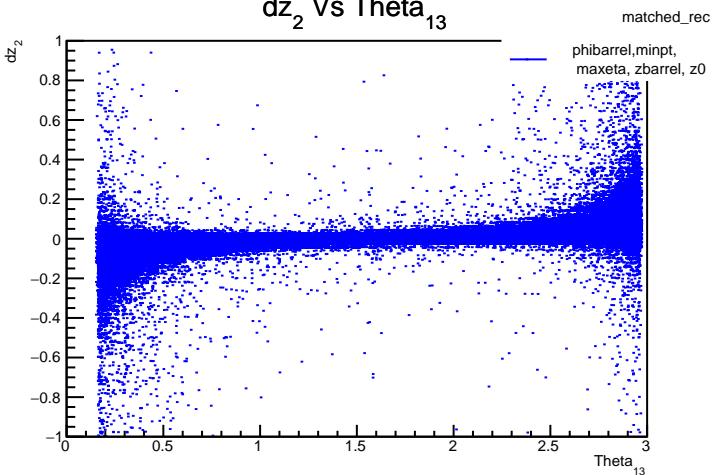
dz<sub>2</sub>



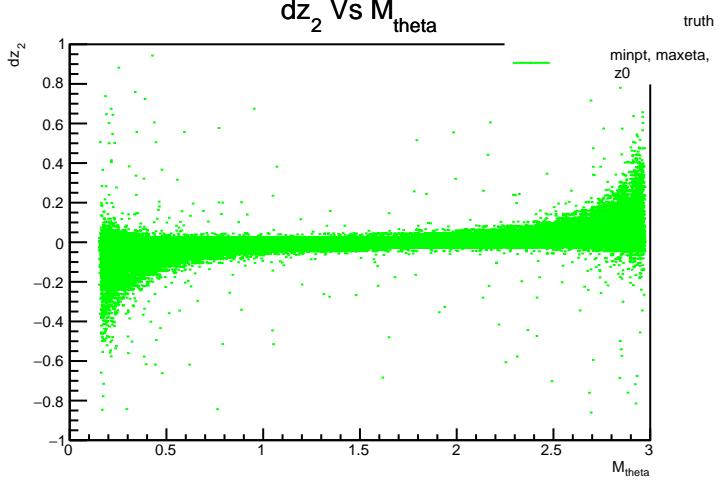
$dz_2$  Vs  $\Theta_{13}$



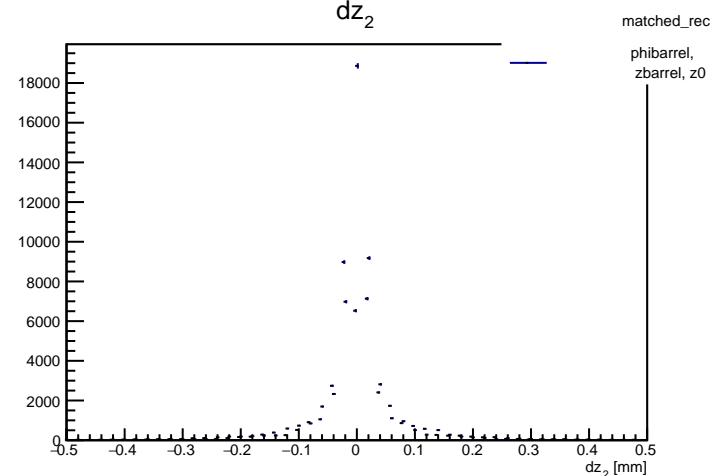
$dz_2$  Vs  $\Theta_{13}$



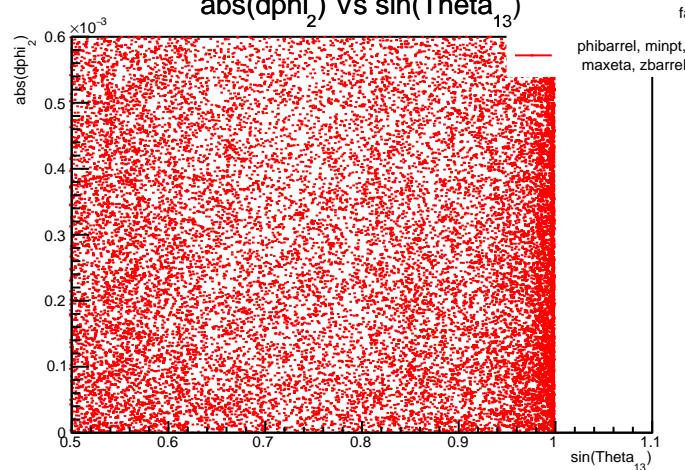
$dz_2$  Vs  $M_{\theta}$



$dz_2$



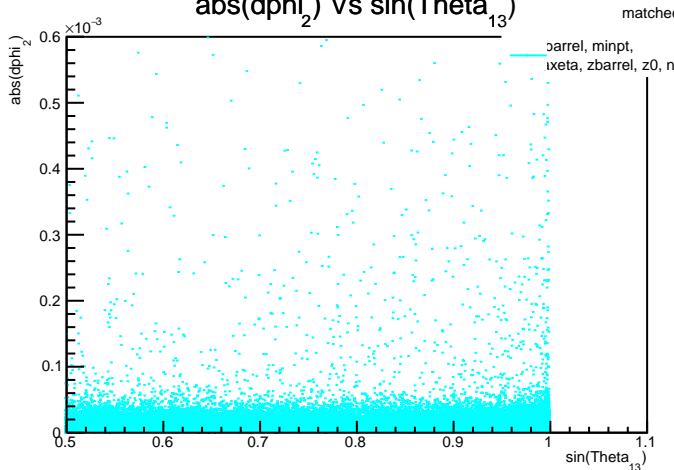
$\text{abs}(\text{dphi}_2)$  Vs  $\sin(\Theta_{13})$



fakes

phibarrel, minpt,  
maxeta, zbarrel, z0

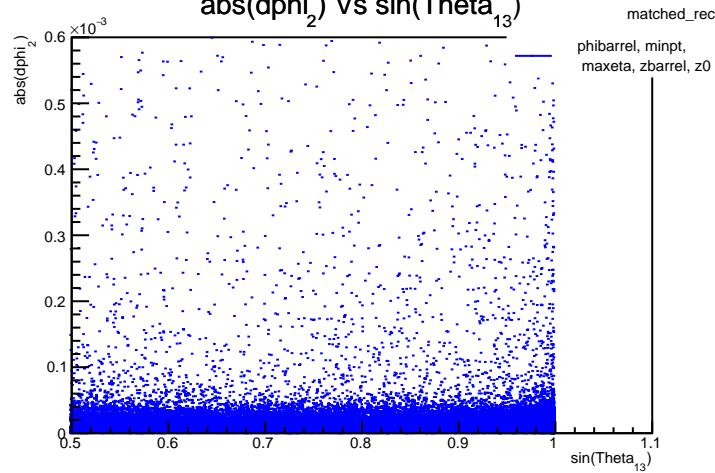
$\text{abs}(\text{dphi}_2)$  Vs  $\sin(\Theta_{13})$



matched\_rec

barrel, minpt,  
ixeta, zbarrel, z0, no e's

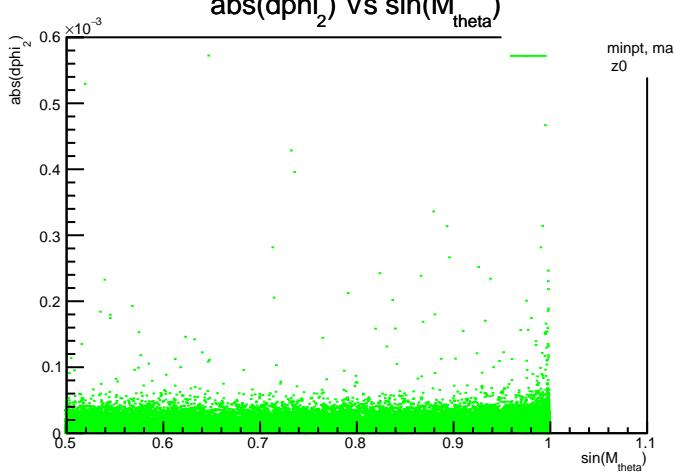
$\text{abs}(\text{dphi}_2)$  Vs  $\sin(\Theta_{13})$



matched\_rec

phibarrel, minpt,  
maxeta, zbarrel, z0

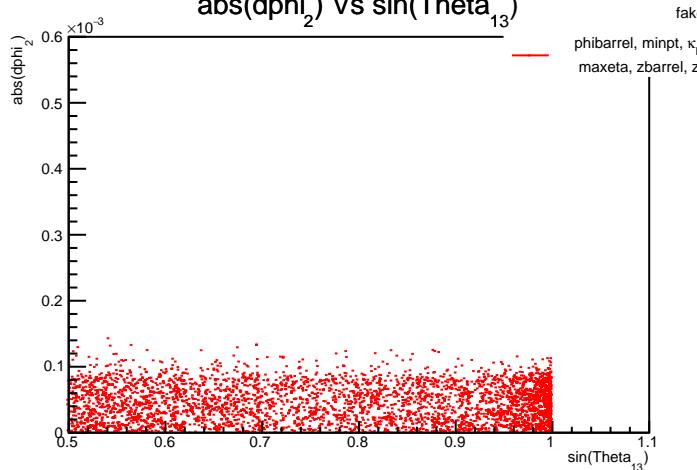
$\text{abs}(\text{dphi}_2)$  Vs  $\sin(M_{\theta})$



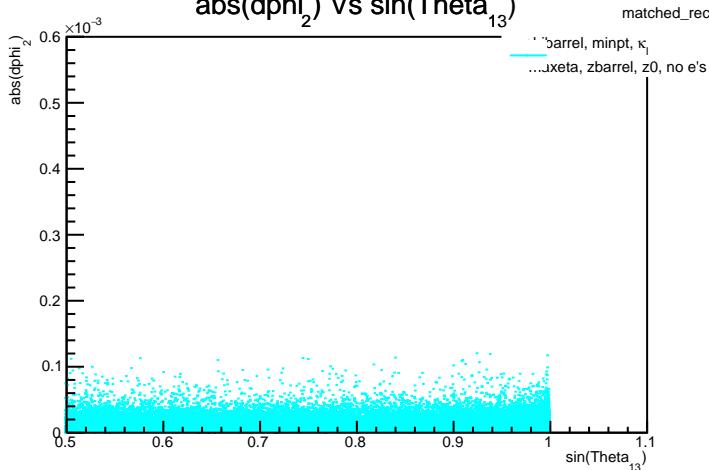
truth

minpt, maxeta,  
z0

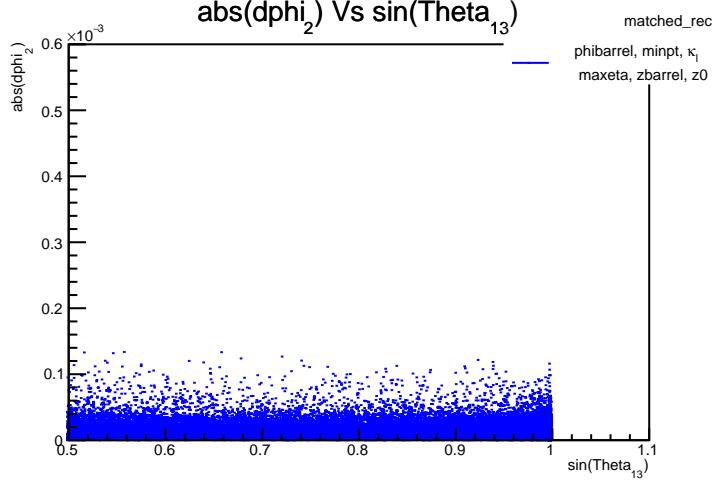
$\text{abs}(\text{dphi}_2)$  Vs  $\sin(\Theta_{13})$



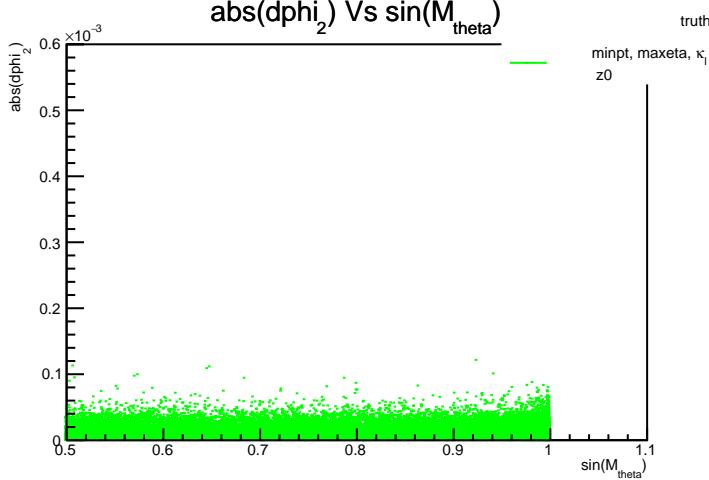
$\text{abs}(\text{dphi}_2)$  Vs  $\sin(\Theta_{13})$

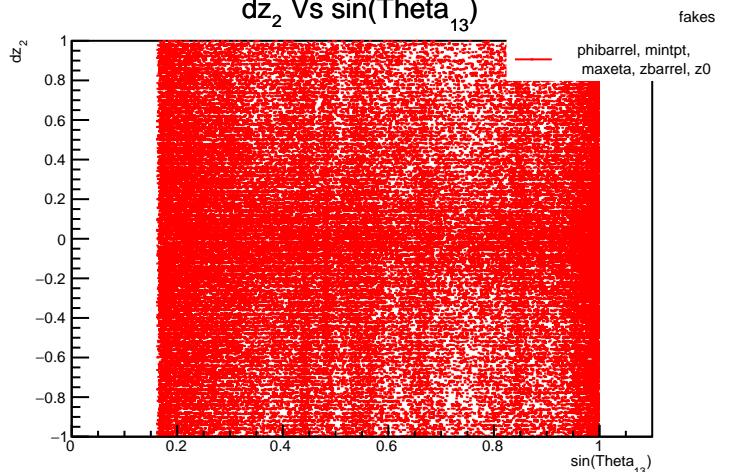
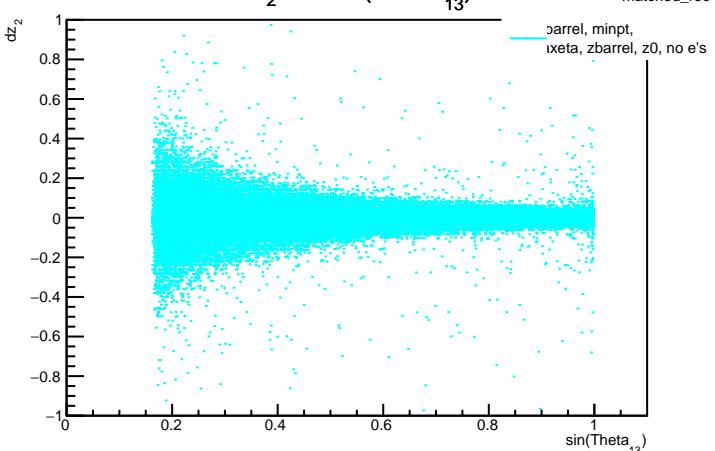
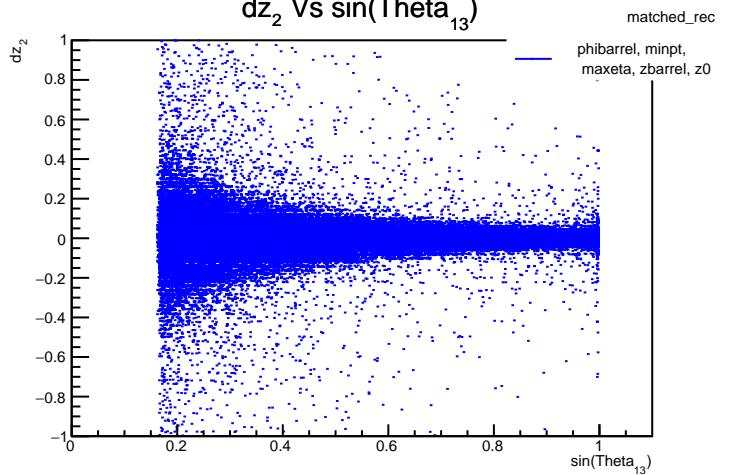
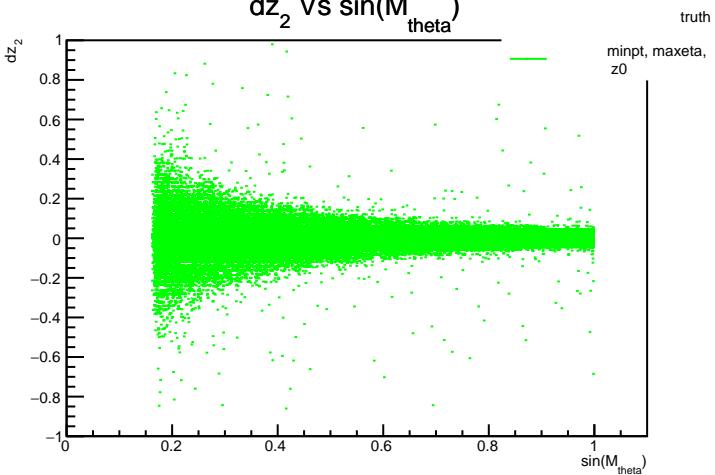


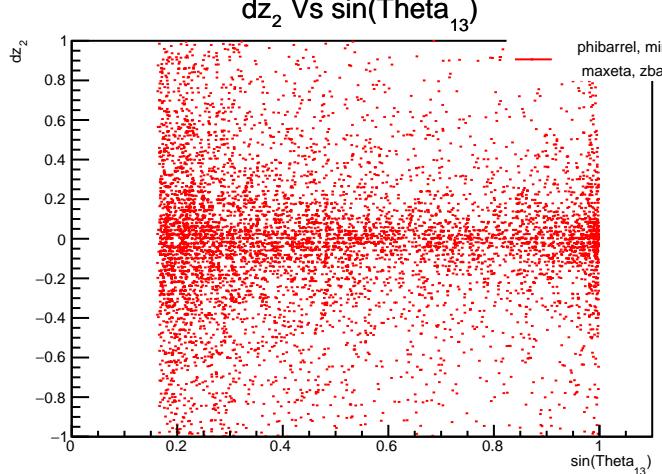
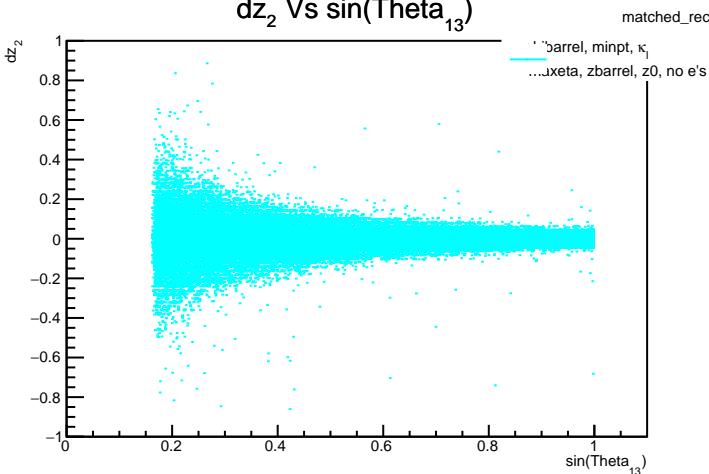
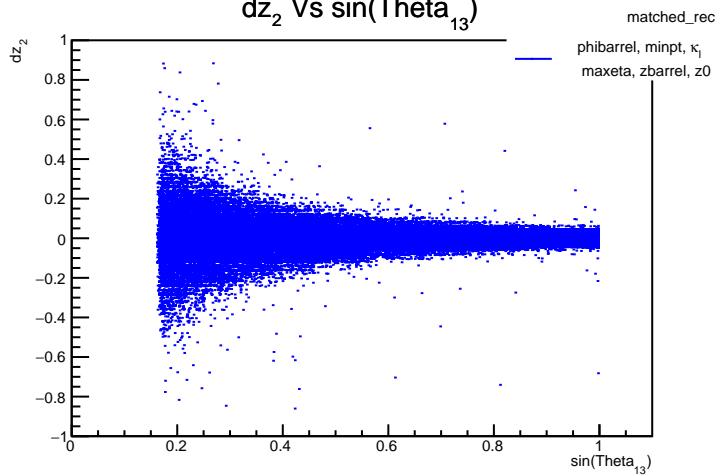
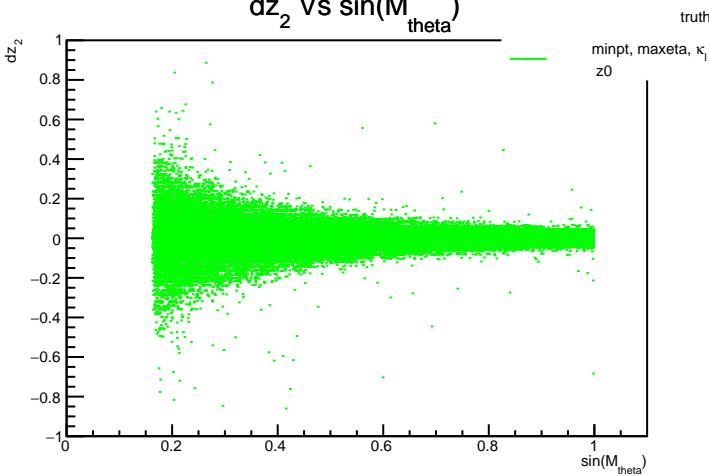
$\text{abs}(\text{dphi}_2)$  Vs  $\sin(\Theta_{13})$



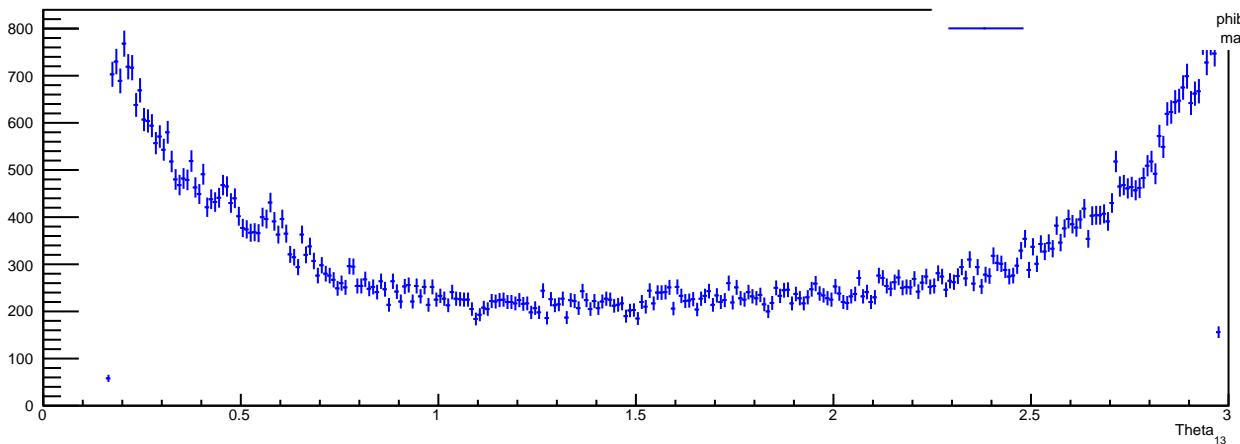
$\text{abs}(\text{dphi}_2)$  Vs  $\sin(M_{\theta})$



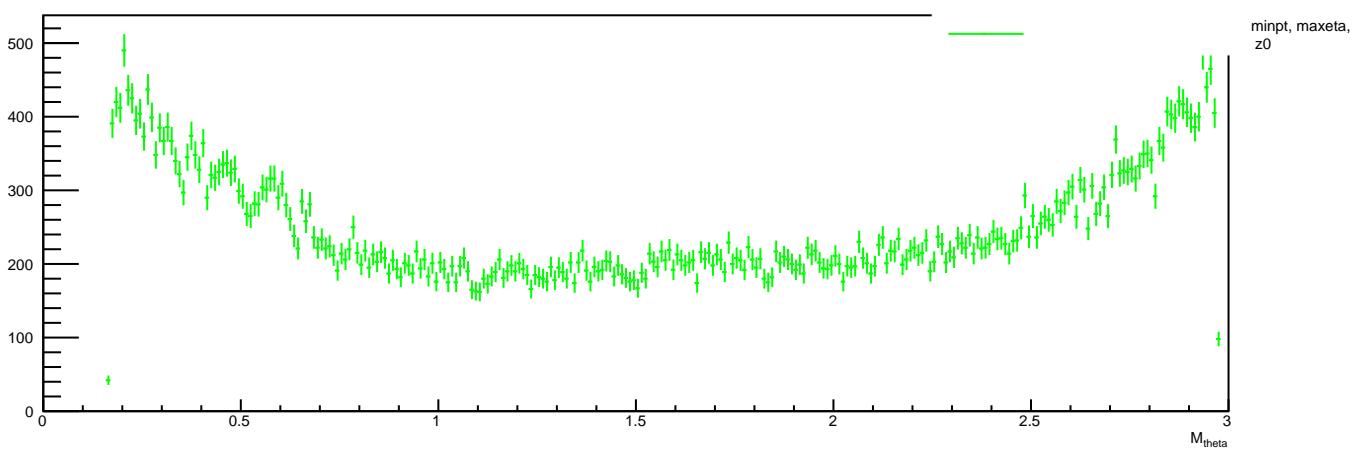
$dz_2$  Vs  $\sin(\Theta_{13})$  $dz_2$  Vs  $\sin(\Theta_{13})$  $dz_2$  Vs  $\sin(\Theta_{13})$  $dz_2$  Vs  $\sin(M_{\theta})$ 

$dz_2$  Vs  $\sin(\Theta_{13})$  $dz_2$  Vs  $\sin(\Theta_{13})$  $dz_2$  Vs  $\sin(\Theta_{13})$  $dz_2$  Vs  $\sin(M_{\theta})$ 

Theta<sub>13</sub>



M<sub>theta</sub>

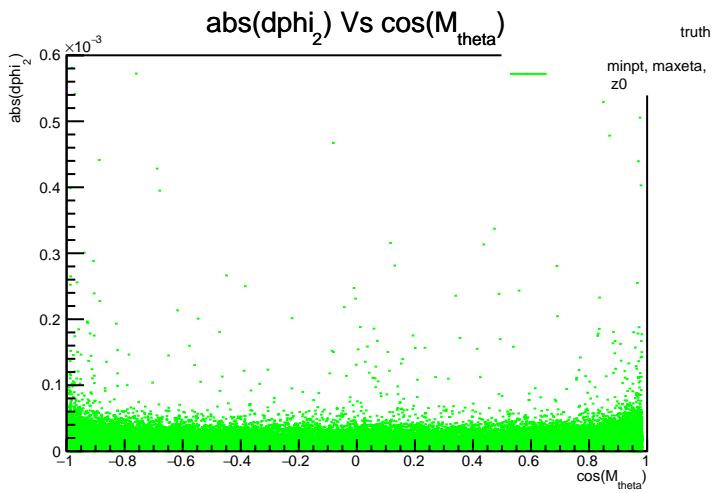
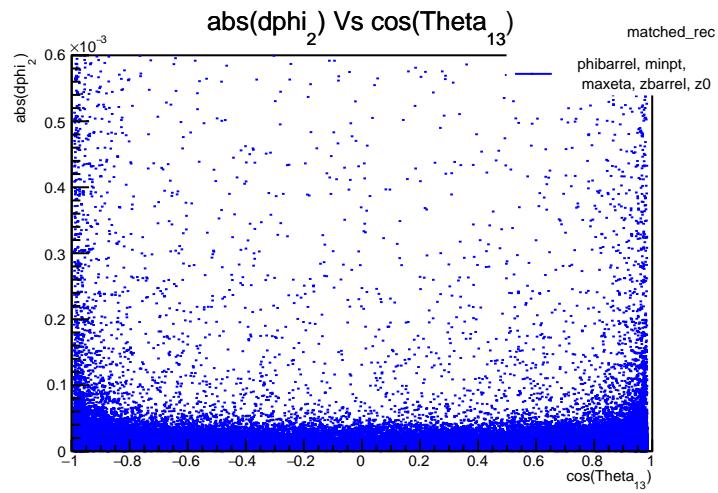
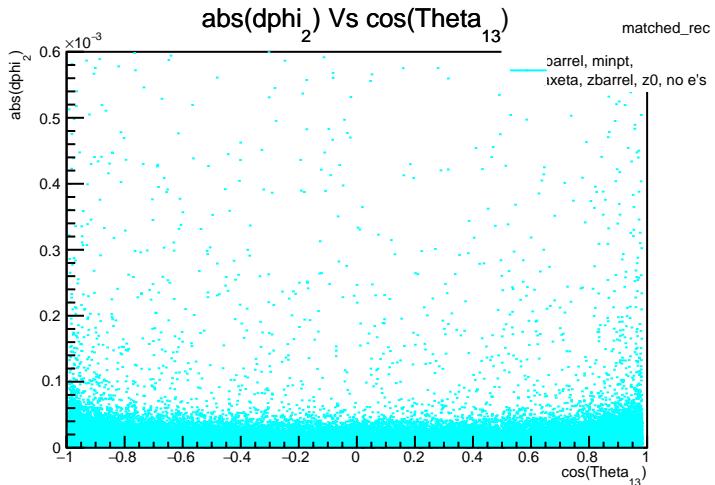
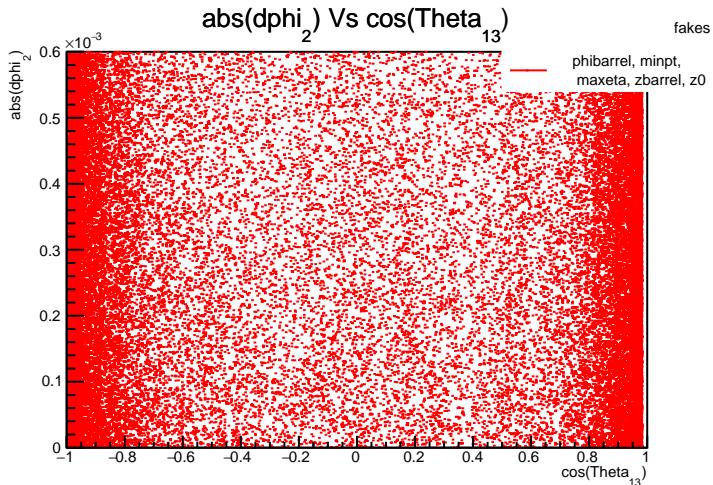


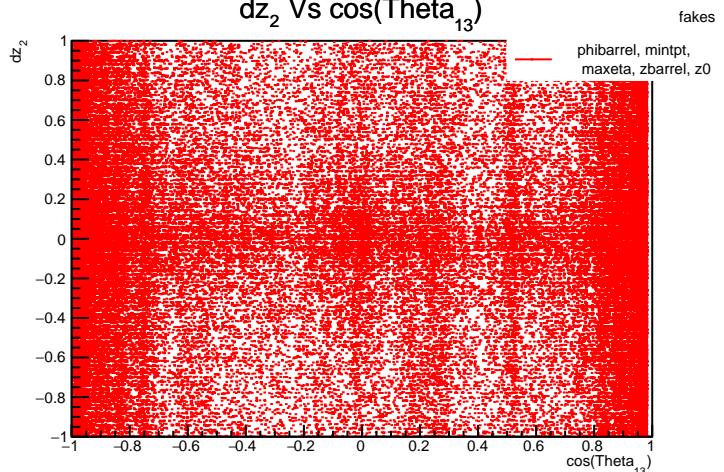
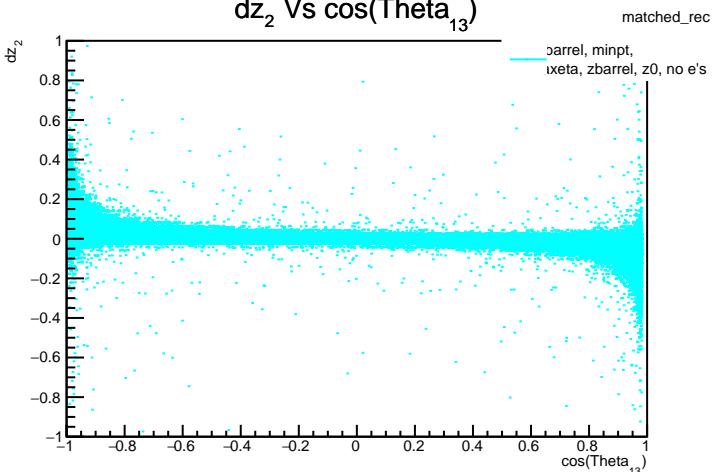
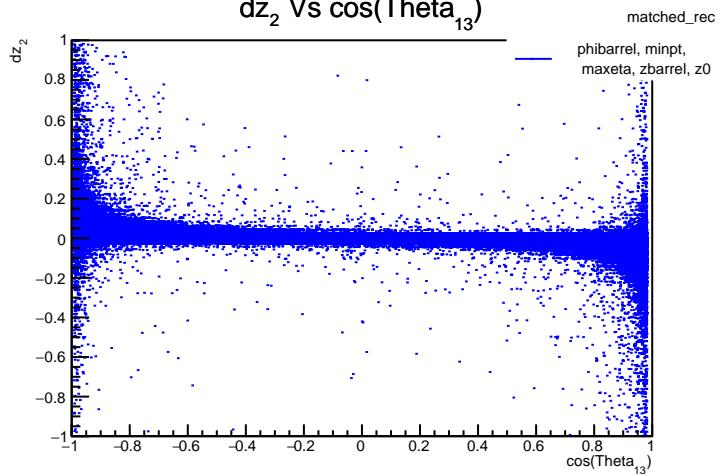
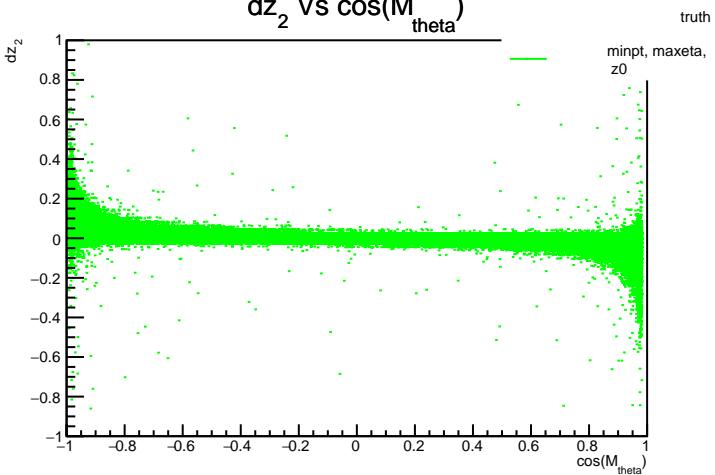
matched\_rec

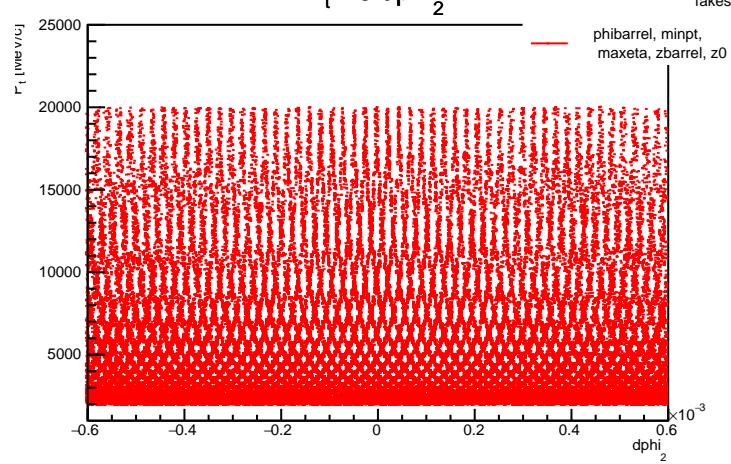
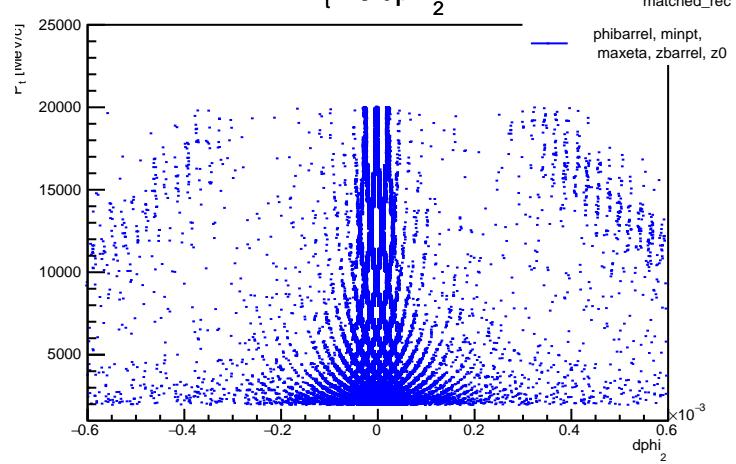
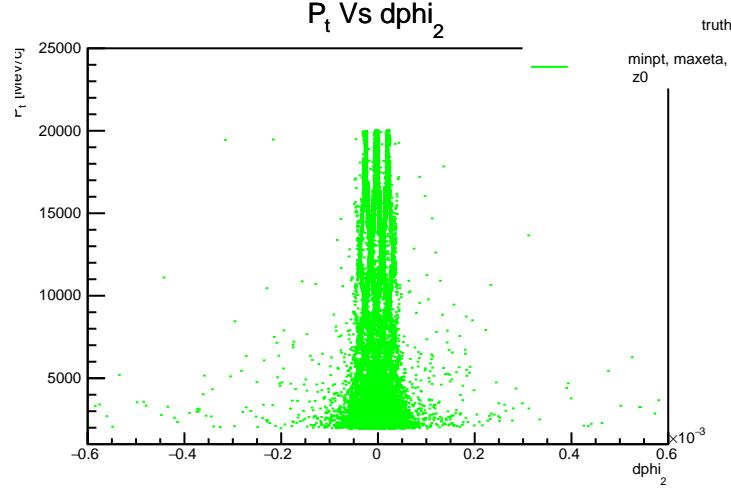
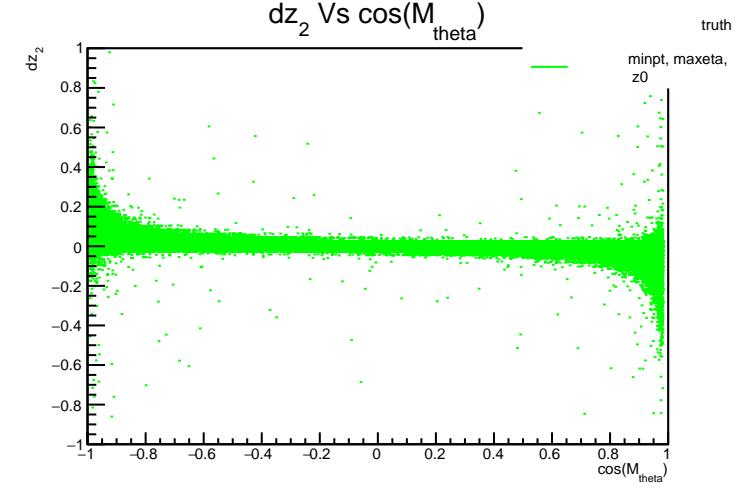
phibarrel,minpt,  
maxeta, zbarrel, z0

truth

minpt, maxeta,  
z0

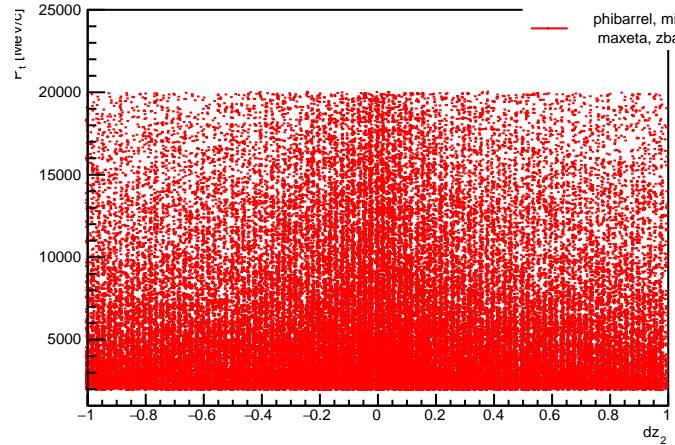


$dz_2$  Vs  $\cos(\Theta_{13})$  $dz_2$  Vs  $\cos(\Theta_{13})$  $dz_2$  Vs  $\cos(\Theta_{13})$  $dz_2$  Vs  $\cos(M_{\theta})$ 

$P_t$  Vs  $d\phi_{2}$  $P_t$  Vs  $d\phi_{2}$  $P_t$  Vs  $d\phi_{2}$  $dz_2$  Vs  $\cos(M_{\theta})$ 

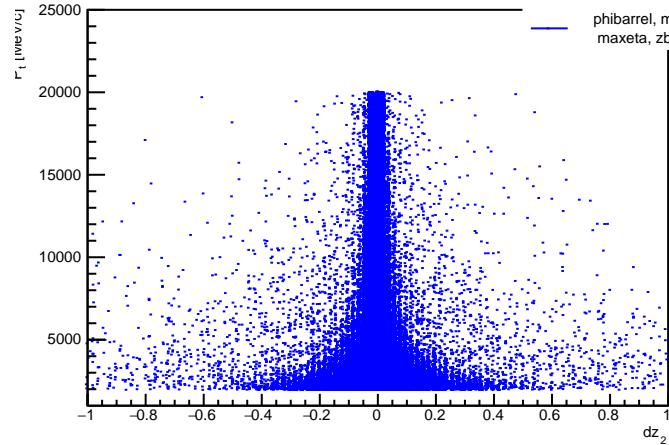
$P_t$  Vs  $dz_2$

fakes



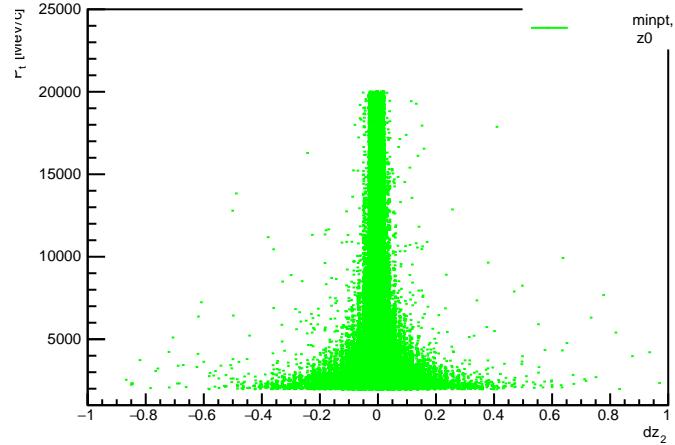
$P_t$  Vs  $dz_2$

matched\_rec



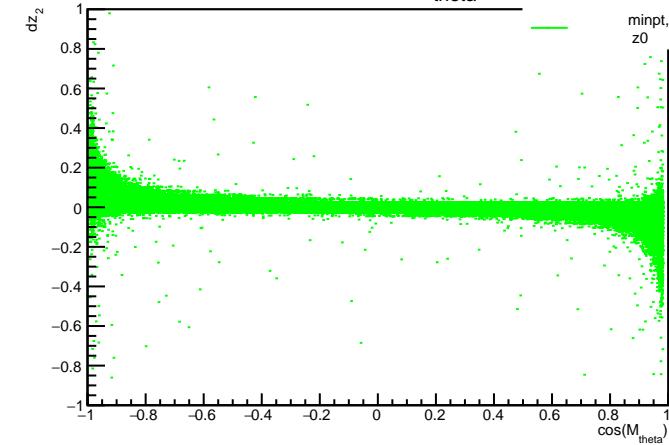
$P_t$  Vs  $dz_2$

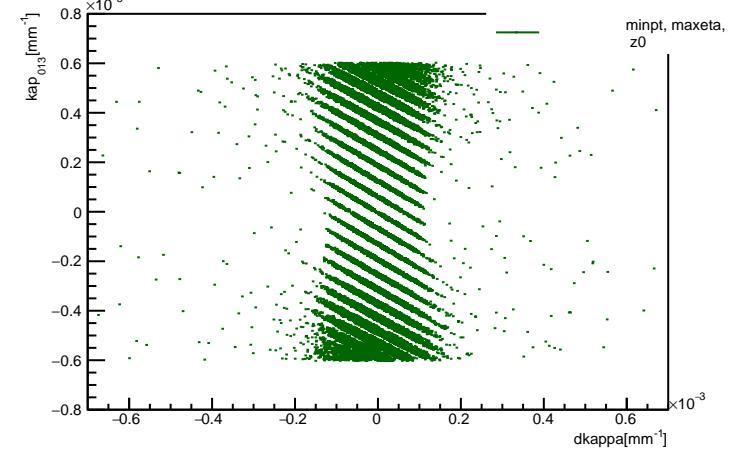
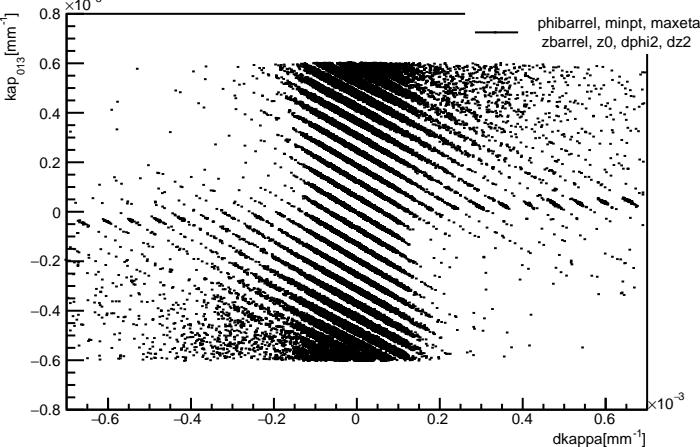
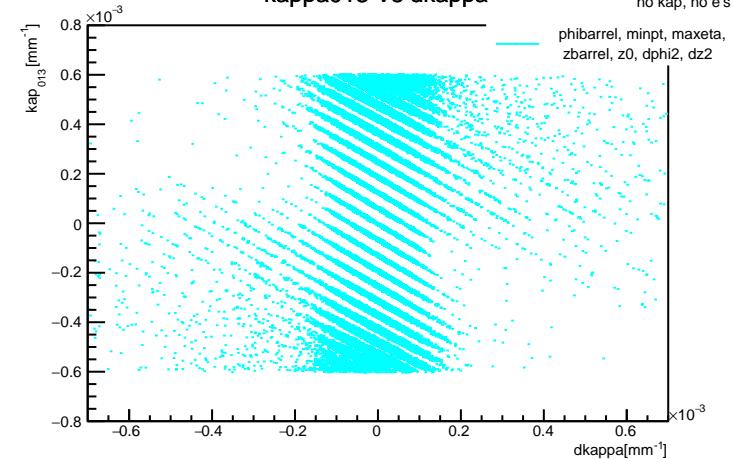
truth



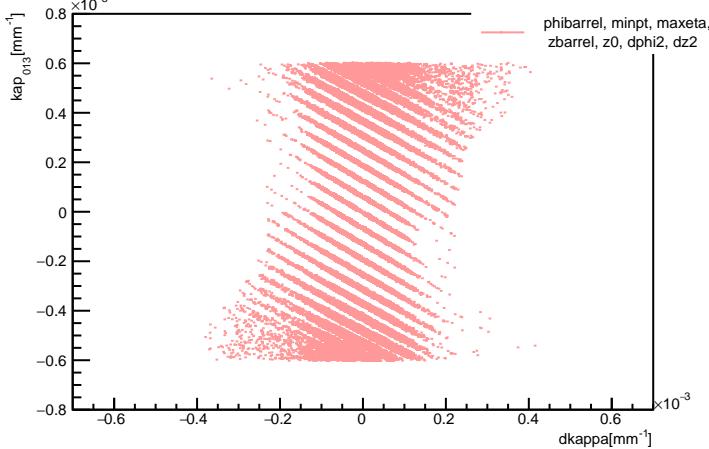
$dz_2$  Vs  $\cos(M_{\theta})$

truth

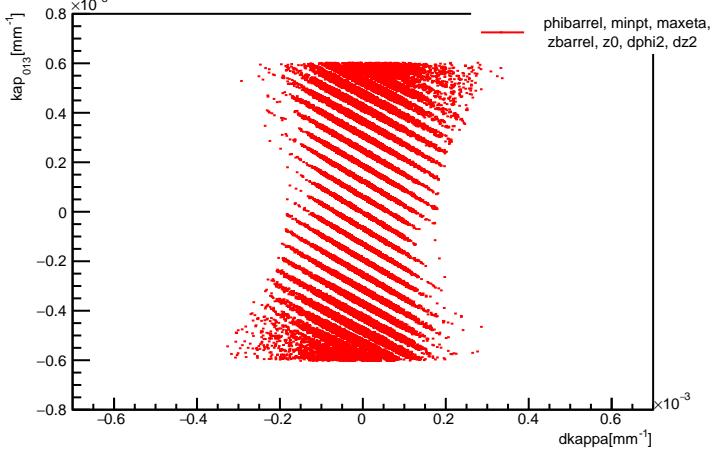


**kappa013 Vs dkappa****kappa013 Vs dkappa****kappa013 Vs dkappa**

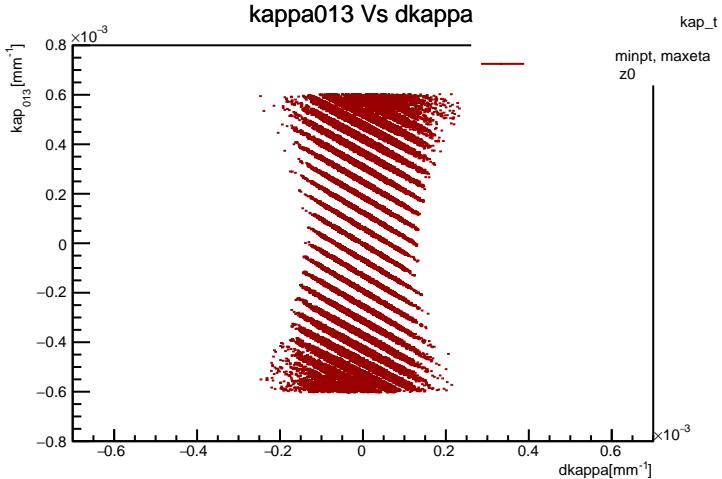
kappa013 Vs dkappa



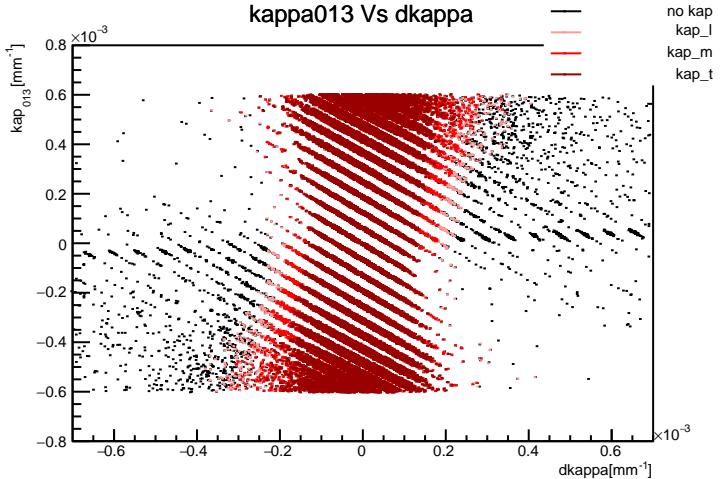
kappa013 Vs dkappa



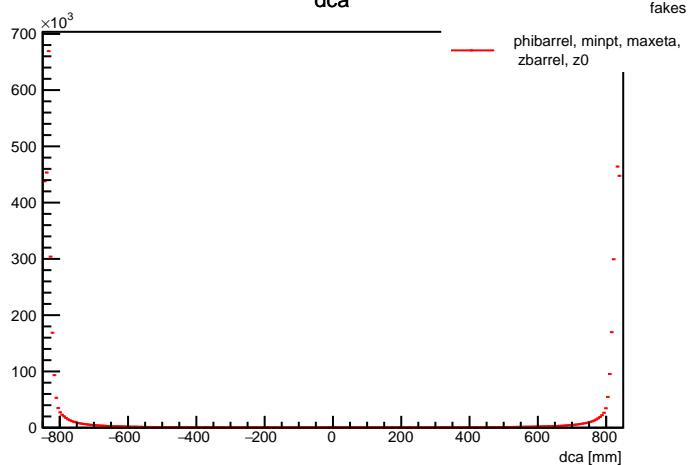
kappa013 Vs dkappa



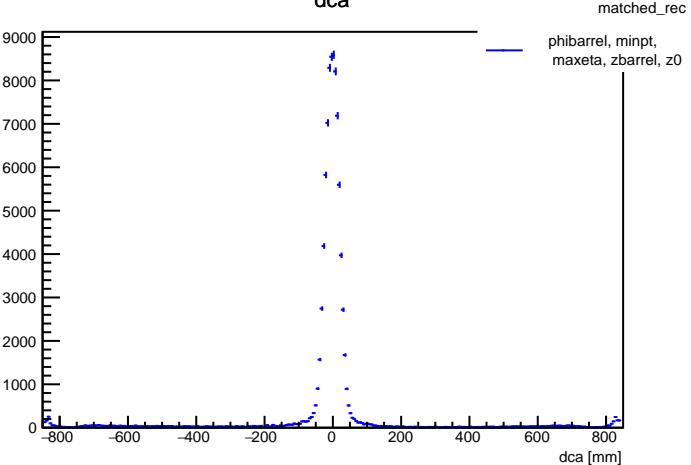
kappa013 Vs dkappa



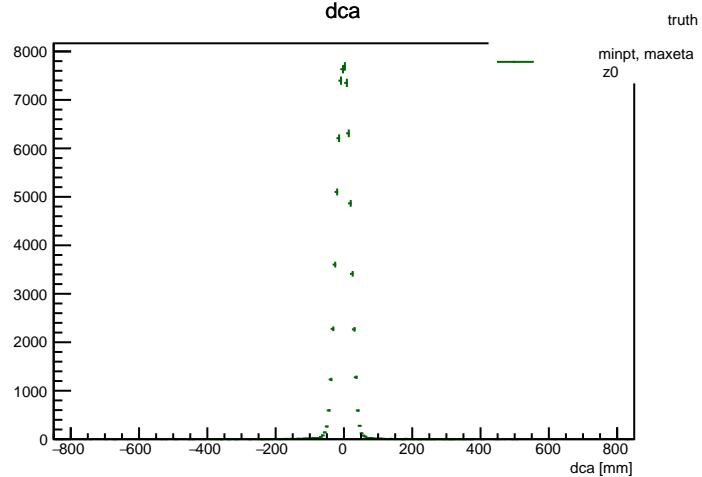
dca



dca

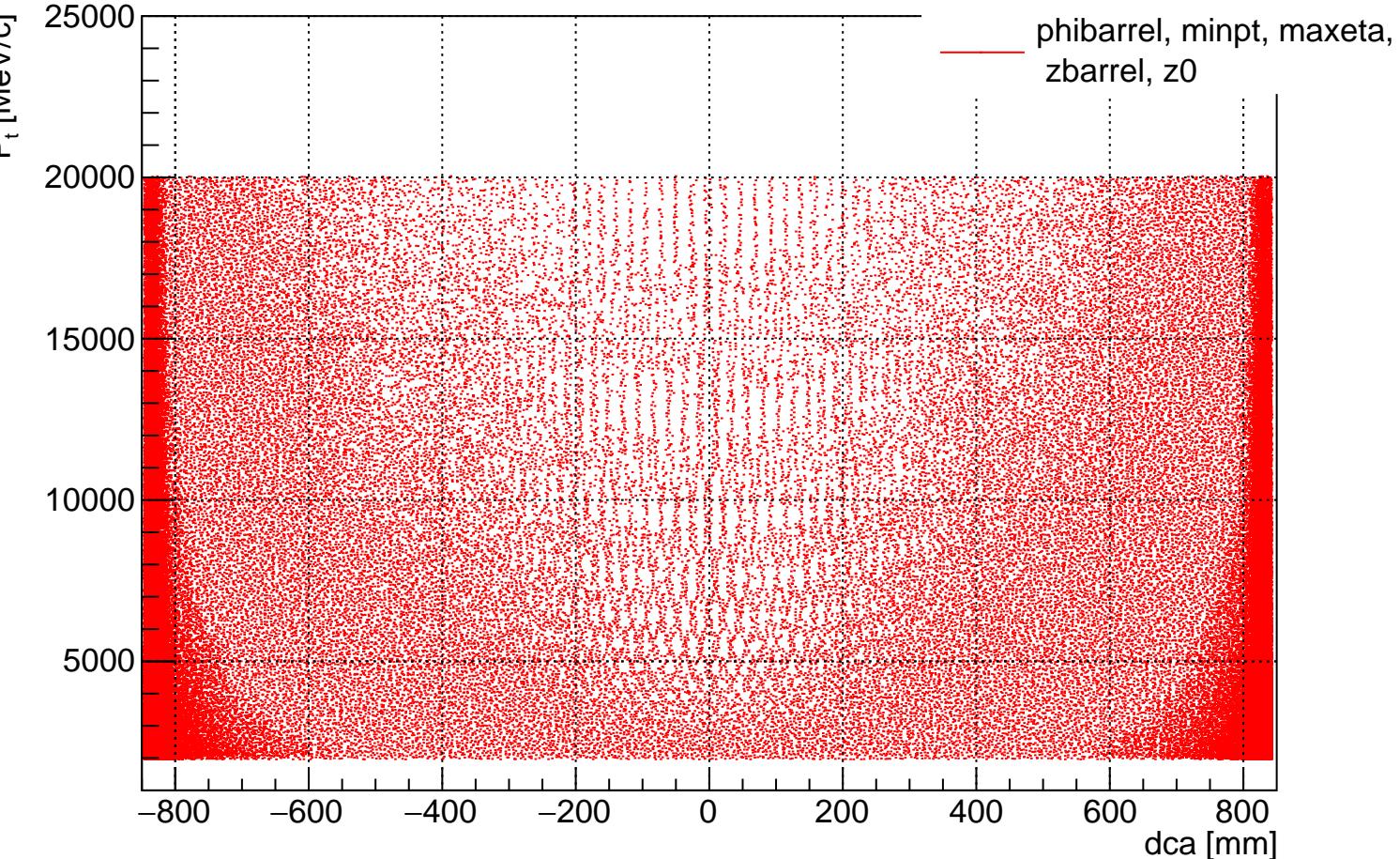


dca

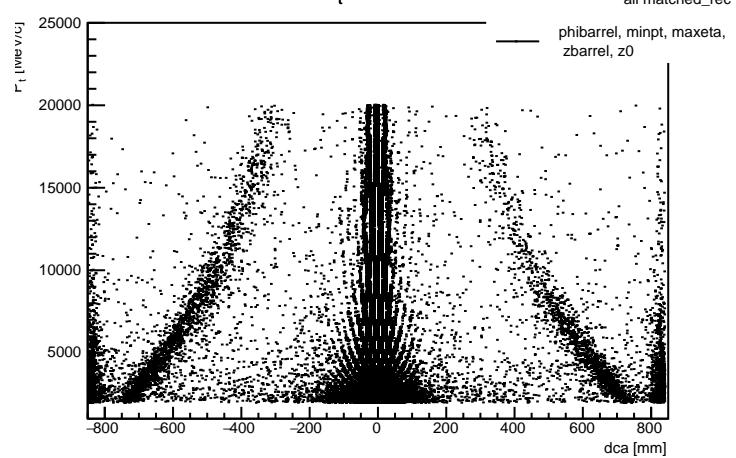


# $P_t$ Vs dca

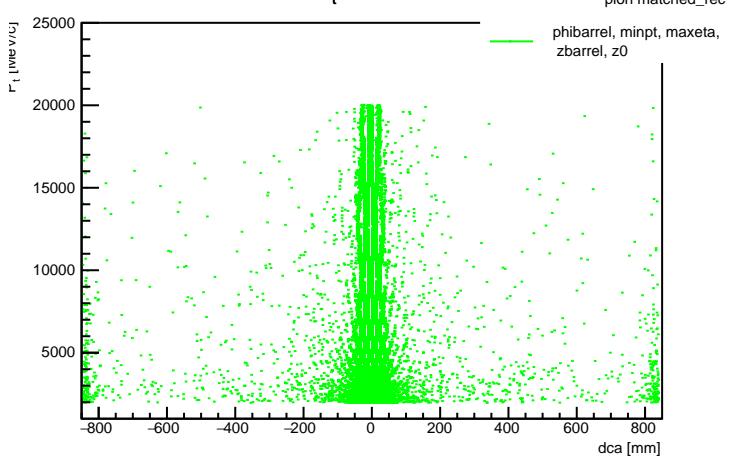
fakes



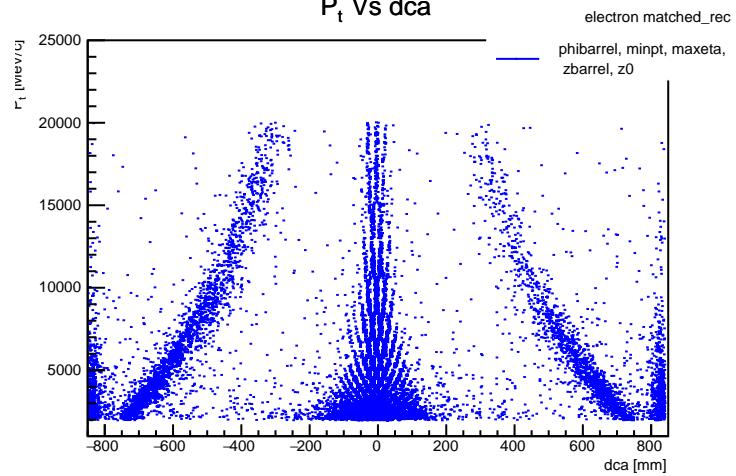
$P_t$  Vs dca



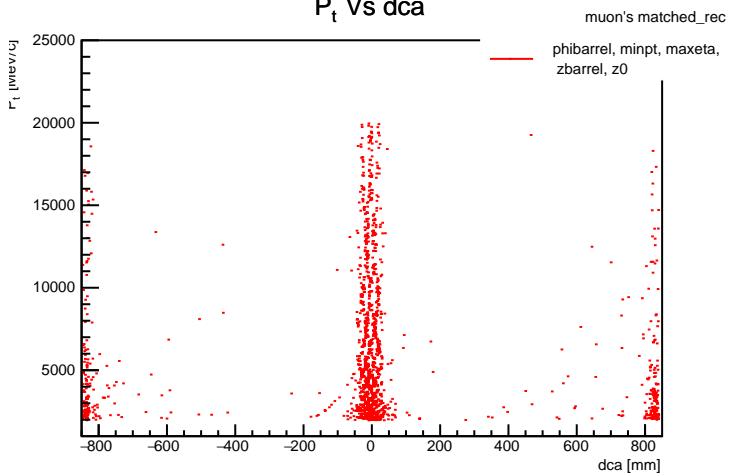
$P_t$  Vs dca



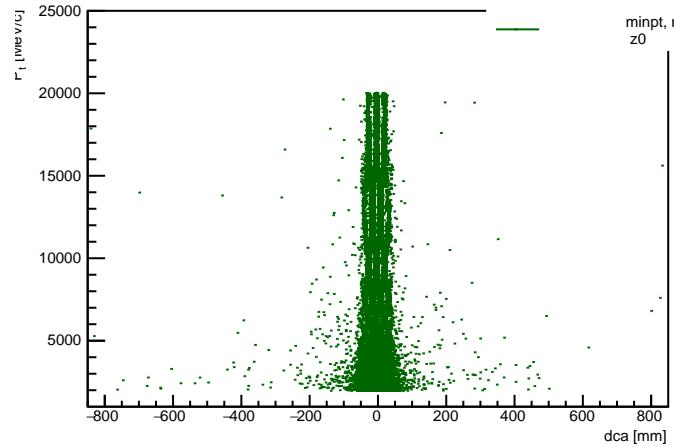
$P_t$  Vs dca



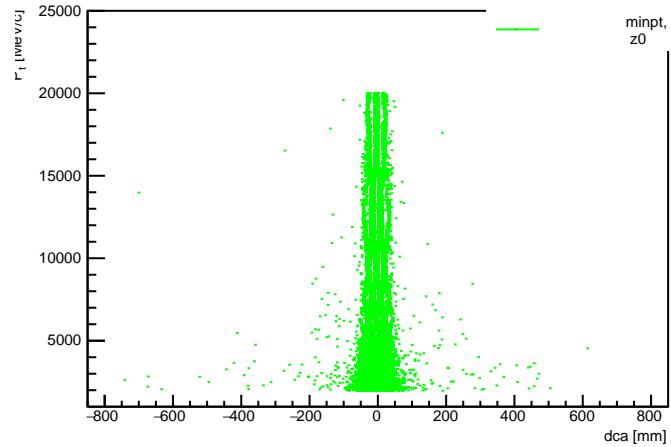
$P_t$  Vs dca



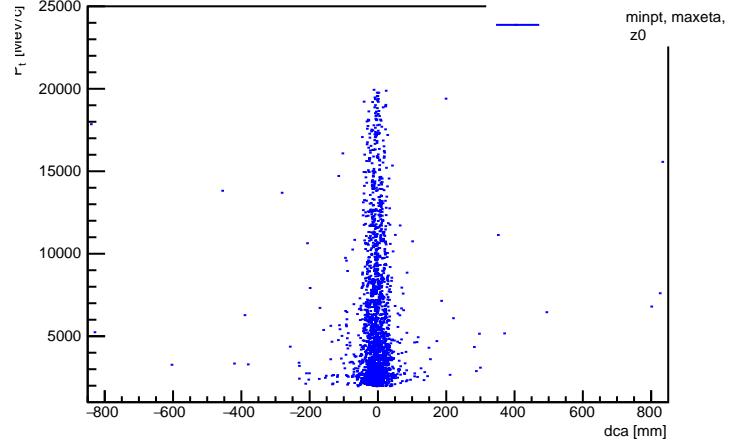
$P_t$  Vs dca



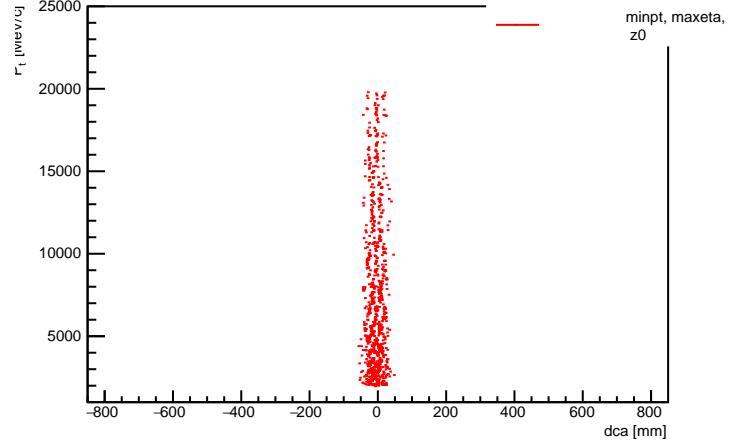
$P_t$  Vs dca



$P_t$  Vs dca



$P_t$  Vs dca



all truth

minpt, maxeta,  
z0

pion truth

electron truth

minpt, maxeta,  
z0

muon's truth

minpt, maxeta,  
z0

# $Z_0$ Vs dca

fakes

$Z_0$  [mm]

100

80

60

40

20

0

-20

-40

-60

-80

-100

-800

-600

-400

-200

0

200

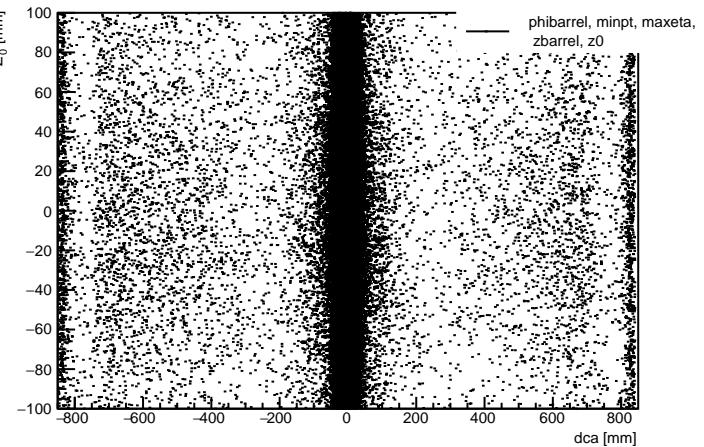
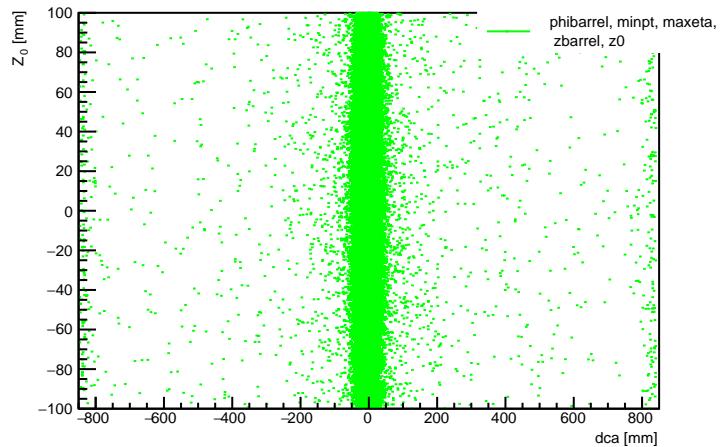
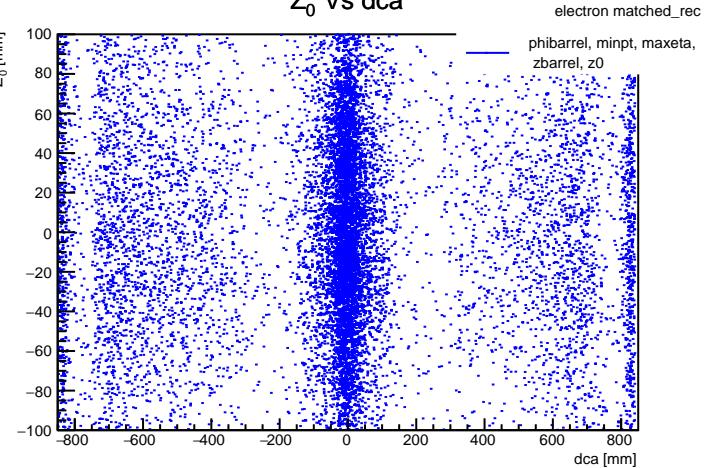
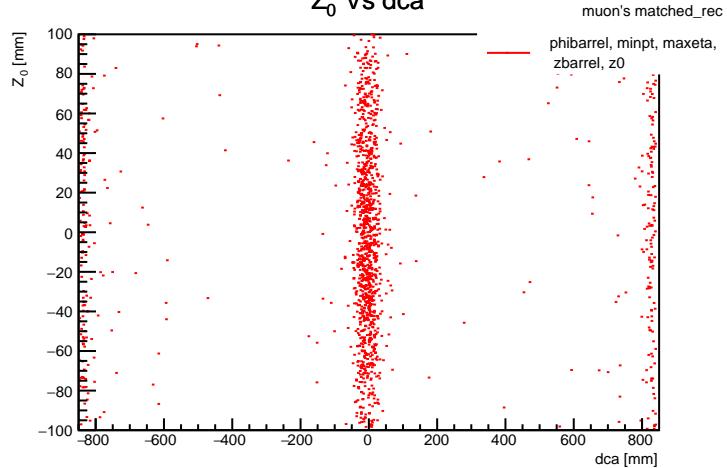
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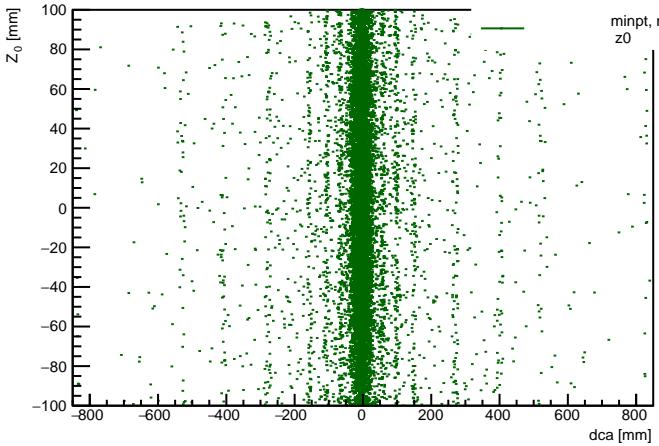
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dca [mm]

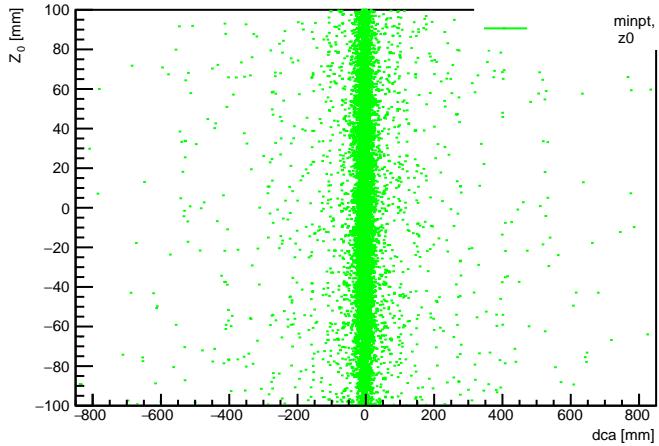
phibarrel, minpt, maxeta,  
zbarrel, z0

$Z_0$  Vs dca $Z_0$  Vs dca $Z_0$  Vs dca $Z_0$  Vs dca

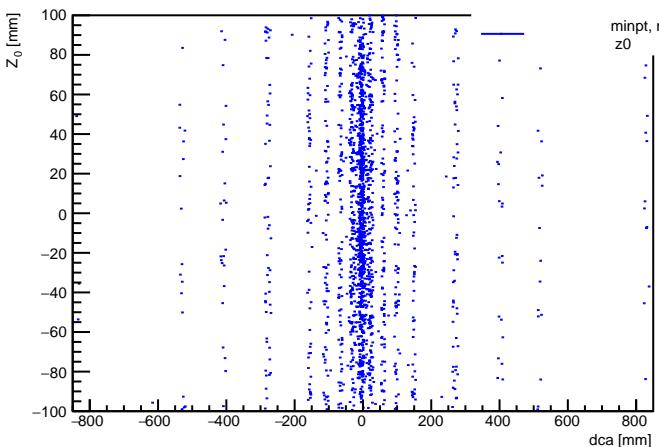
### $Z_0$ Vs dca



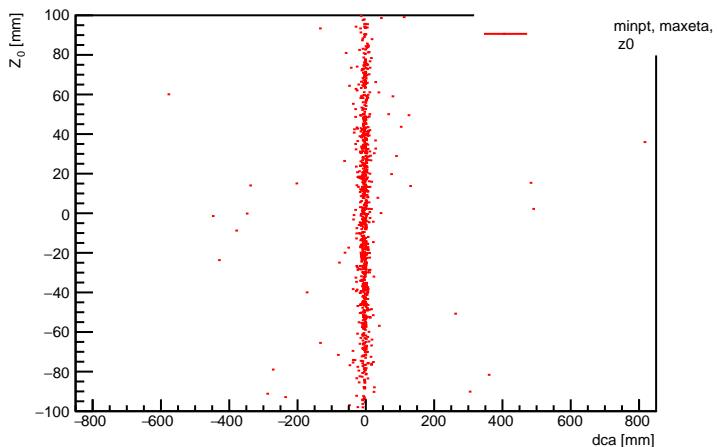
### $Z_0$ Vs dca

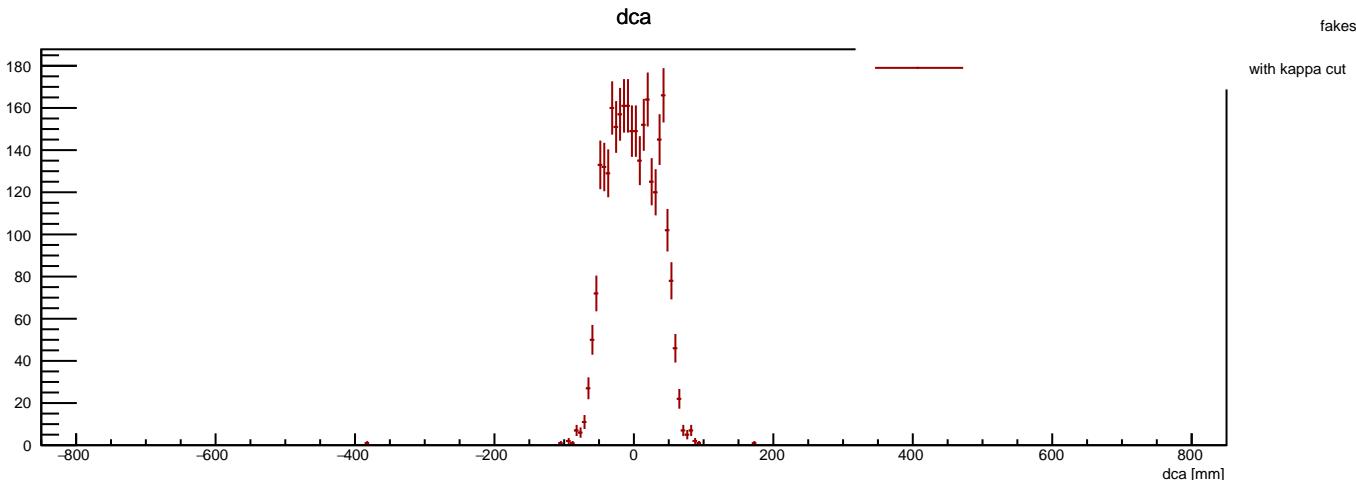
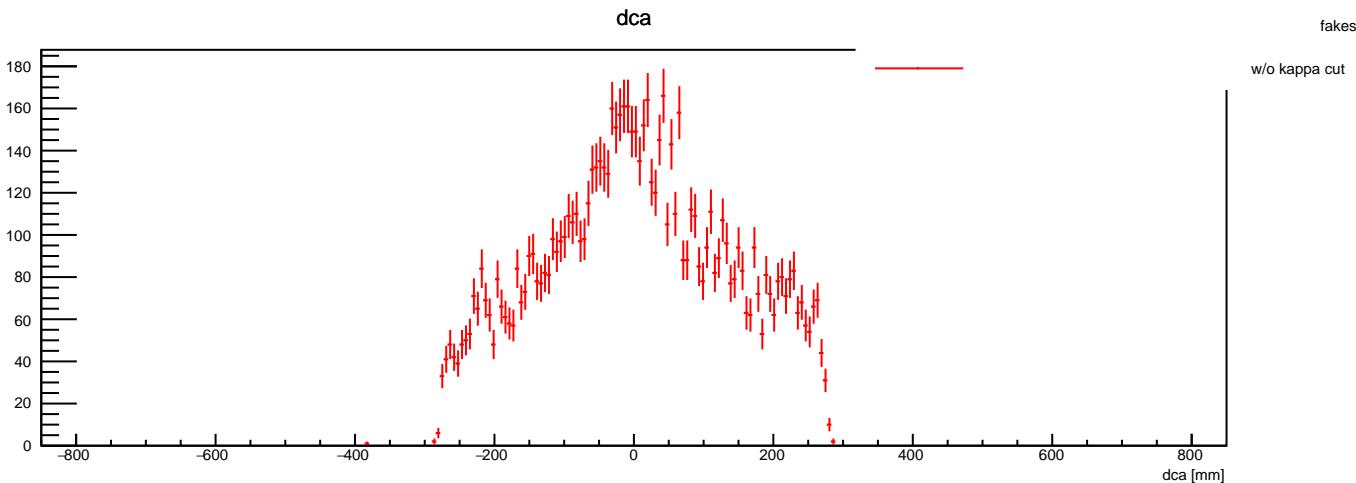


### $Z_0$ Vs dca



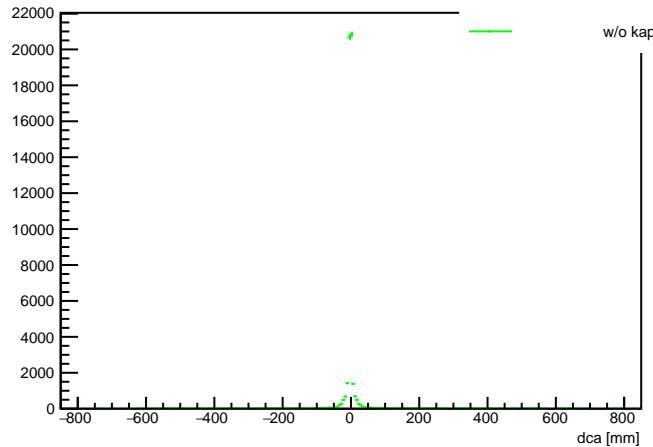
### $Z_0$ Vs dca





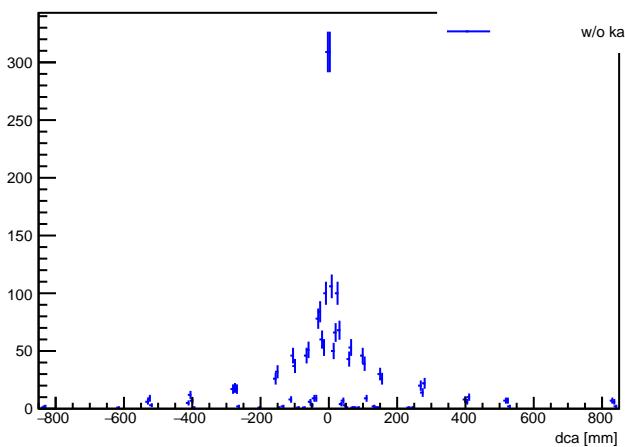
dca

pion truth



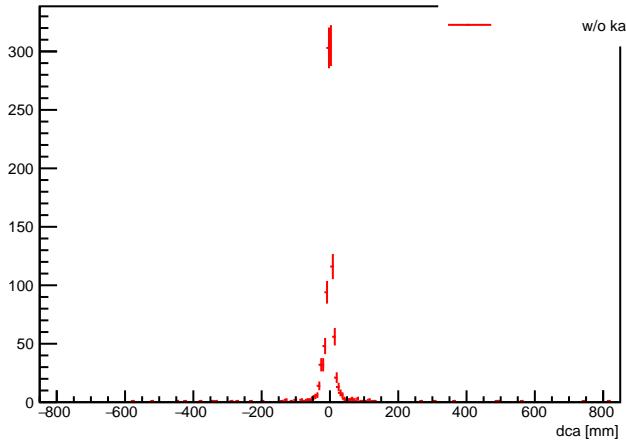
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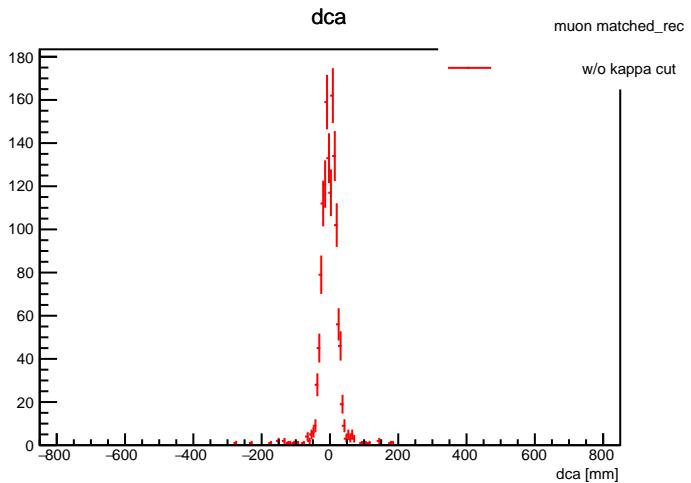
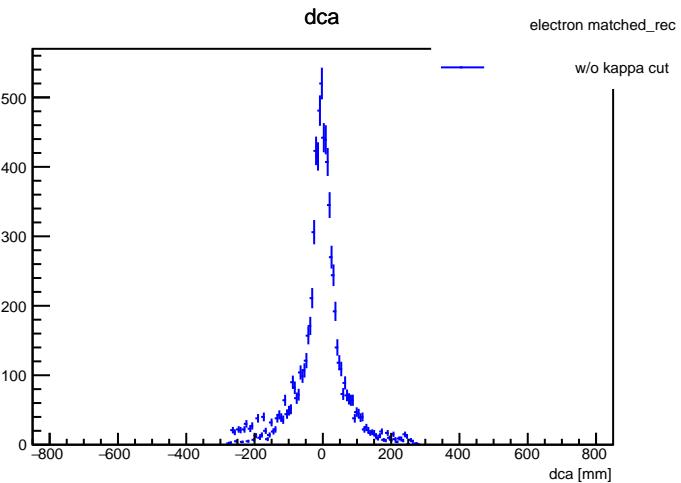
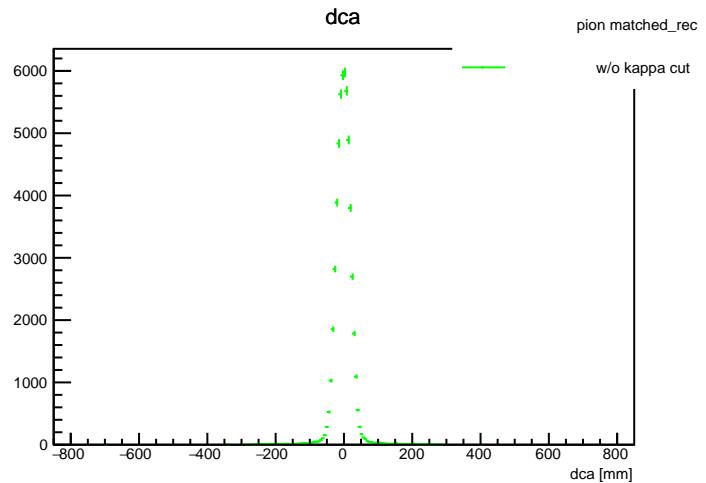
electron truth



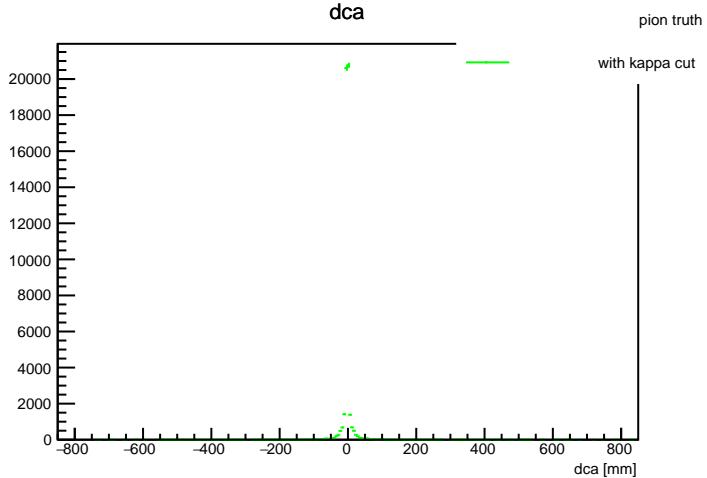
dca

muon truth

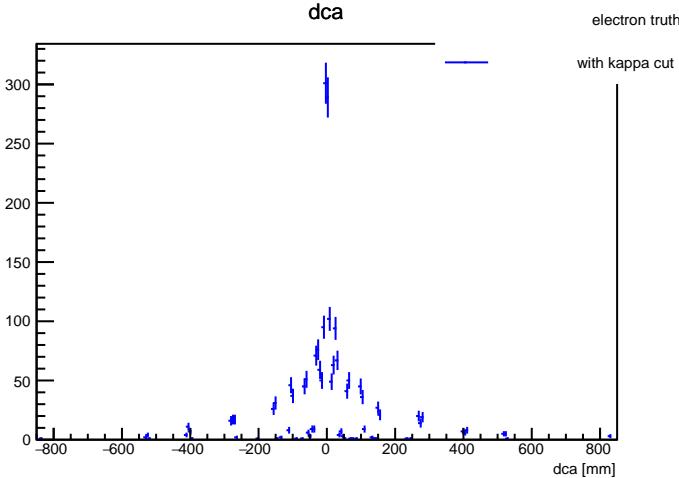




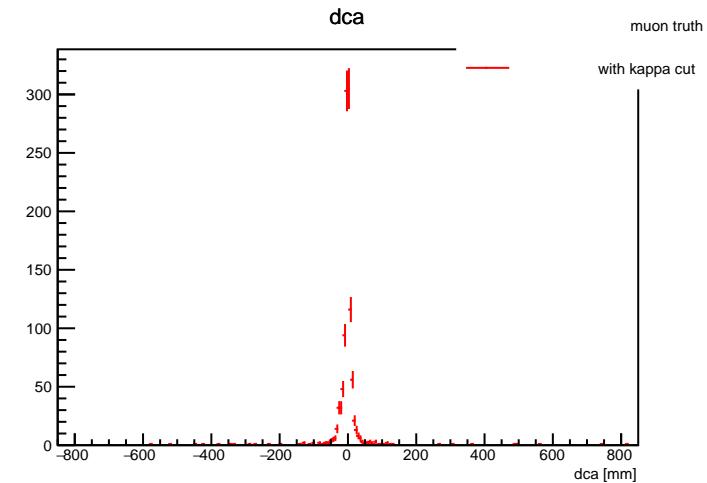
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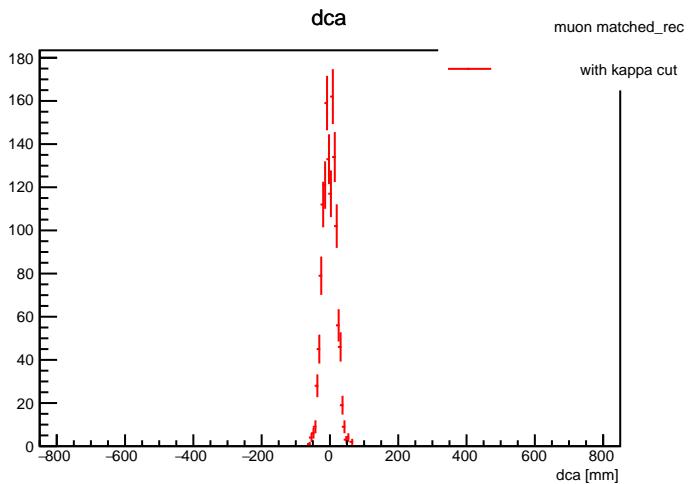
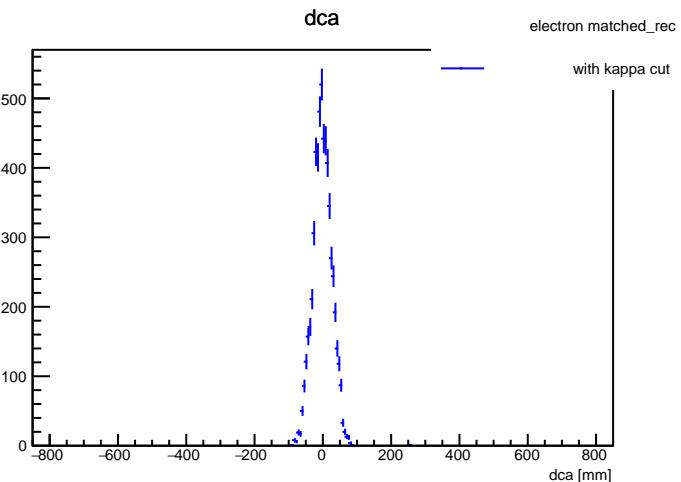
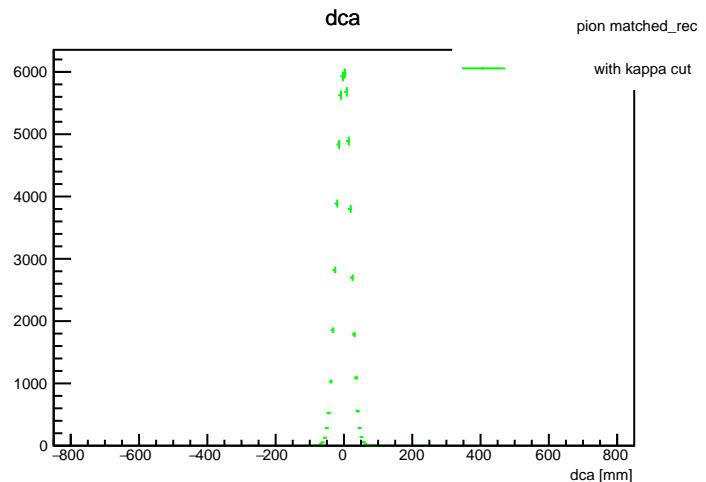


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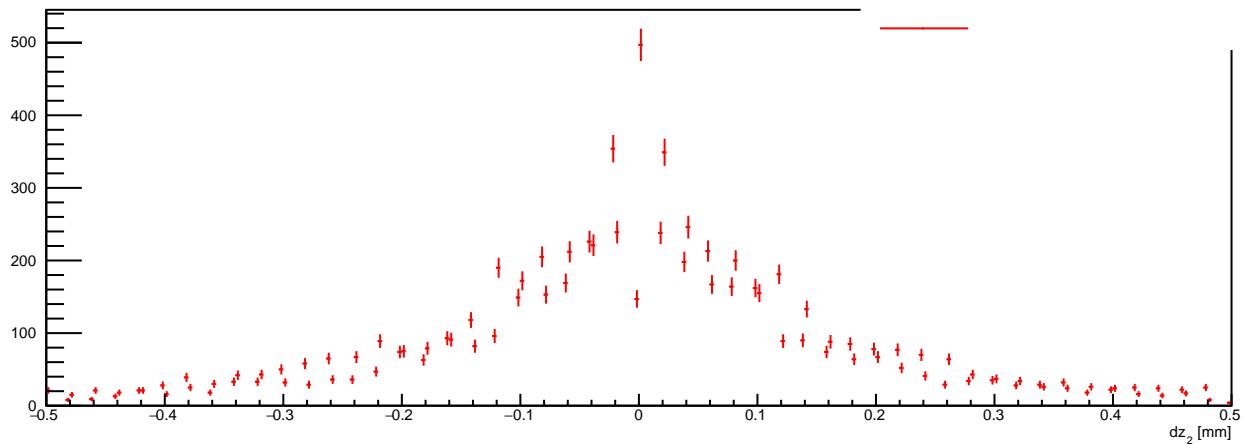
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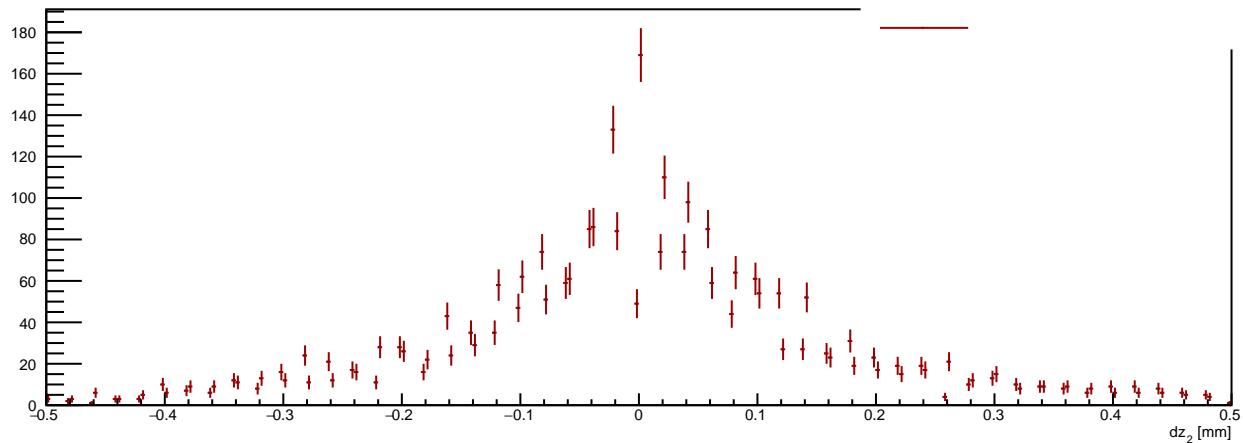


$dz_2$ 

fakes

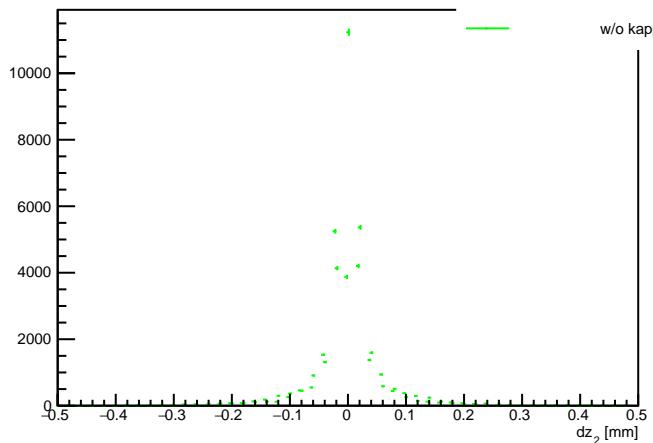
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fakes

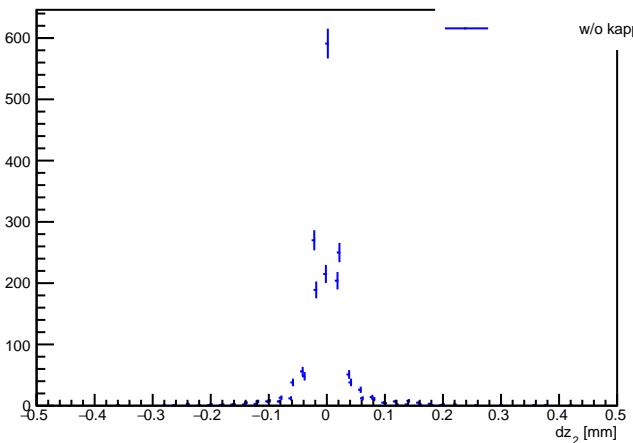


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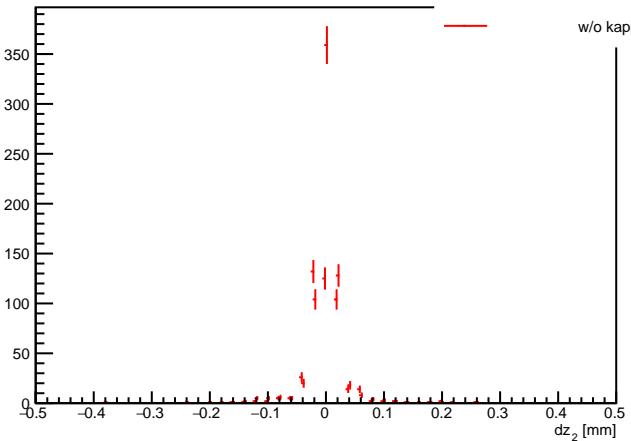
pion truth

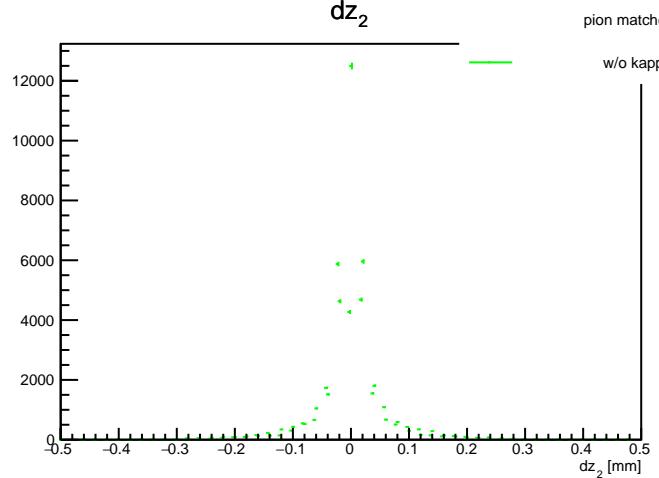
 $dz_2$ 

electron truth

 $dz_2$ 

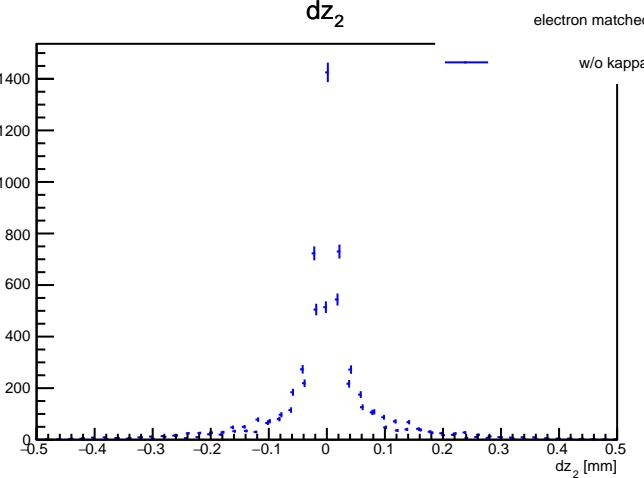
muon truth



$dz_2$ 

pion matched\_rec

w/o kappa cut

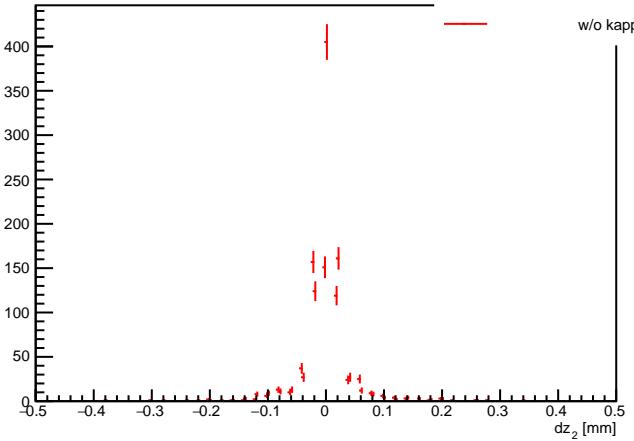
 $dz_2$ 

electron matched\_rec

 $dz_2$ 

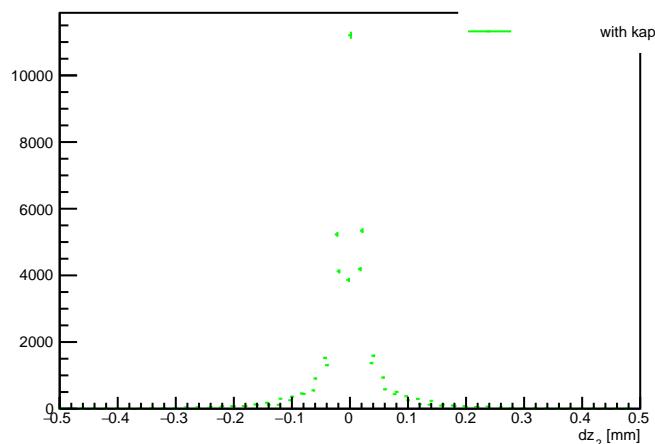
muon matched\_rec

w/o kappa cut

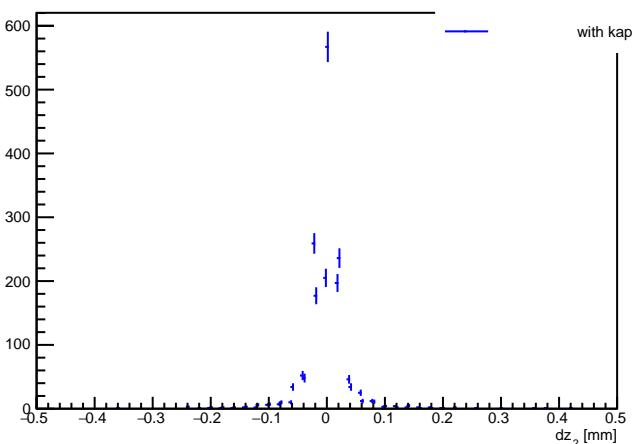


$dz_2$ 

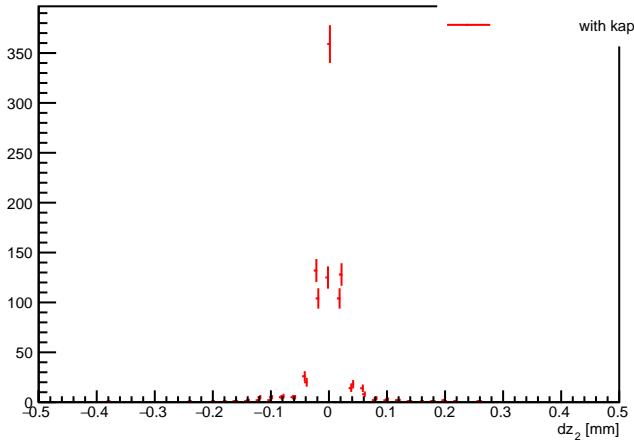
pion truth

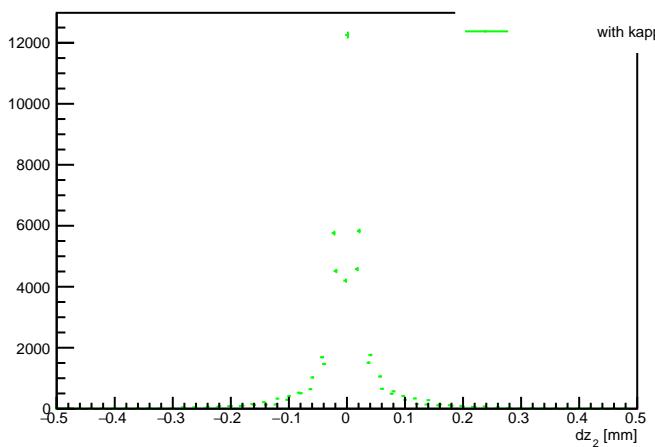
 $dz_2$ 

electron truth

 $dz_2$ 

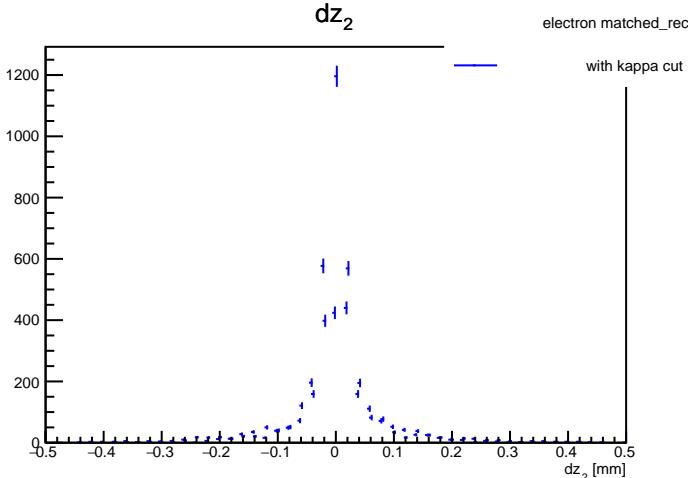
muon truth



$dz_2$ 

pion matched\_rec

with kappa cut

 $dz_2$ 

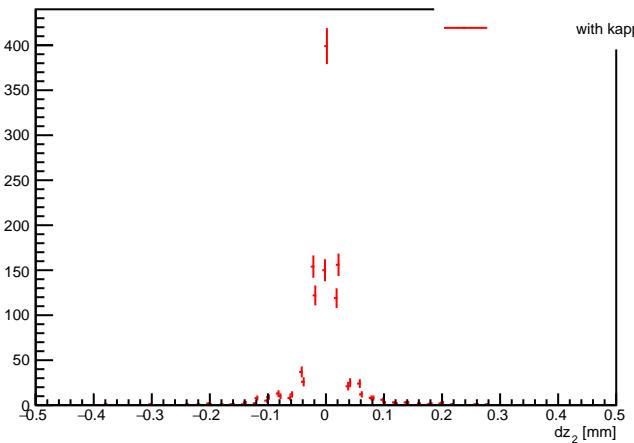
electron matched\_rec

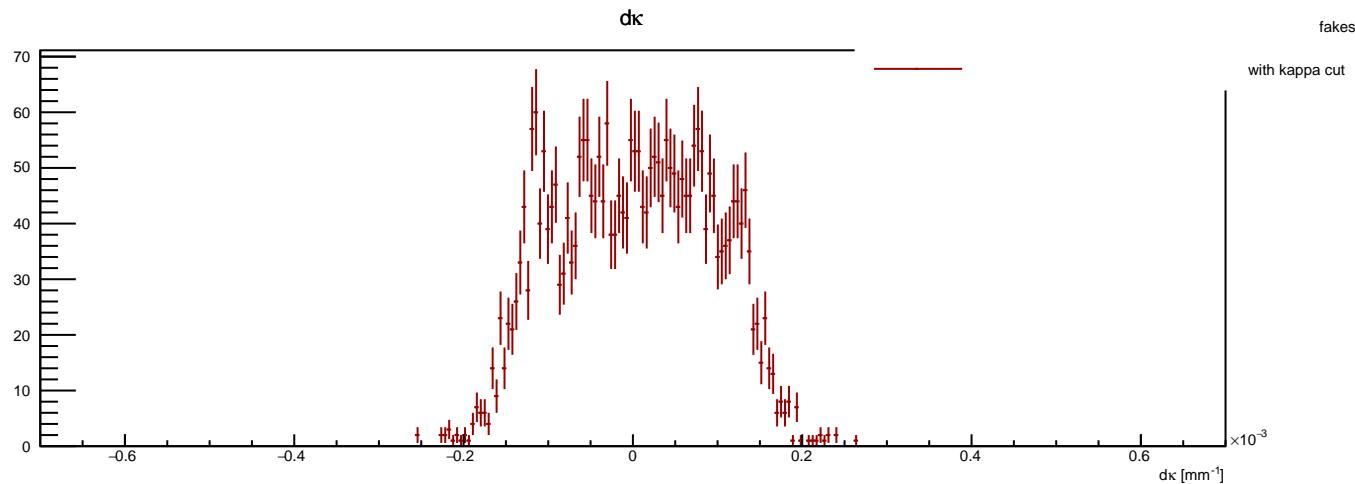
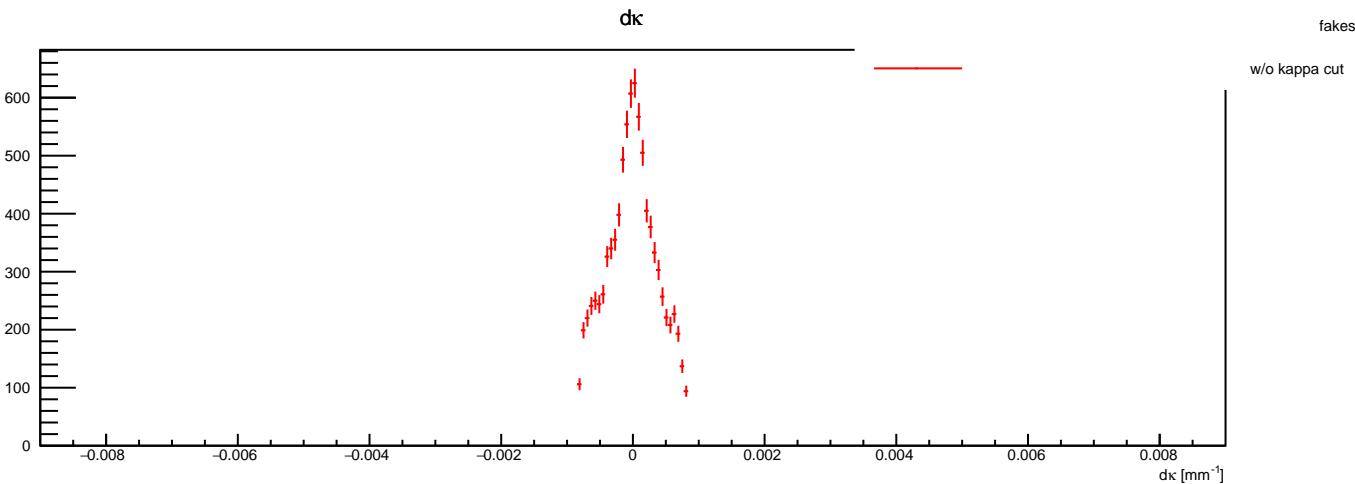
with kappa cut

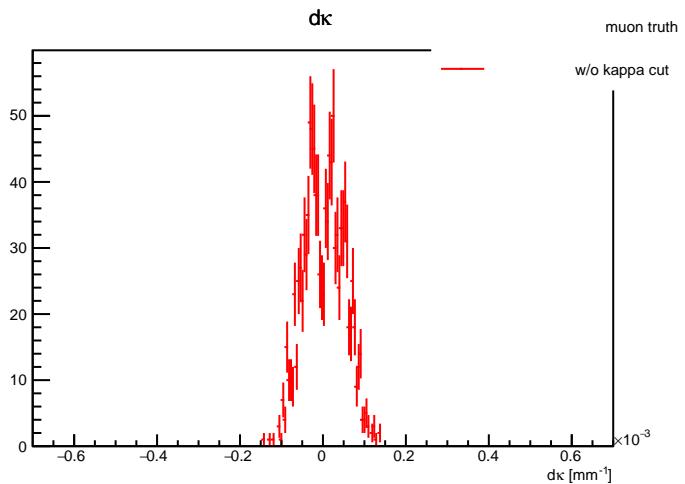
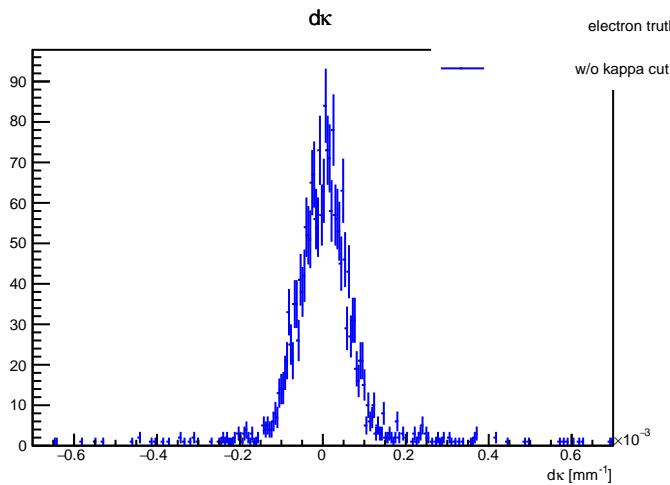
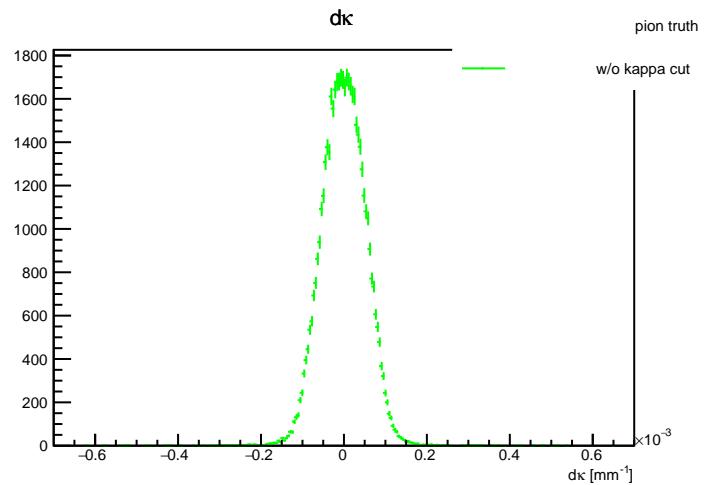
 $dz_2$ 

muon matched\_rec

with kappa cut

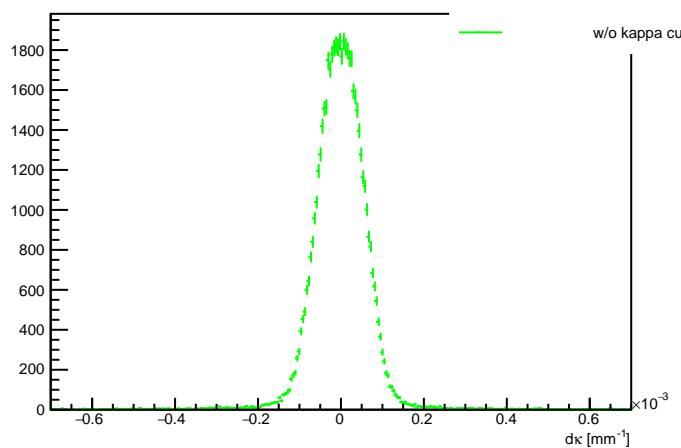






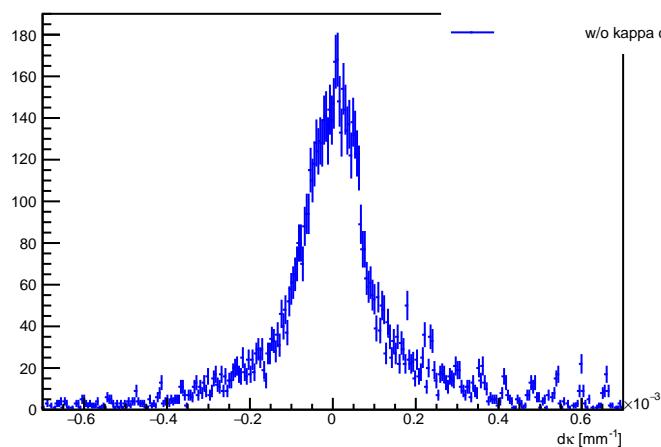
dk

pion matched\_rec



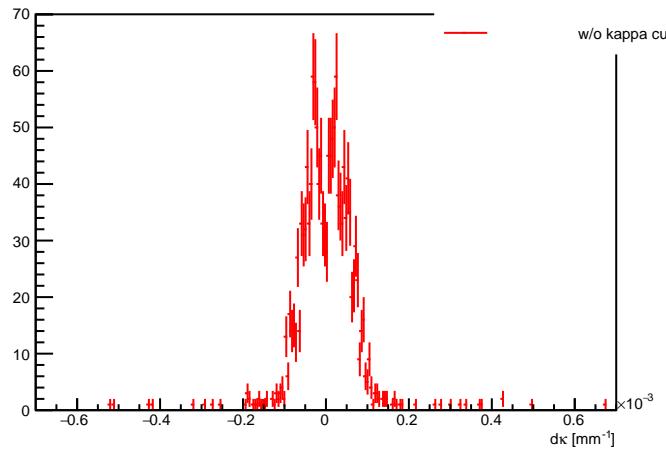
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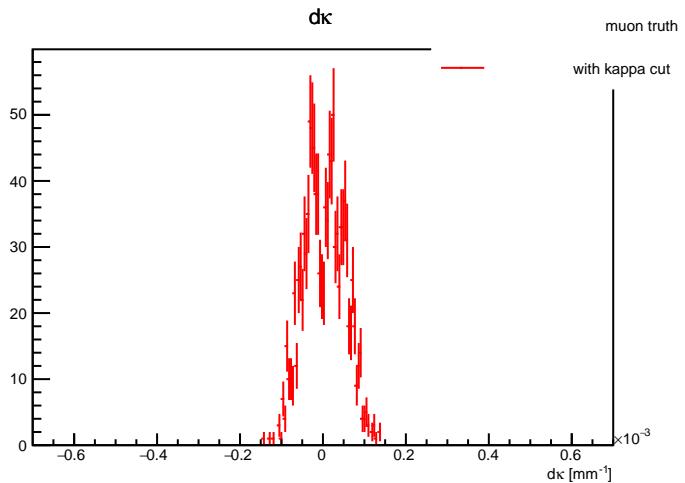
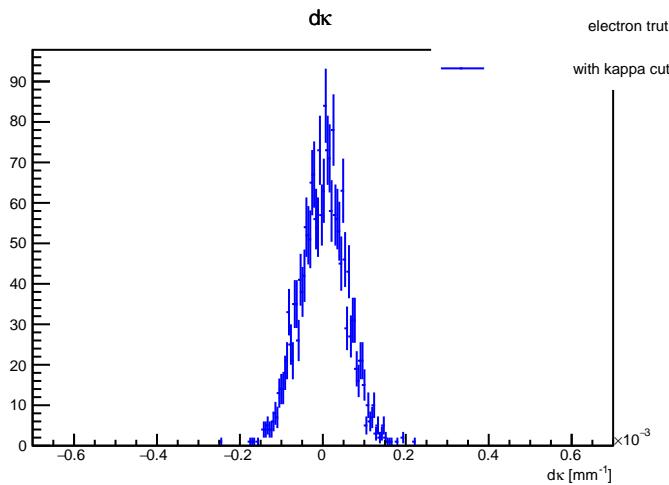
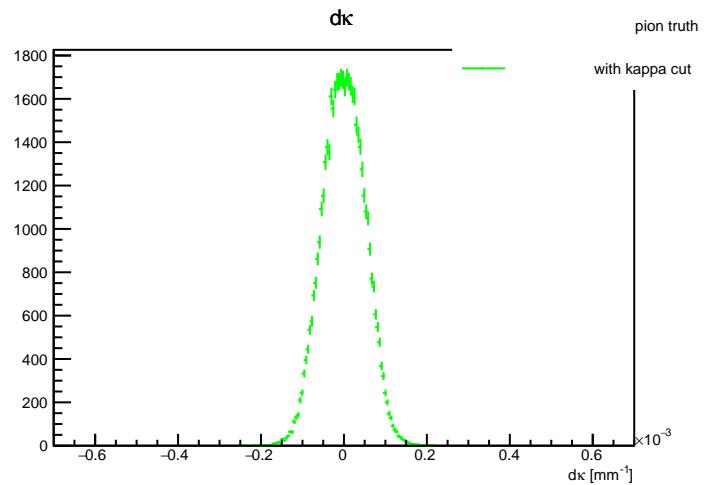
electron matched\_rec



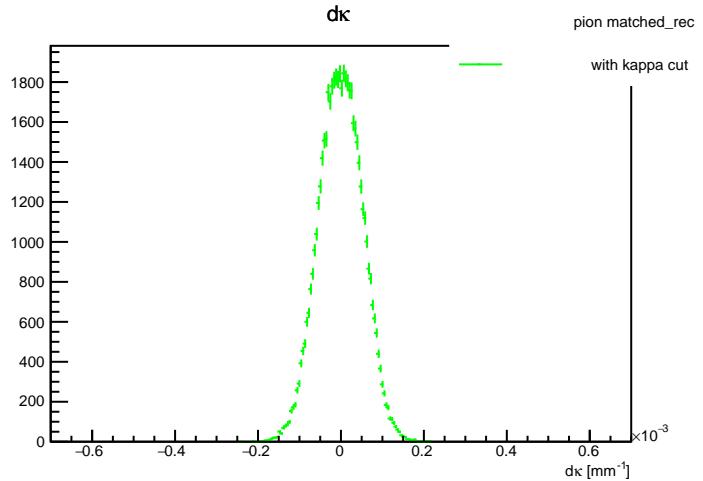
dk

muon matched\_rec

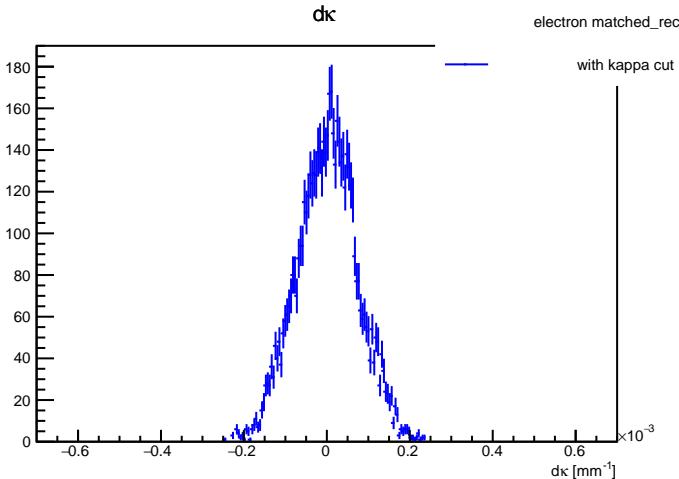




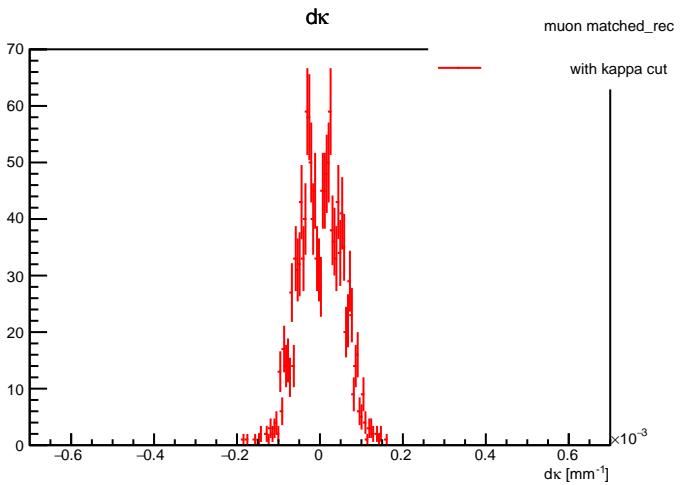
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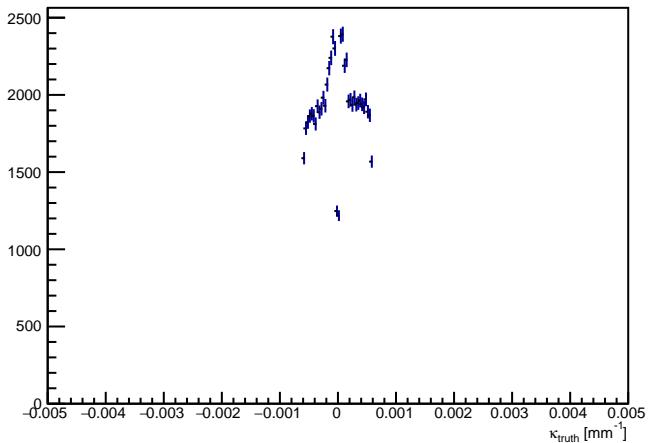
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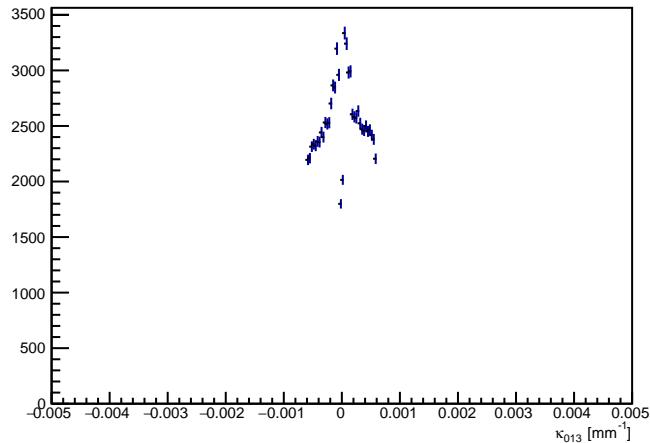
dk



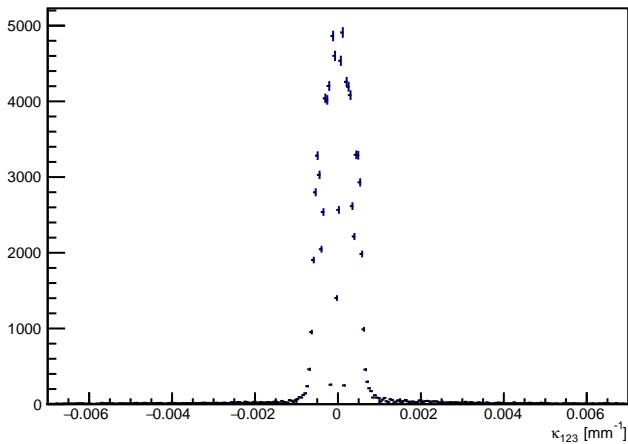
kappa truth



kappa rec with bml constraint

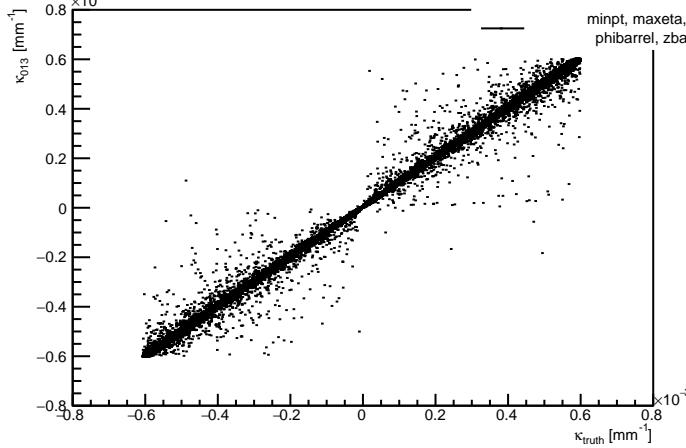


kappa rec w/o bml constraint

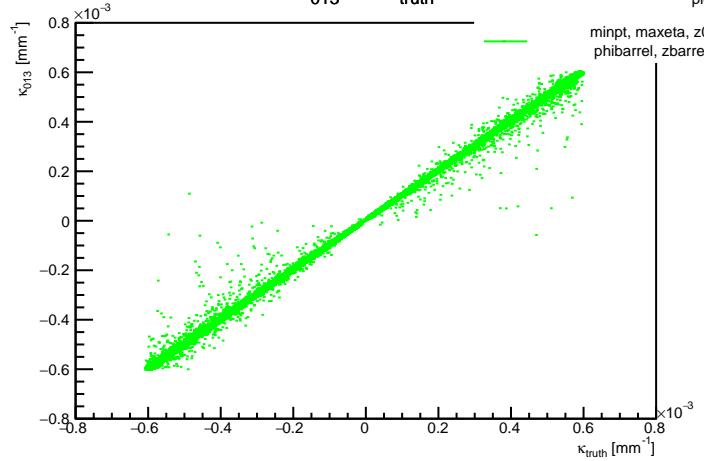


$\kappa_{013}$  Vs  $\kappa_{\text{truth}}$ 

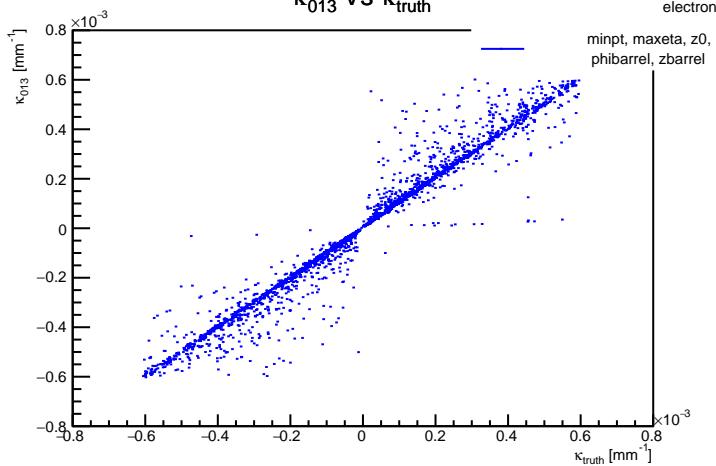
all

 $\kappa_{013}$  Vs  $\kappa_{\text{truth}}$ 

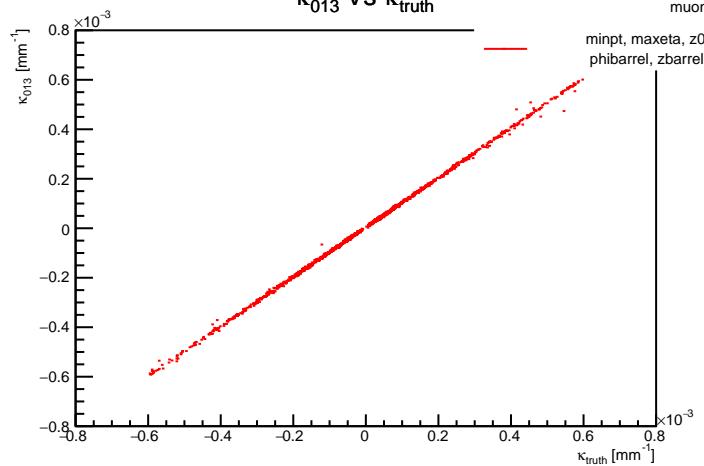
pion

 $\kappa_{013}$  Vs  $\kappa_{\text{truth}}$ 

electron

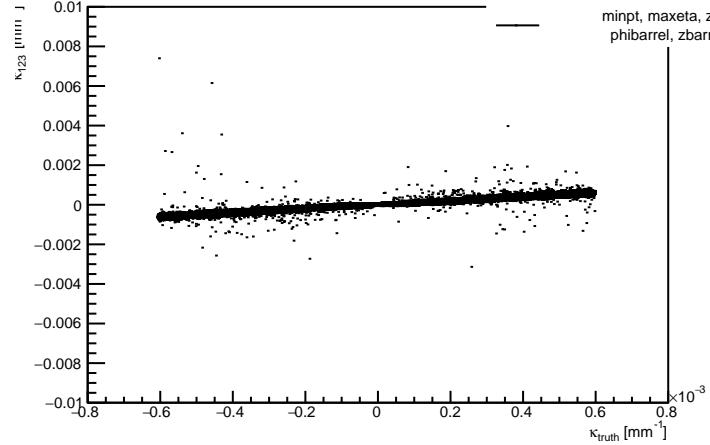
 $\kappa_{013}$  Vs  $\kappa_{\text{truth}}$ 

muon's

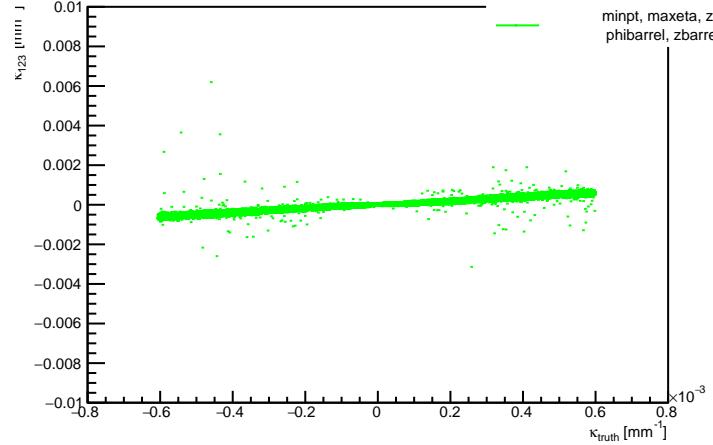


$\kappa_{123}$  Vs  $\kappa_{\text{truth}}$ 

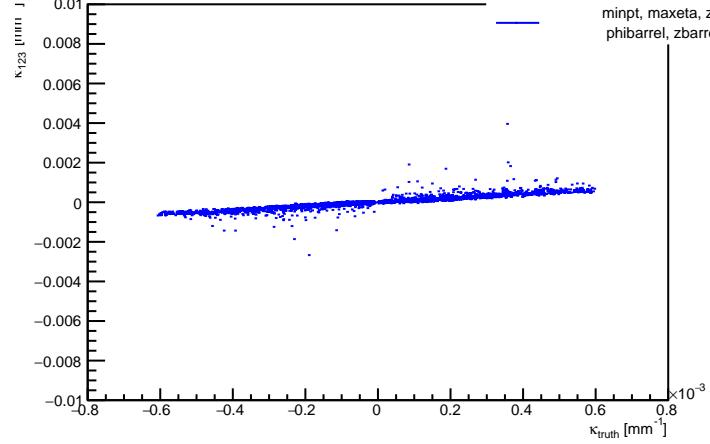
all

 $\kappa_{123}$  Vs  $\kappa_{\text{truth}}$ 

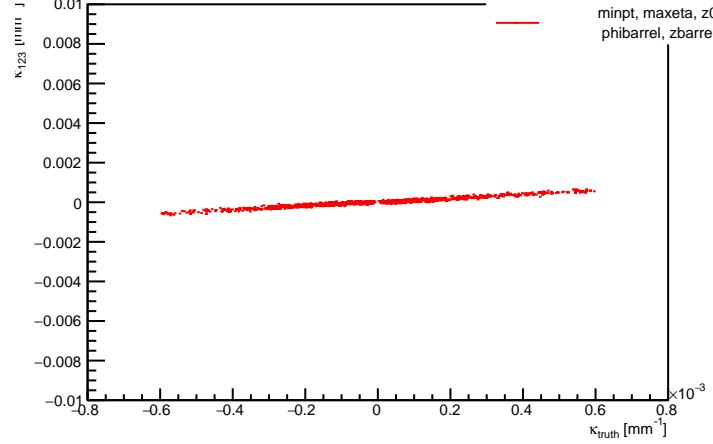
pion

 $\kappa_{123}$  Vs  $\kappa_{\text{truth}}$ 

electron

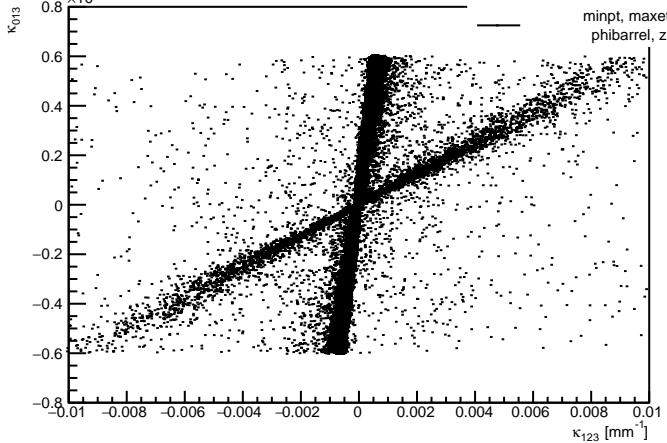
 $\kappa_{123}$  Vs  $\kappa_{\text{truth}}$ 

muon's

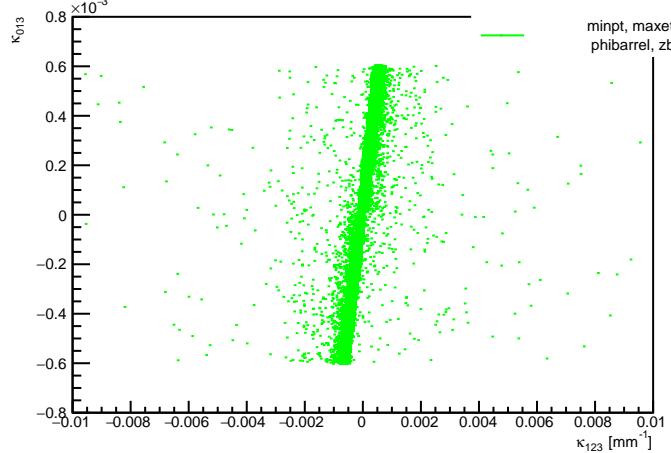


$\kappa_{013}$  Vs  $\kappa_{123}$ 

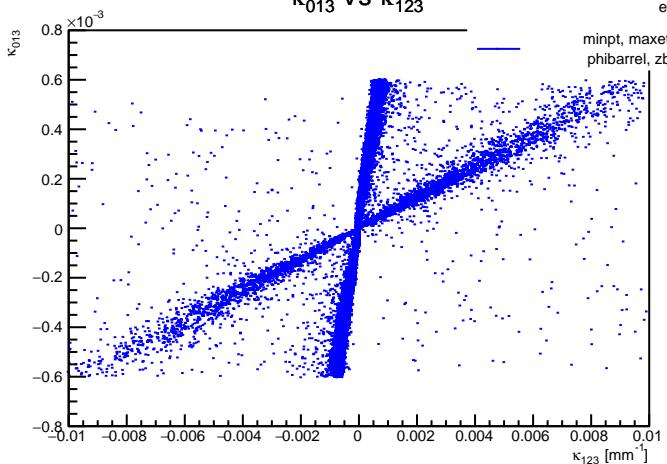
all

 $\kappa_{013}$  Vs  $\kappa_{123}$ 

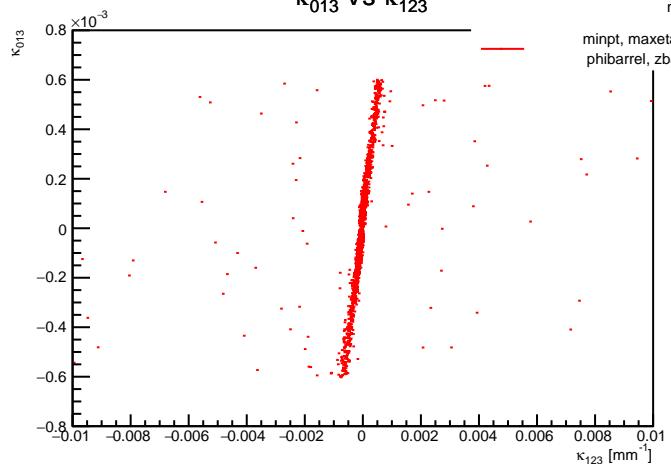
pion

 $\kappa_{013}$  Vs  $\kappa_{123}$ 

electron

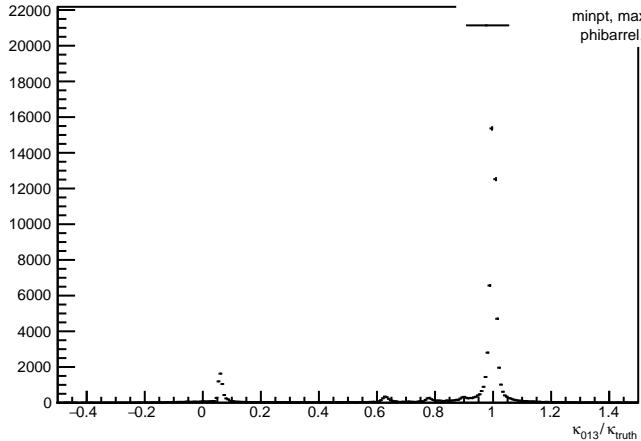
 $\kappa_{013}$  Vs  $\kappa_{123}$ 

muon's

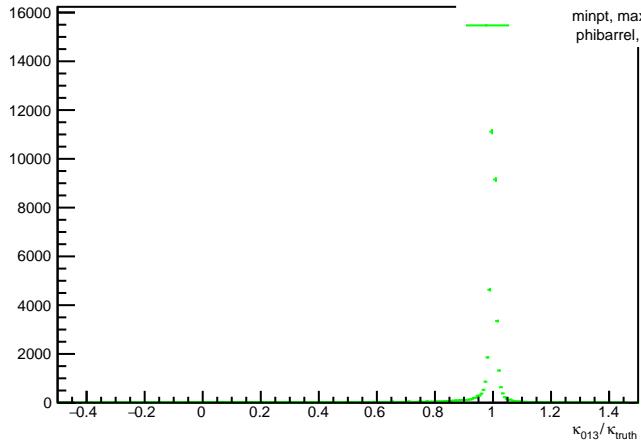


$\kappa_{013}/\kappa_{\text{truth}}$ 

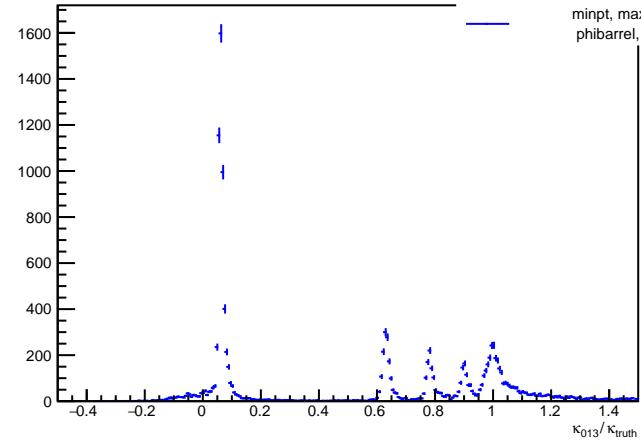
all

 $\kappa_{013}/\kappa_{\text{truth}}$ 

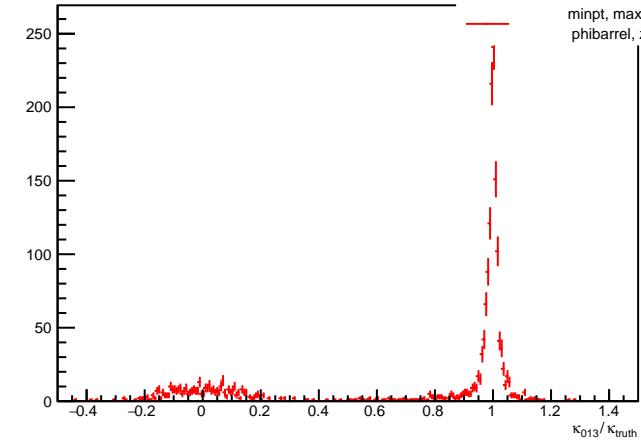
pion

 $\kappa_{013}/\kappa_{\text{truth}}$ 

electron

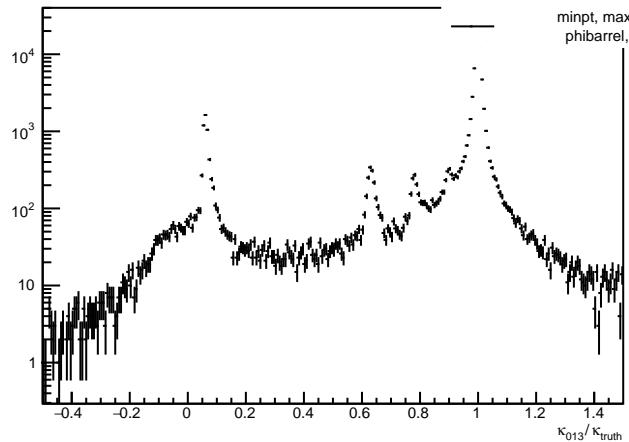
 $\kappa_{013}/\kappa_{\text{truth}}$ 

muon's

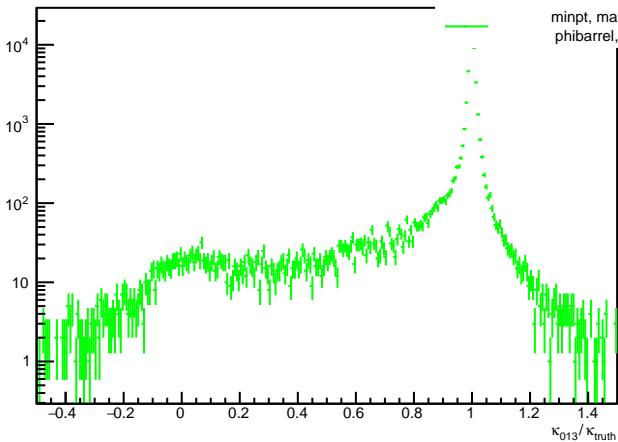


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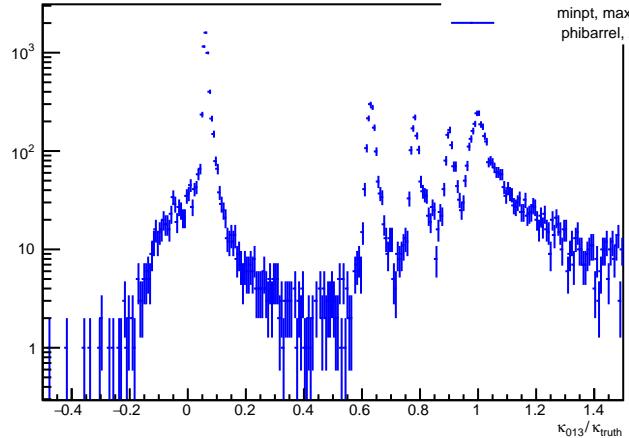
all

 $\kappa_{013}/\kappa_{\text{truth}}$ 

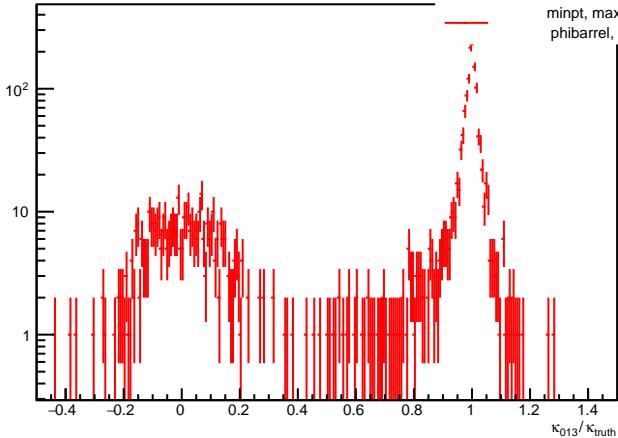
pion

 $\kappa_{013}/\kappa_{\text{truth}}$ 

electron

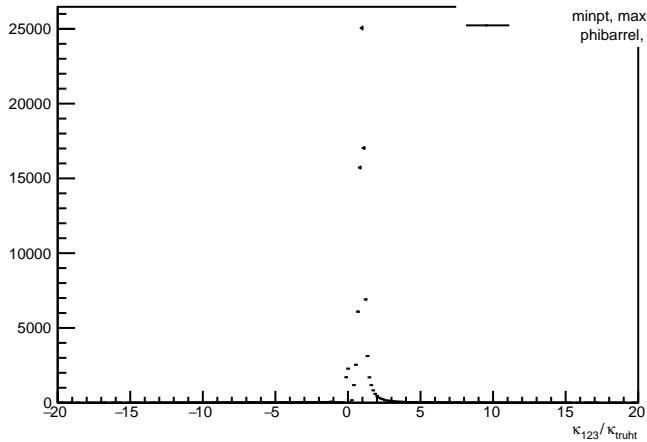
 $\kappa_{013}/\kappa_{\text{truth}}$ 

muon's

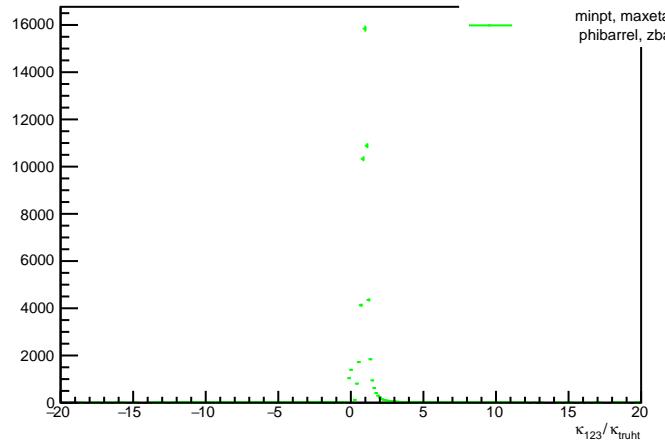


$\kappa_{123}/\kappa_{\text{truth}}$ 

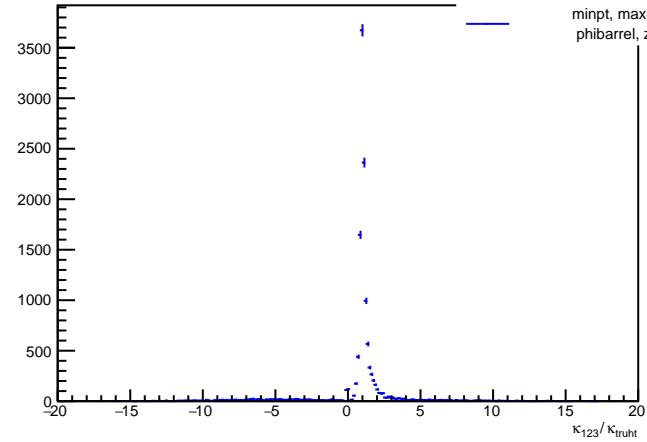
all

 $\kappa_{123}/\kappa_{\text{truth}}$ 

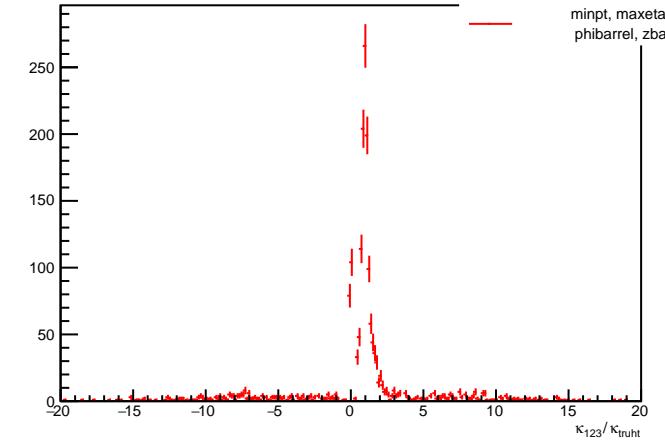
pion

 $\kappa_{123}/\kappa_{\text{truth}}$ 

electron

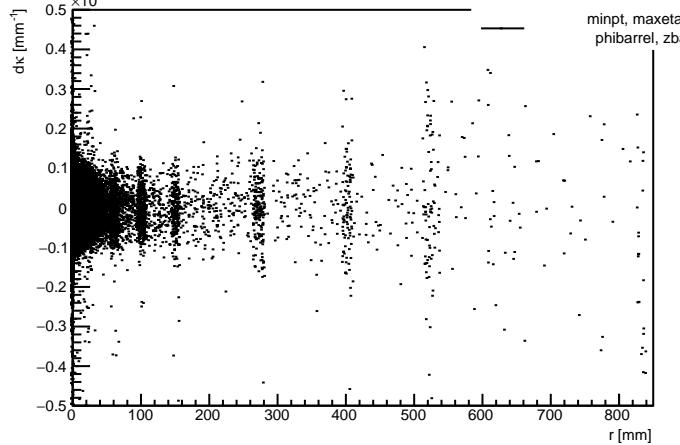
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muon's



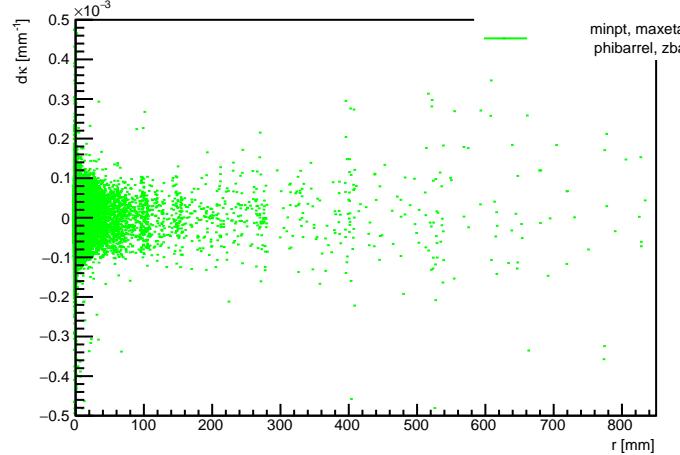
dk Vs r

all



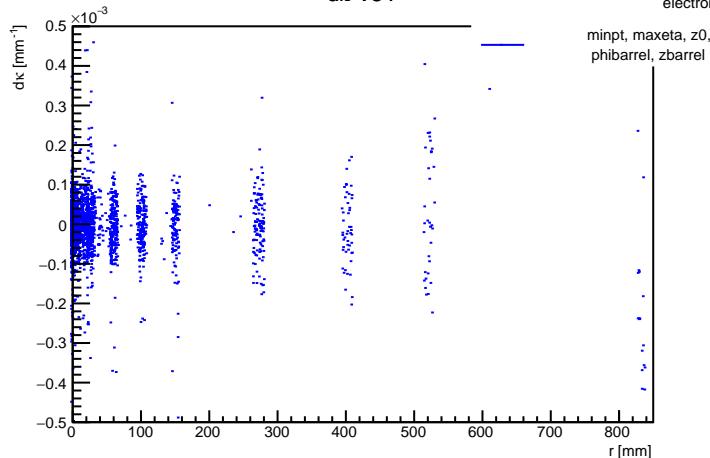
dk Vs r

pion



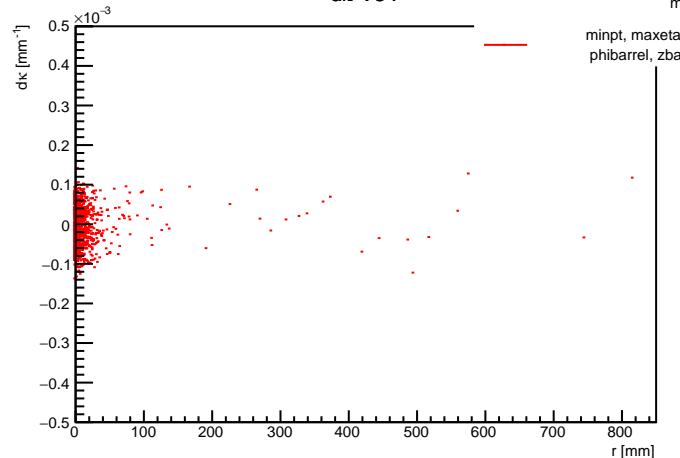
dk Vs r

electron



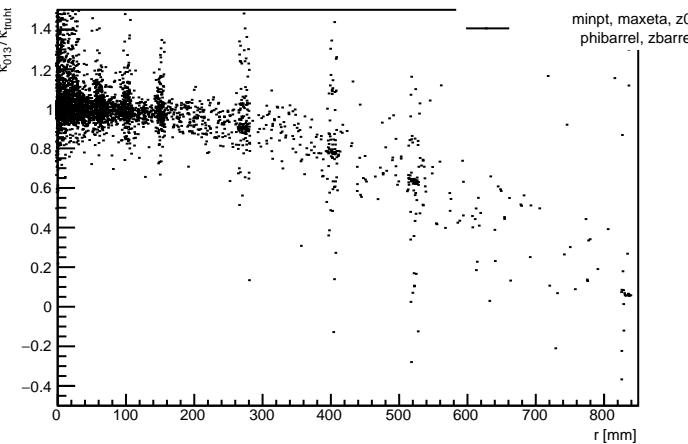
dk Vs r

muon's

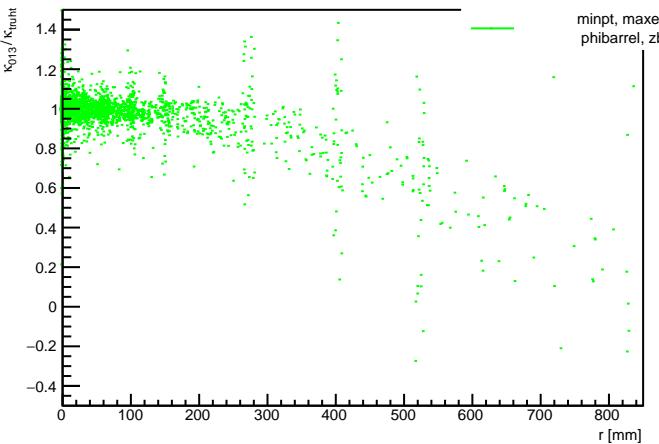


$\kappa_{013}/\kappa_{\text{truth}}$  Vs  $r$ 

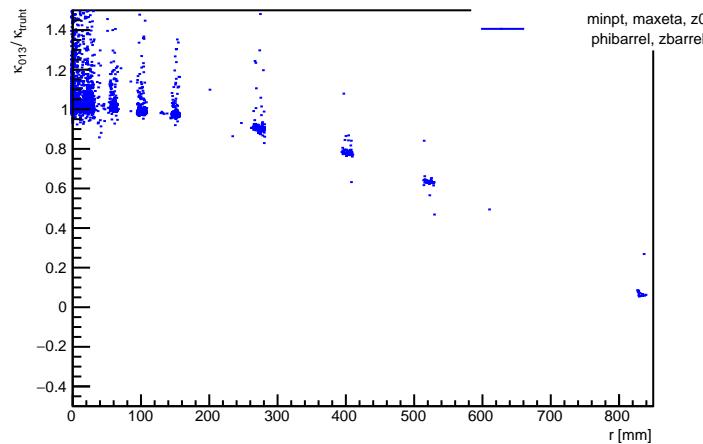
all

 $\kappa_{013}/\kappa_{\text{truth}}$  Vs  $r$ 

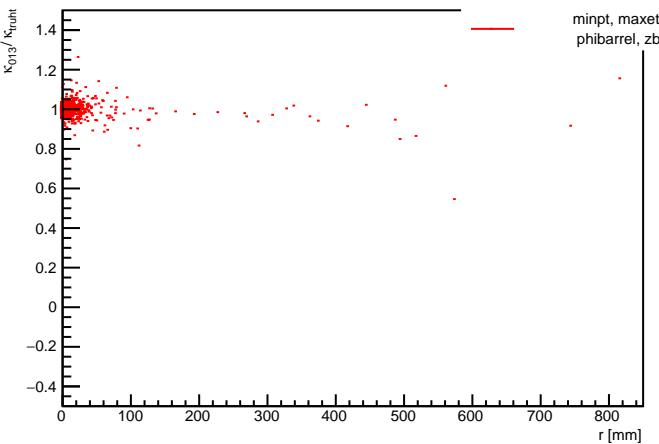
pion

 $\kappa_{013}/\kappa_{\text{truth}}$  Vs  $r$ 

electron

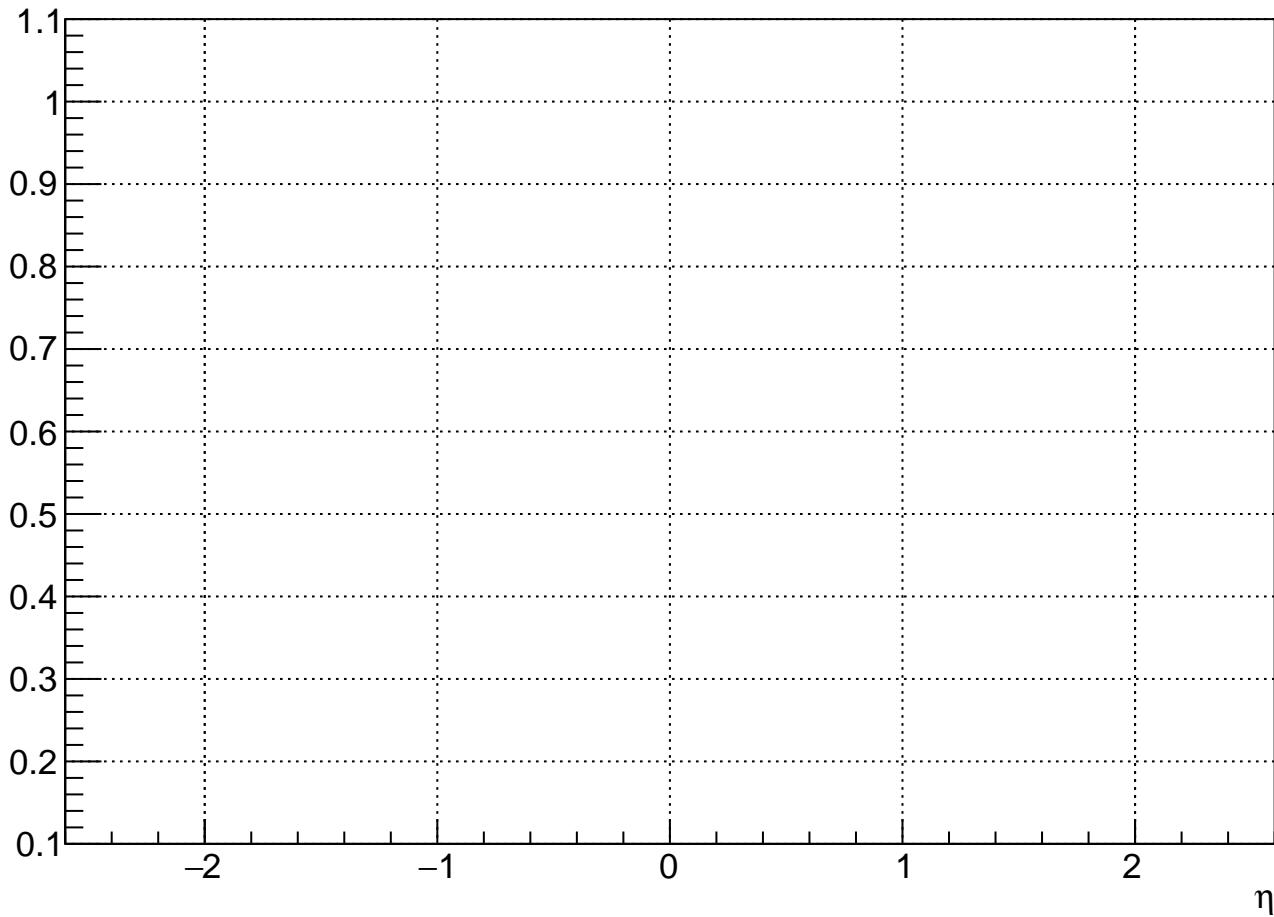
 $\kappa_{013}/\kappa_{\text{truth}}$  Vs  $r$ 

muon's



# Purity vs $\eta$

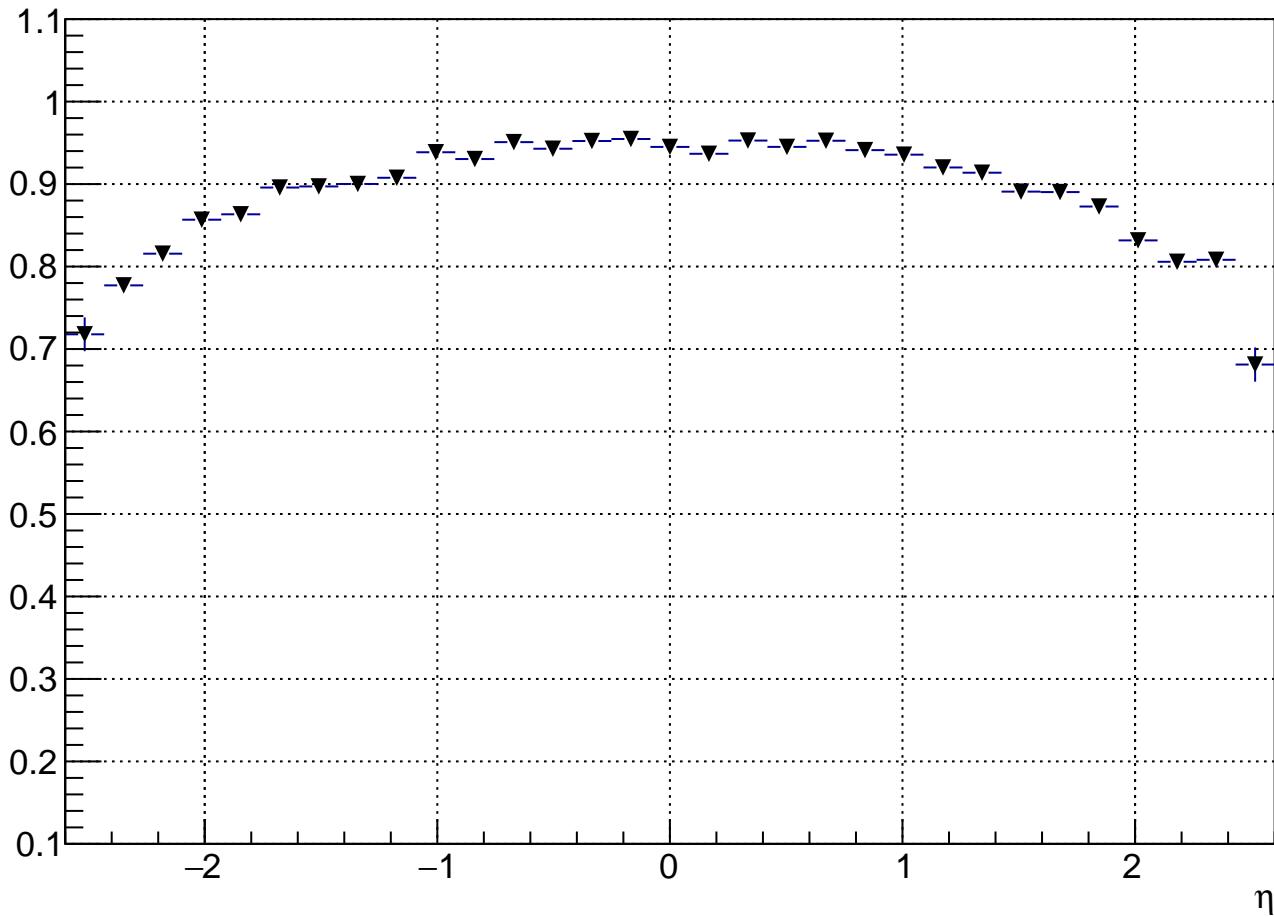
Purity



$\eta$

# Purity vs $\eta$

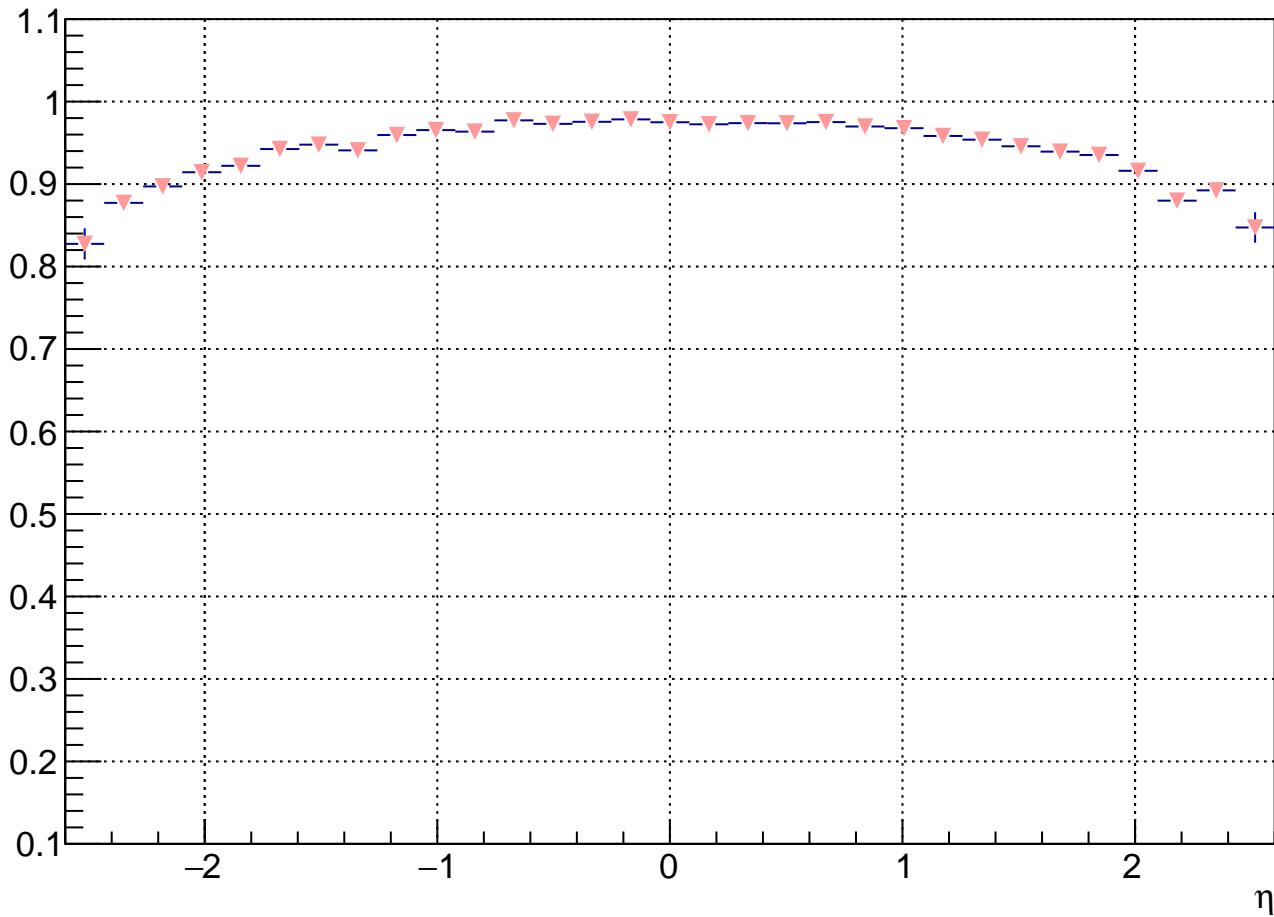
Purity



$\eta$

# Purity vs $\eta$

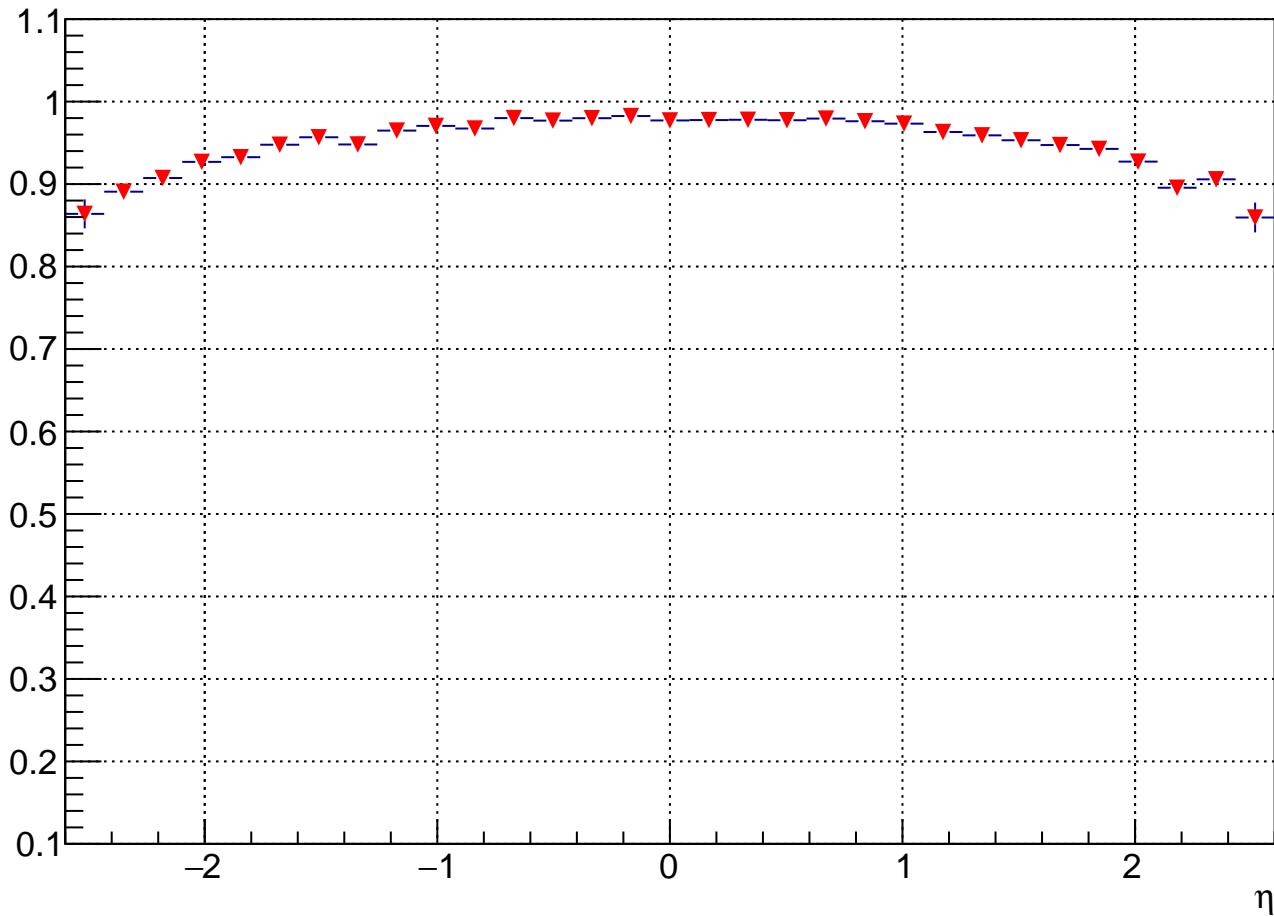
Purity



$\eta$

# Purity vs $\eta$

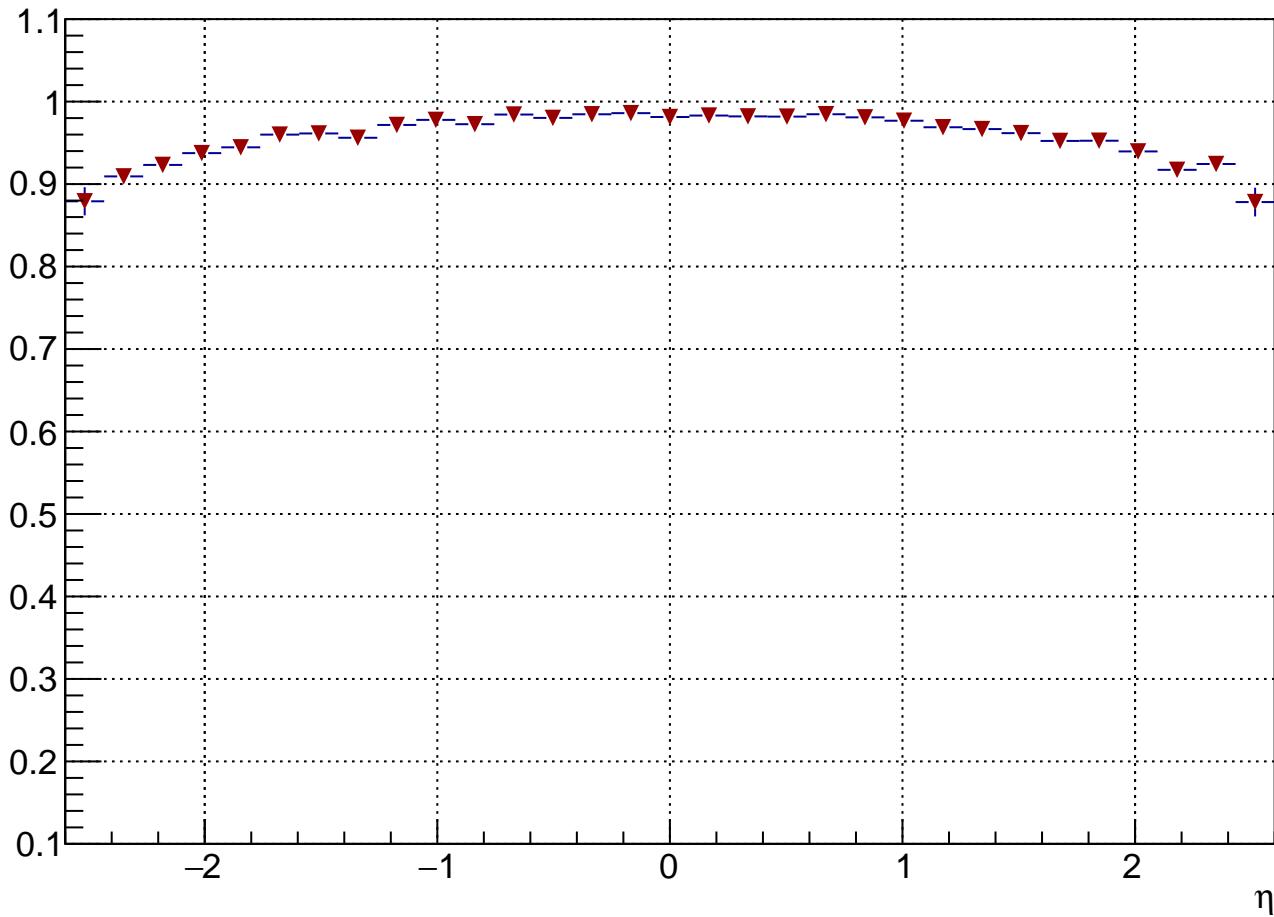
Purity



$\eta$

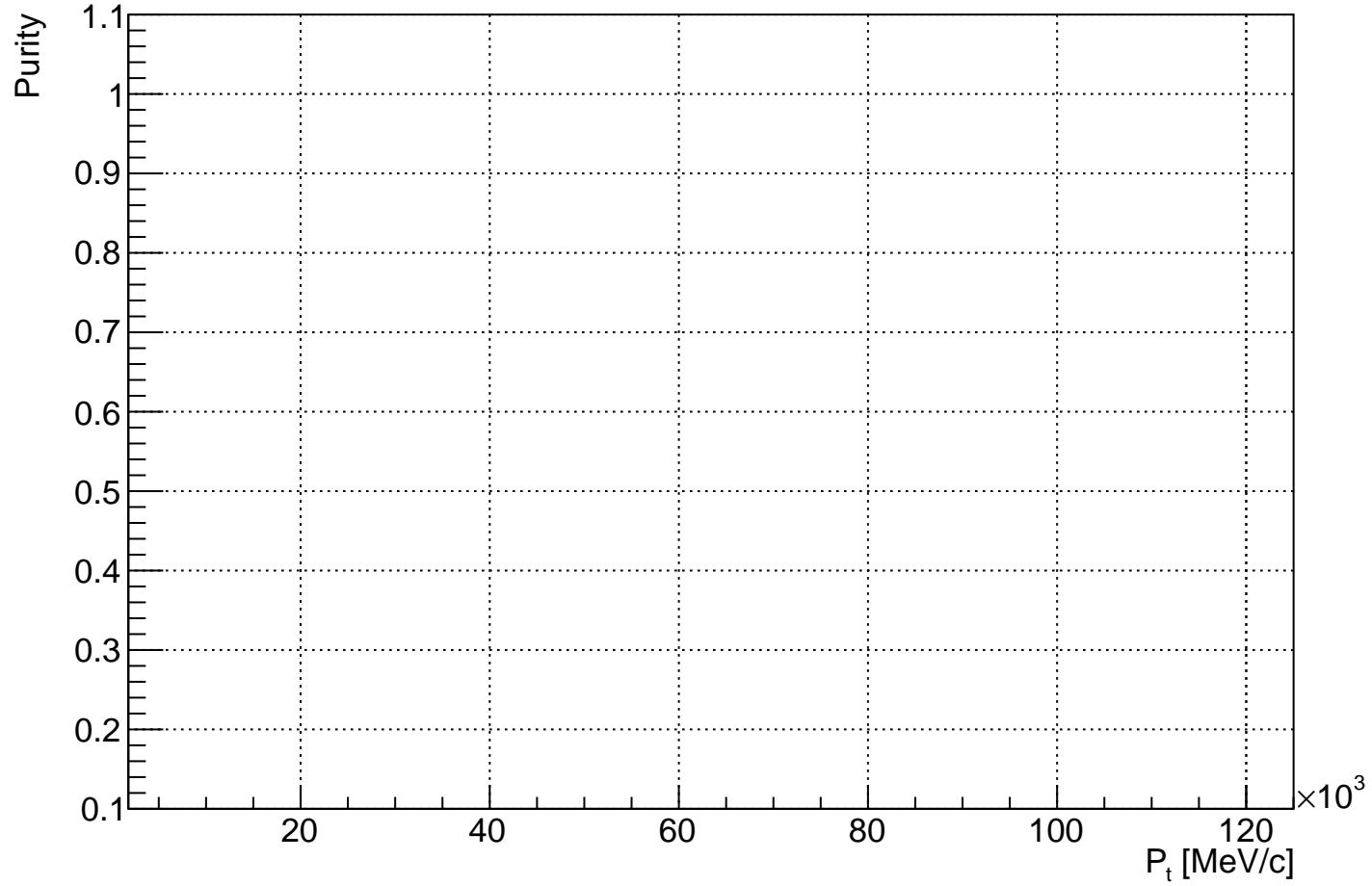
# Purity vs $\eta$

Purity

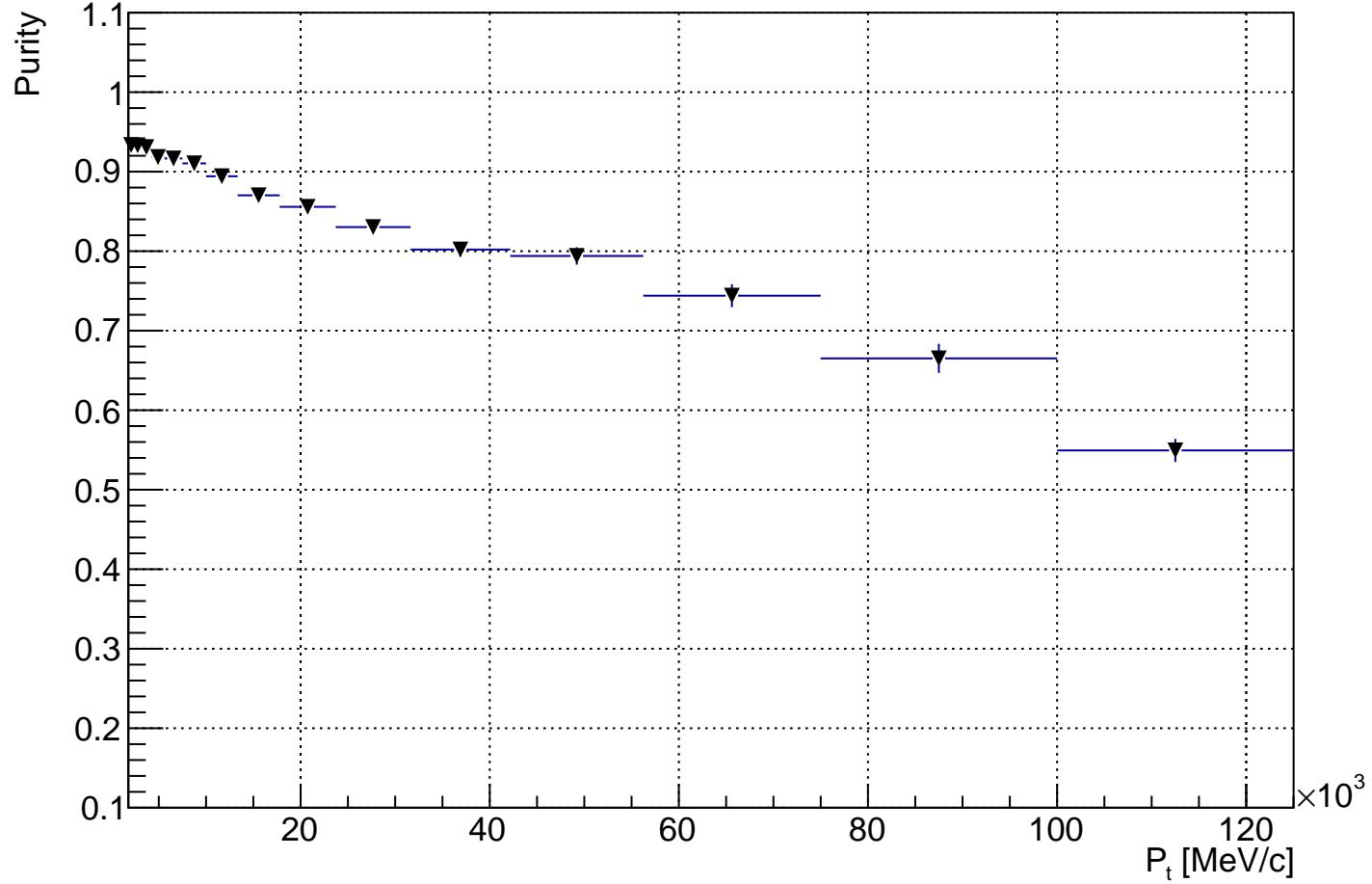


$\eta$

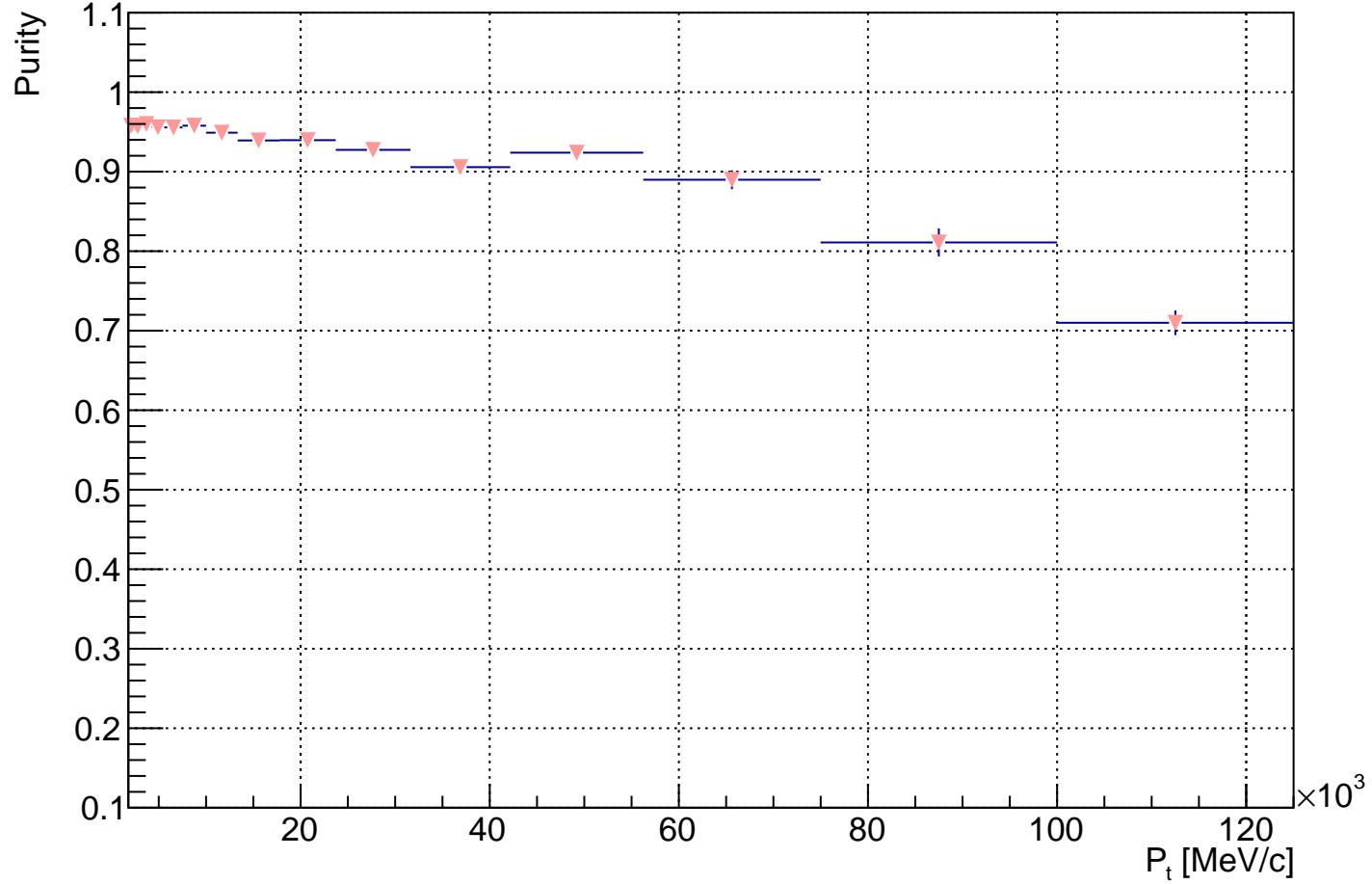
# Purity vs $P_t$



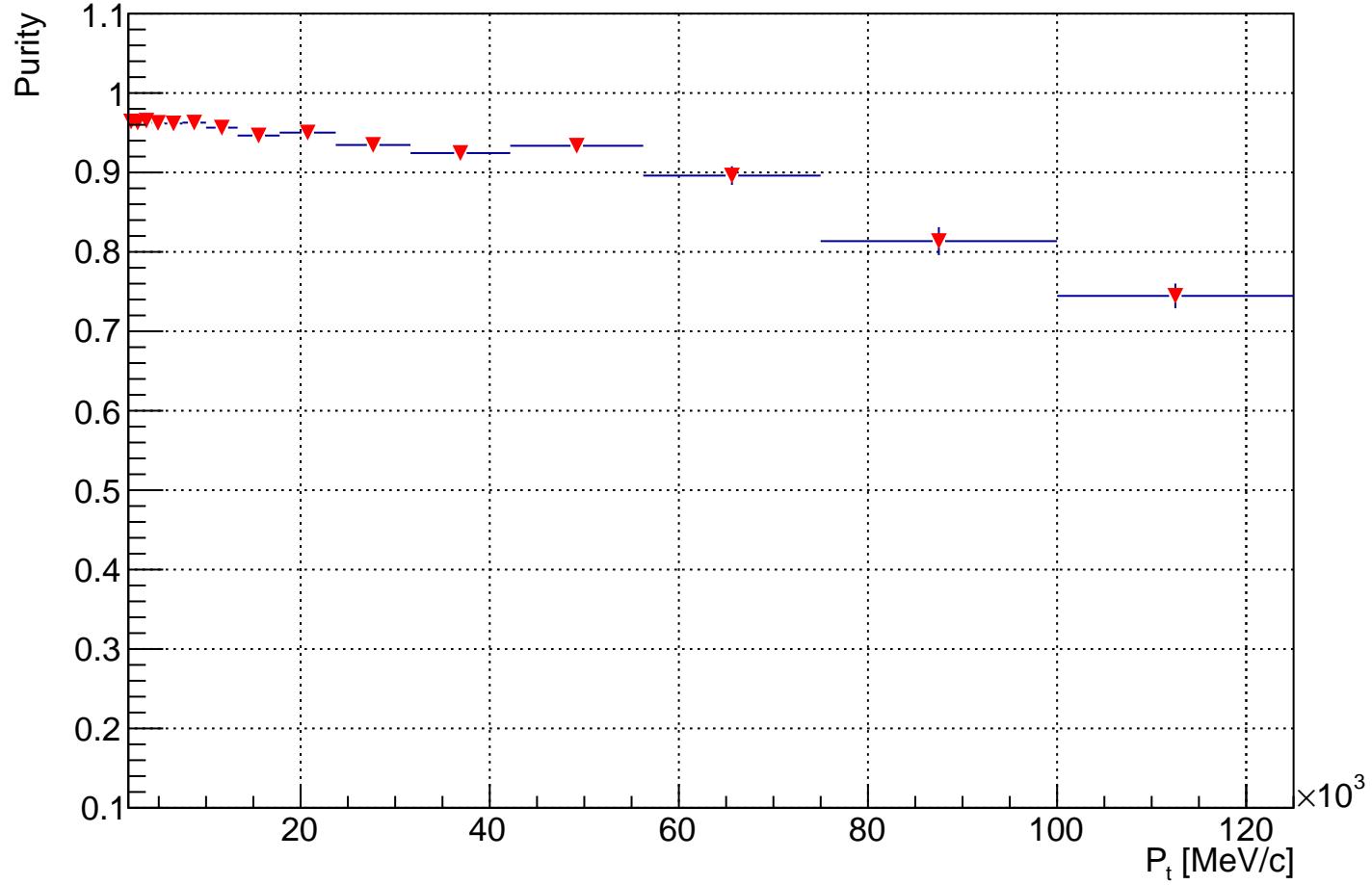
# Purity vs $P_t$



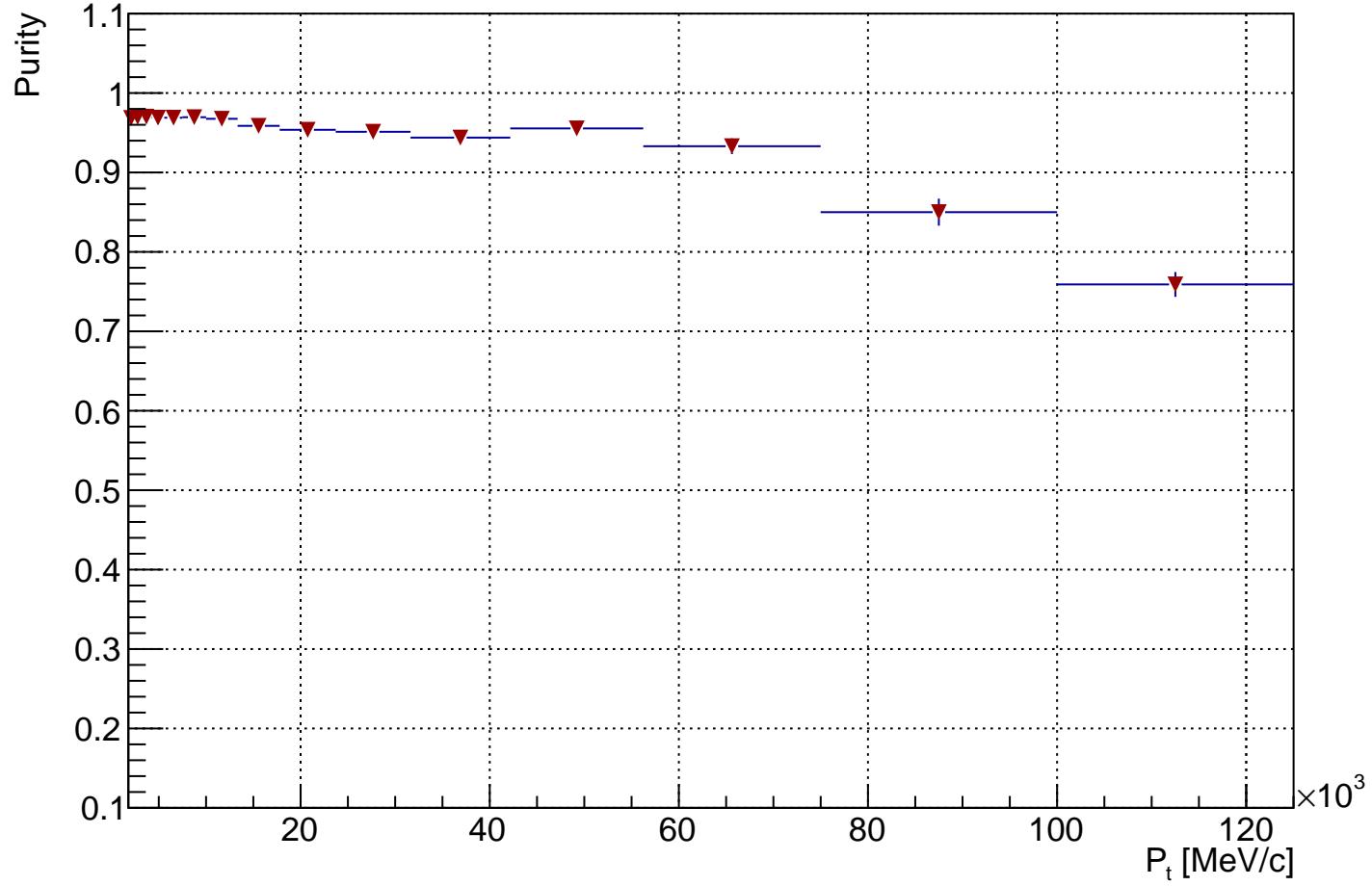
# Purity vs $P_t$



# Purity vs $P_t$

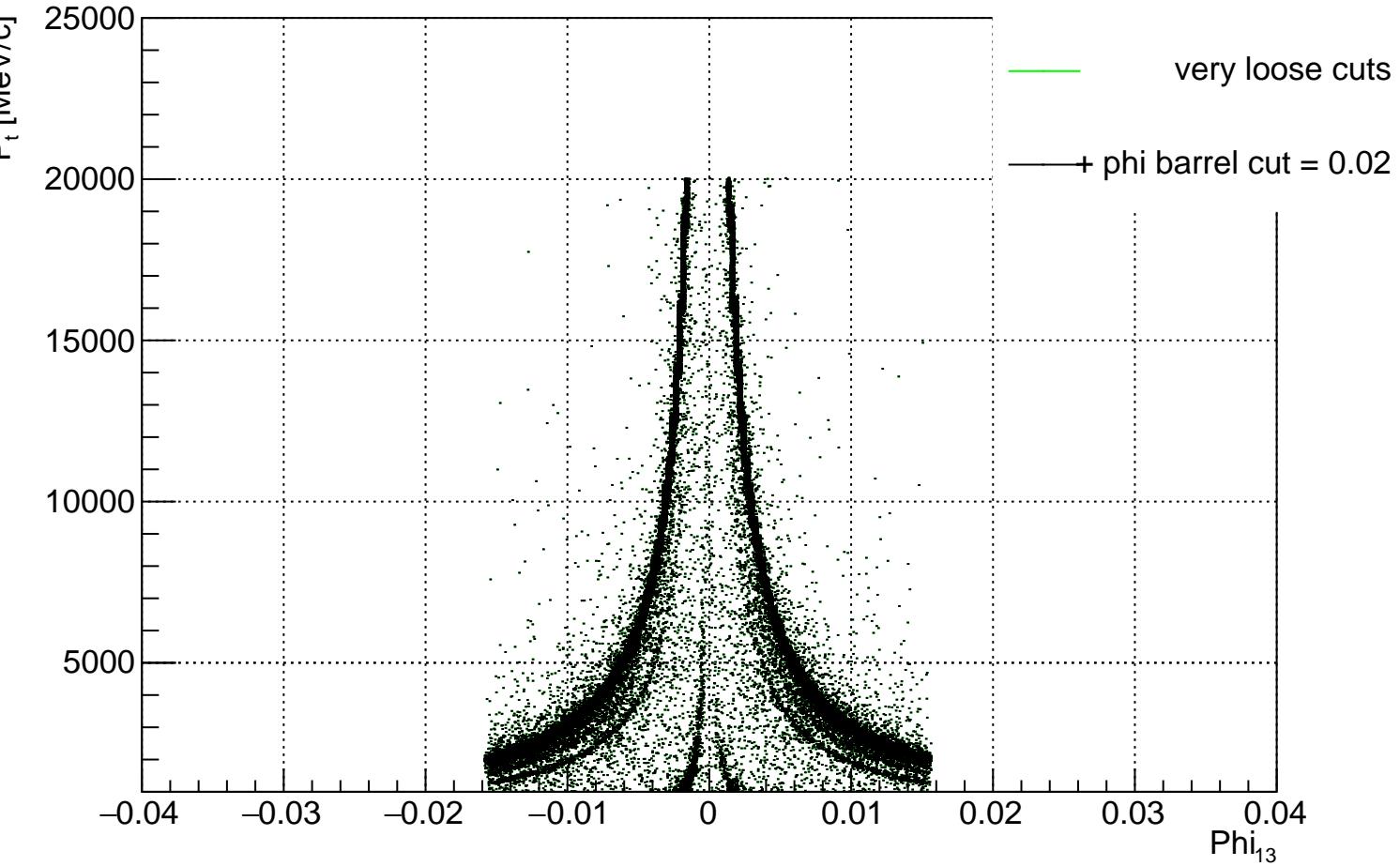


# Purity vs $P_t$

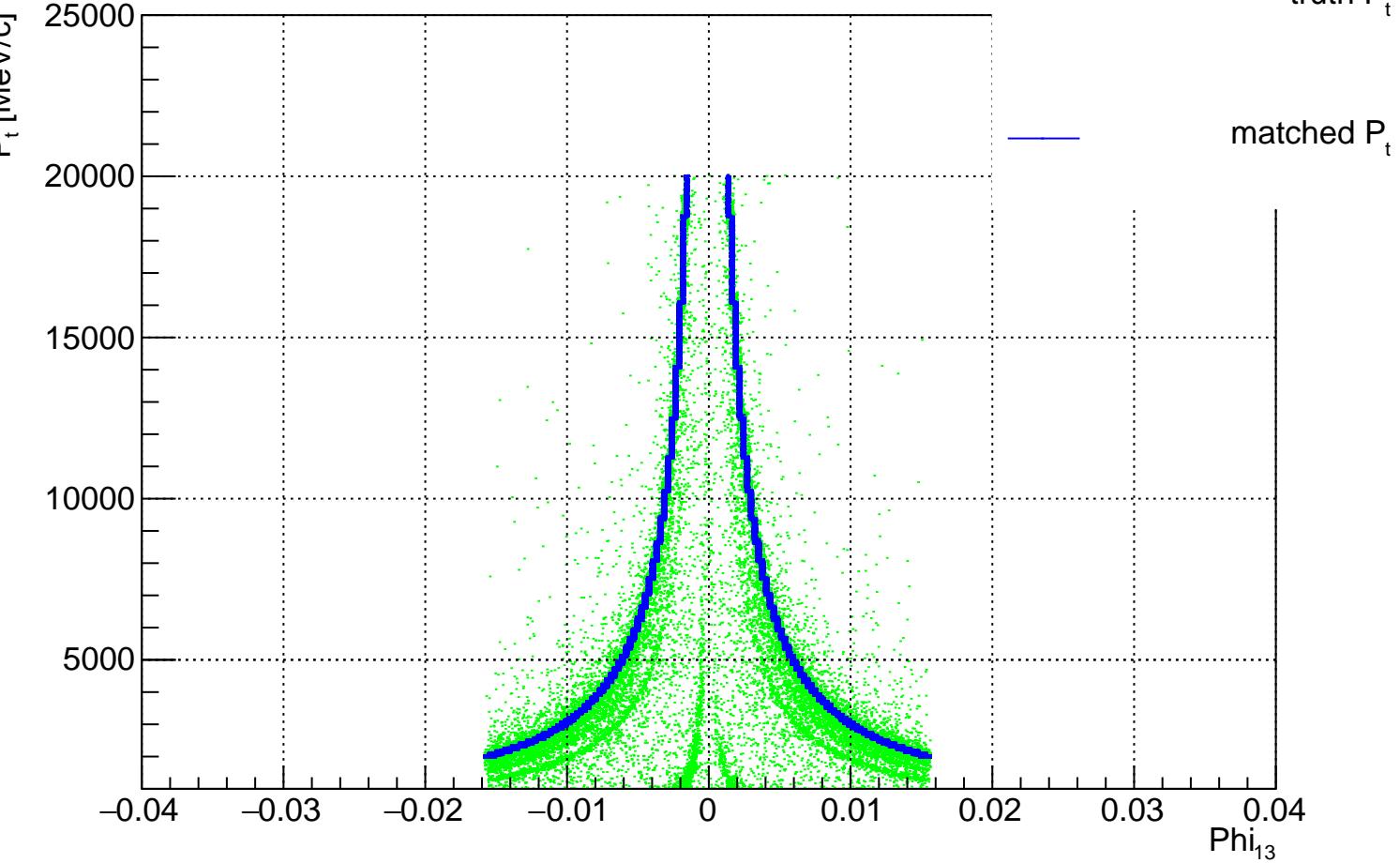


# $P_t$ Vs $\Phi_{13}$

truth  $P_t$

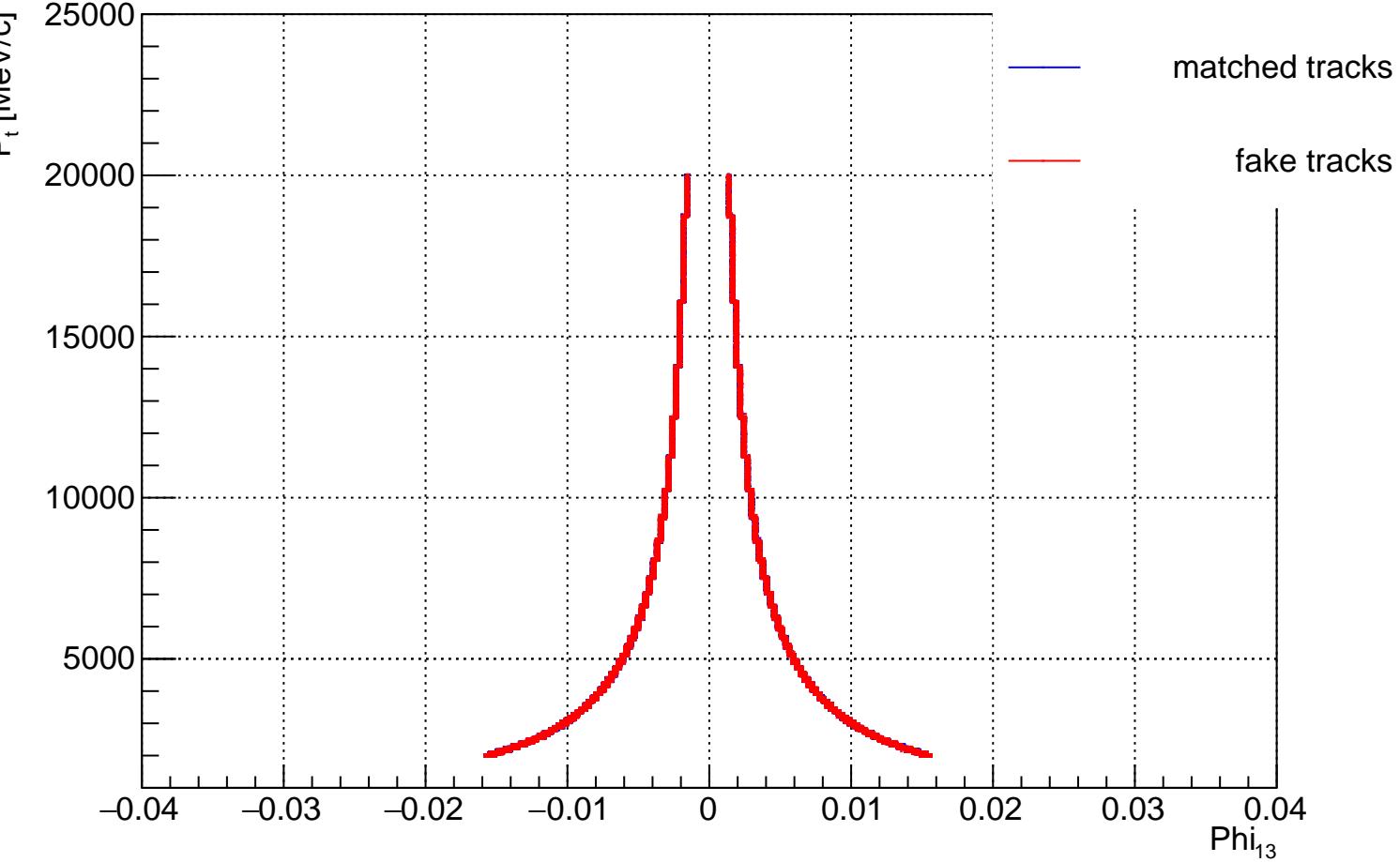


# $P_t$ Vs $\Phi_{13}$

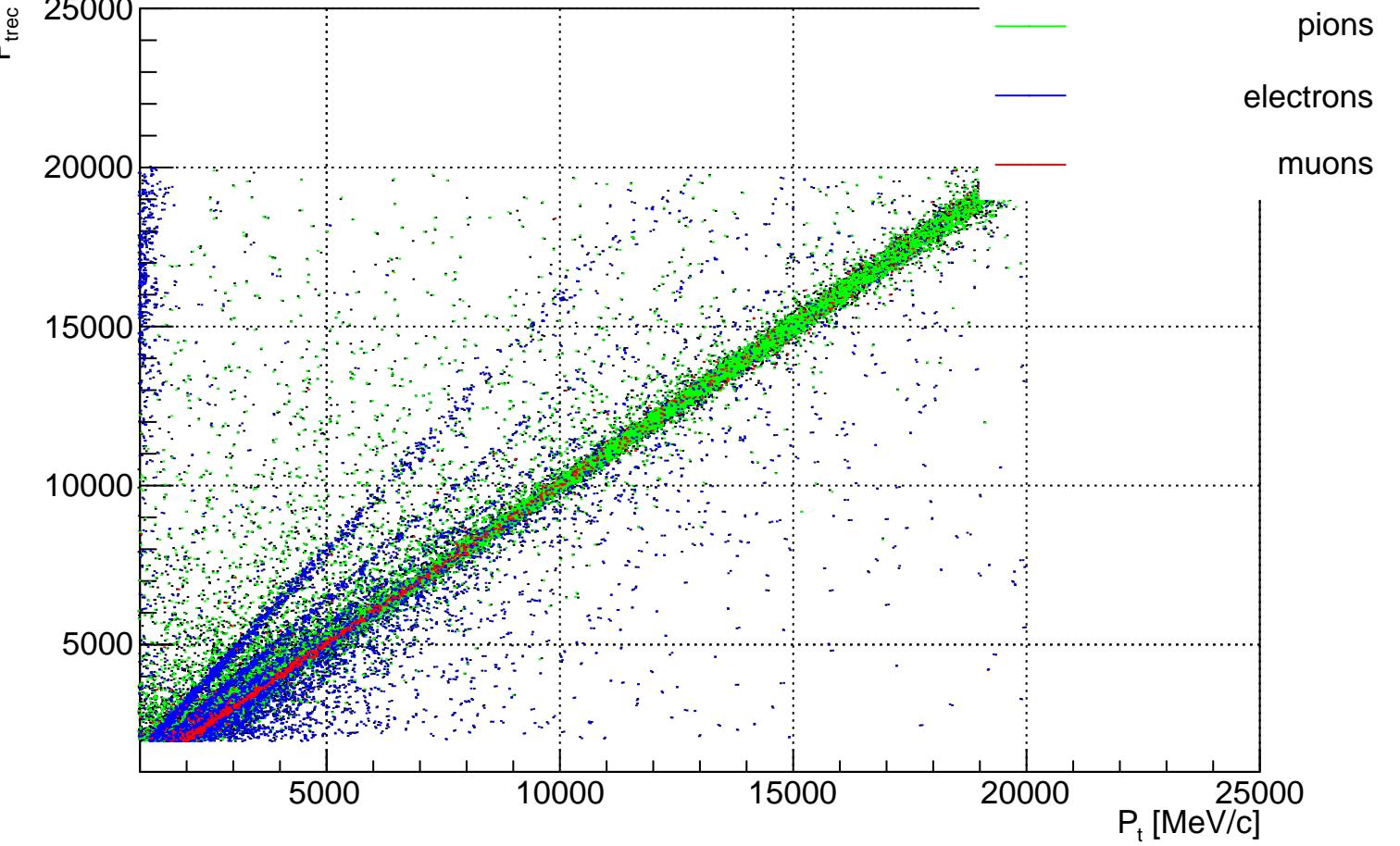


# $P_t$ Vs $\Phi_{13}$

rec  $P_t$

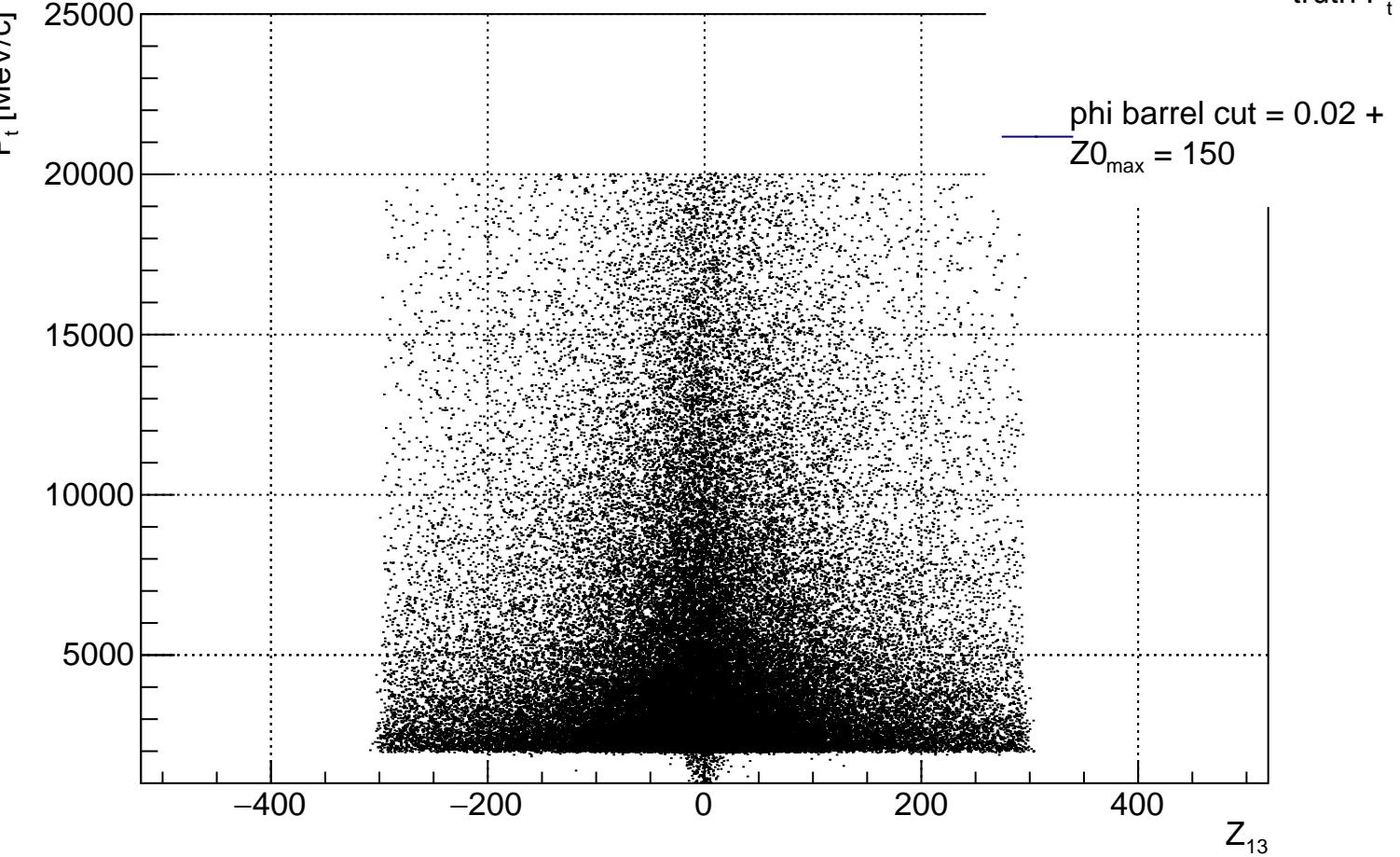


# $P_{\text{trec}}$ Vs $P_t$



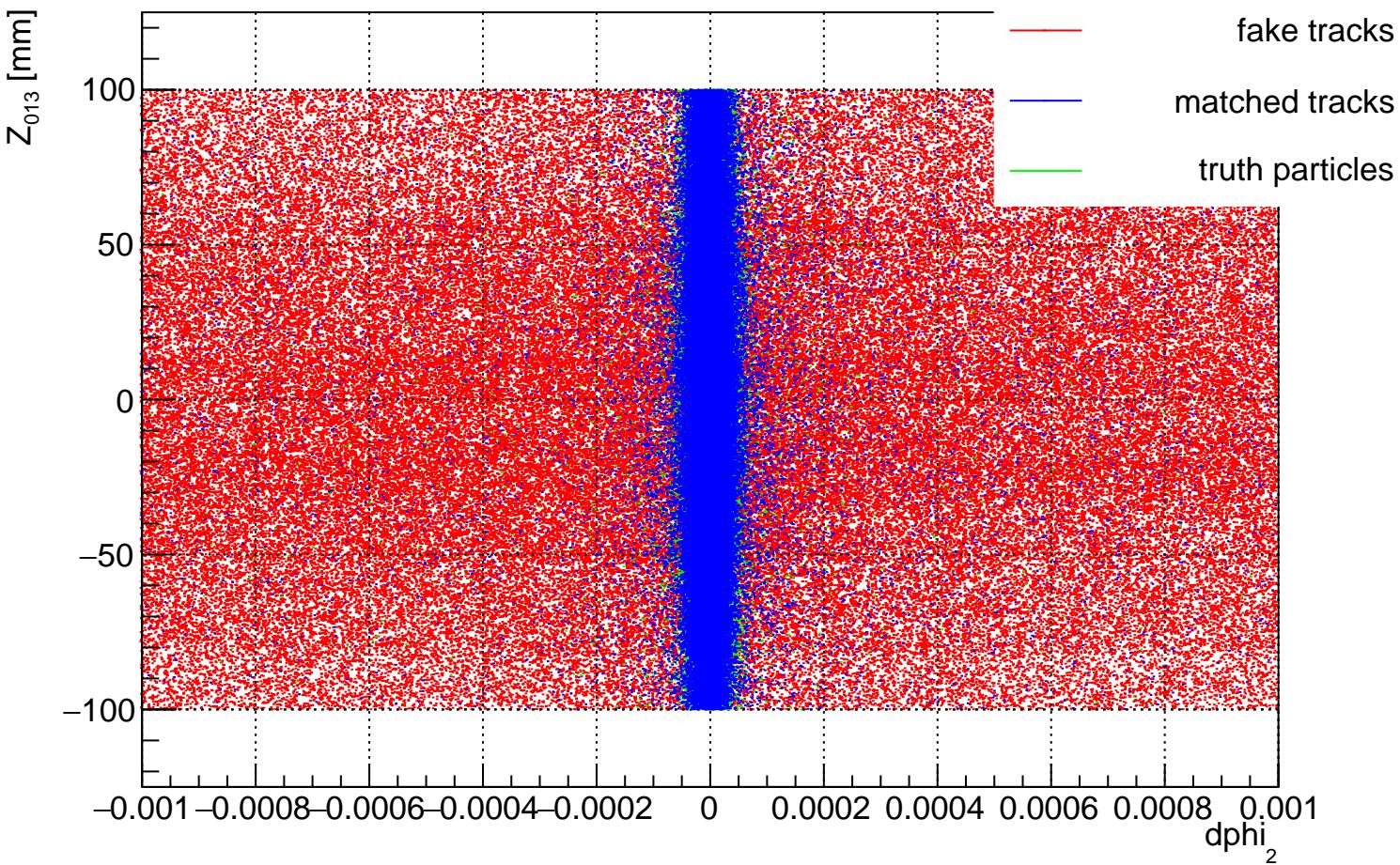
# $P_t$ Vs $Z_{13}$

truth  $P_t$



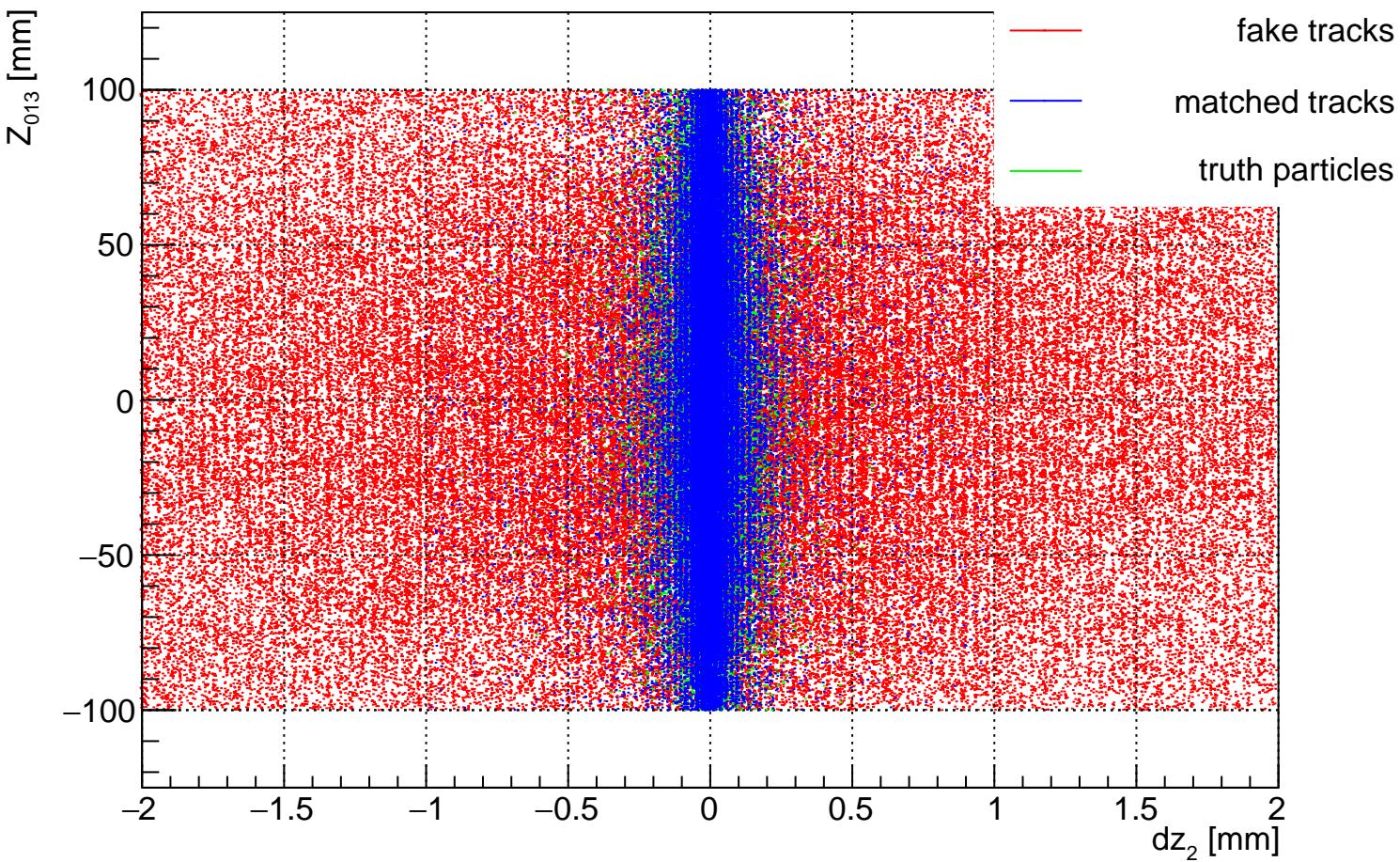
# $Z_{013}$ Vs $d\phi_{_2}$

phi Barrel = 0.02 +  
 $Z_{\text{barrel}} = 160 + Z_{0_{\text{max}}} = 150$



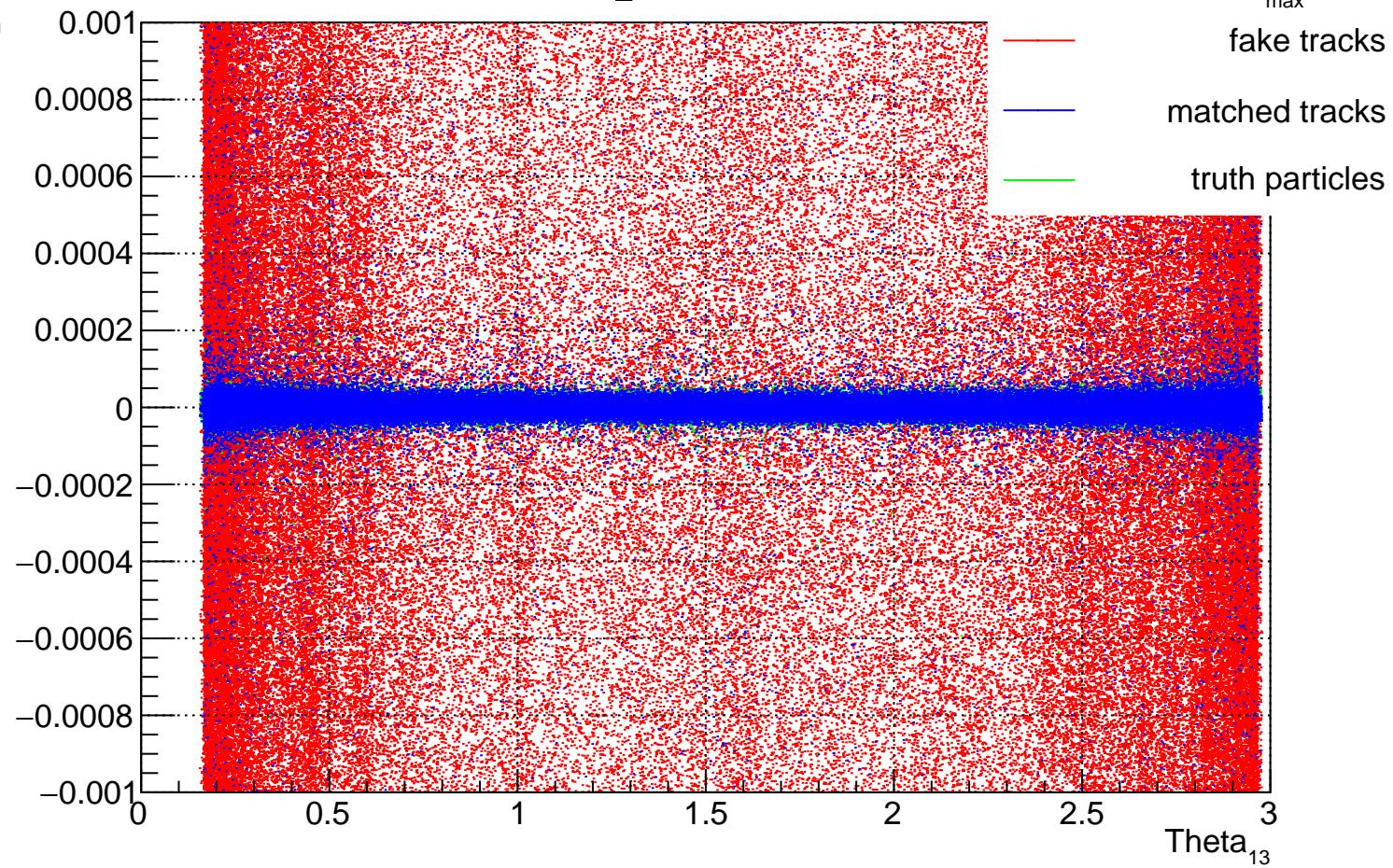
# $Z_{013}$ Vs $dz_2$

$\phi$  Barrel = 0.02 +  
 $Z_{\text{barrel}} = 160 + Z_{0_{\text{max}}} = 150$



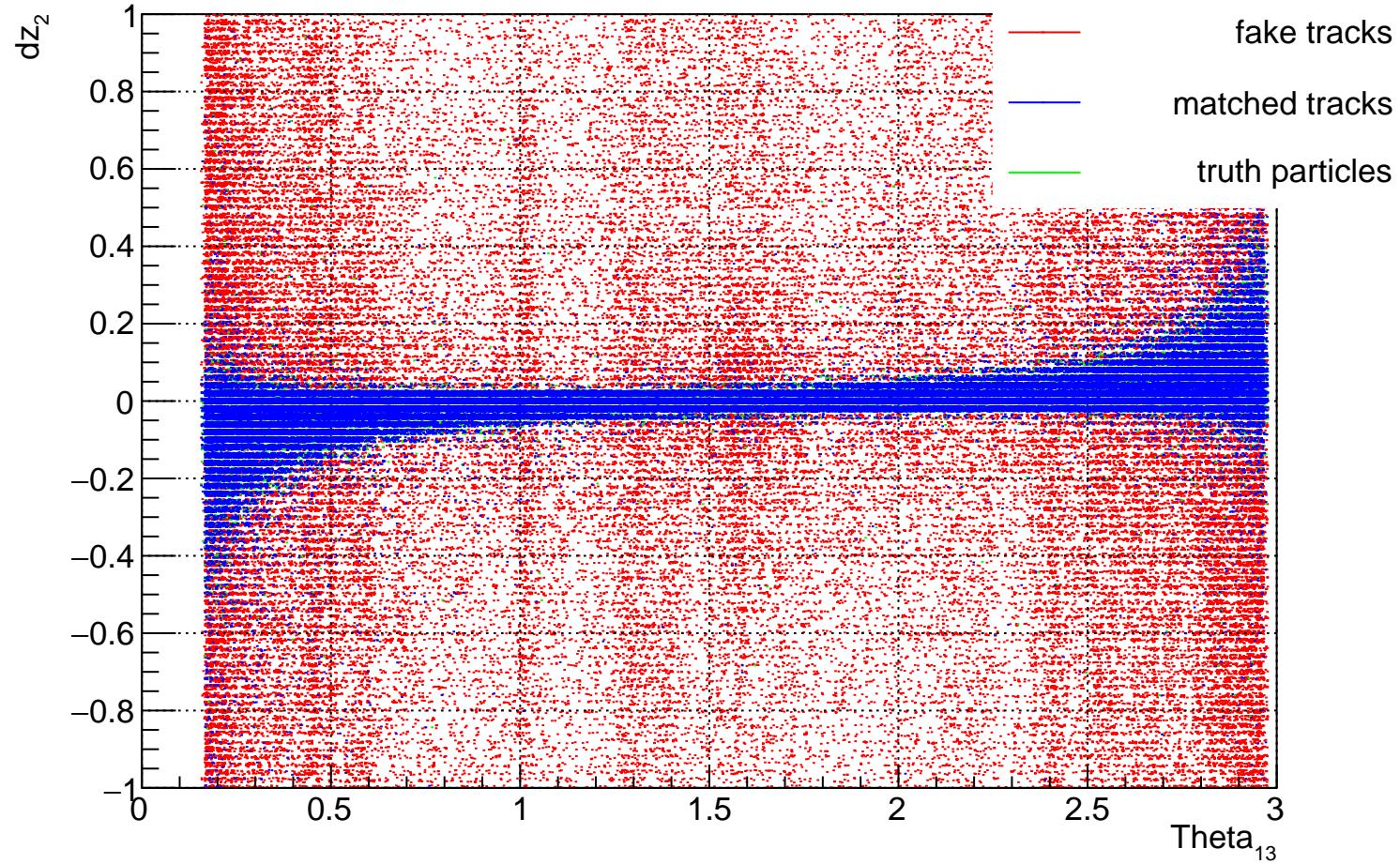
# $d\phi_{2}$ Vs $\Theta_{13}$

$\phi$  Barrel = 0.02 +  
 $Z_{\text{barrel}} = 160 + Z_0^{\text{max}} = 150$



# $dz_2$ Vs $\Theta_{13}$

$\phi$  Barrel = 0.02 +  
 $Z_{\text{barrel}} = 160 + Z_0^{\text{max}} = 150$



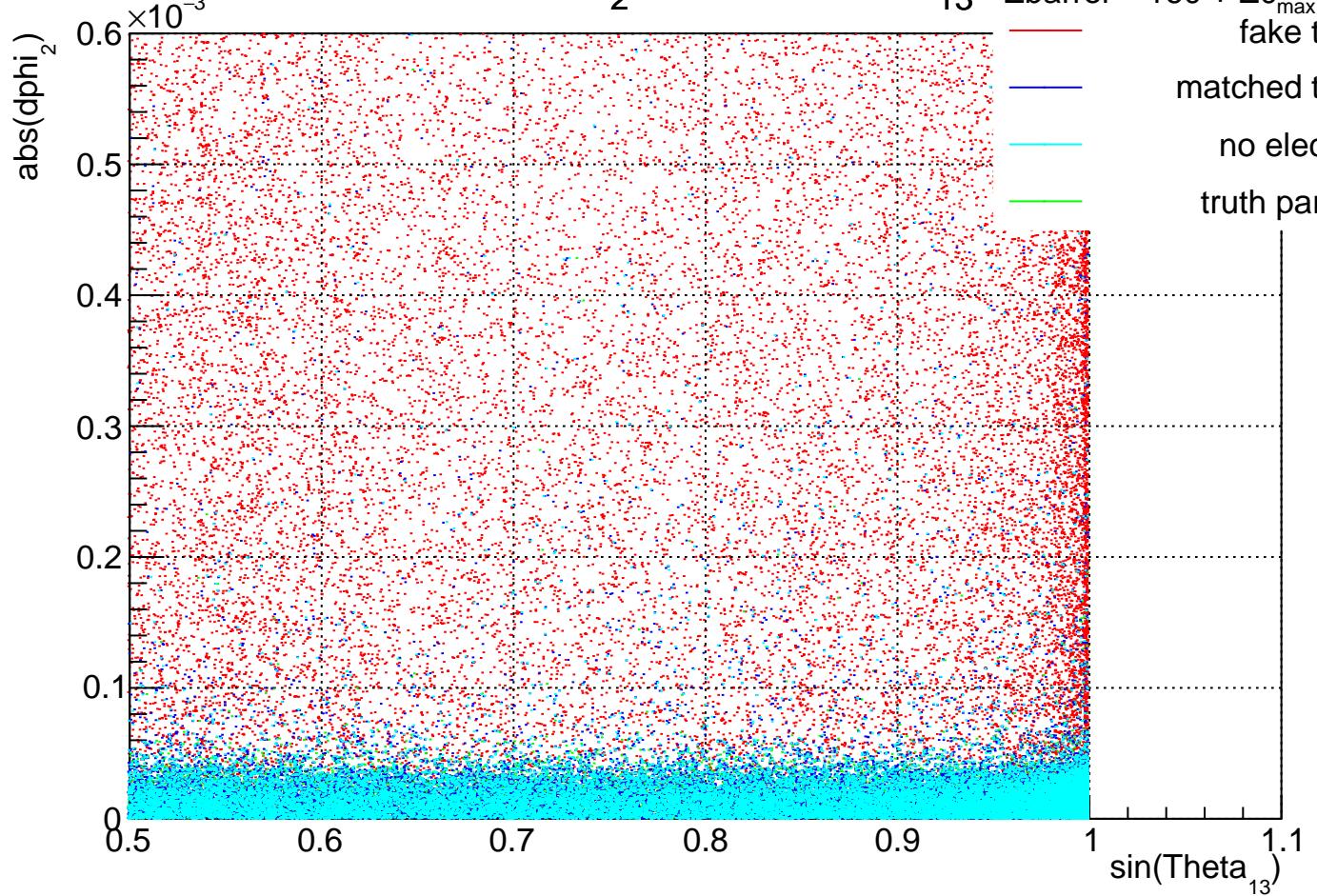
# $\text{abs}(\text{dphi}_2) \text{ Vs } \sin(\text{Theta}_{13})$

$\text{phi Barrel} = 0.02 +$   
 $\text{Zbarrel} = 160 + \text{Z0}_{\text{max}} = 150$   
fake tracks

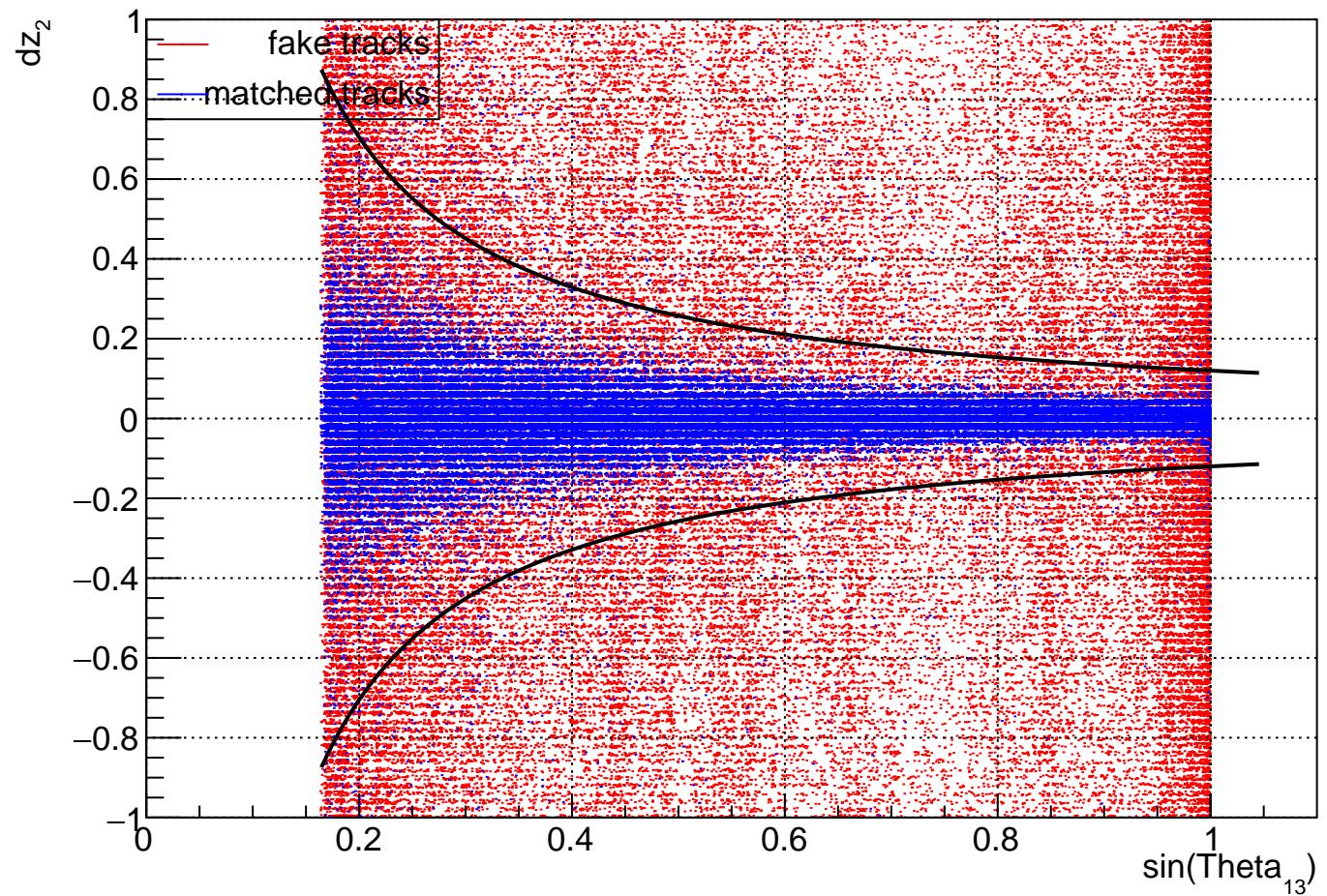
matched tracks

no electrons

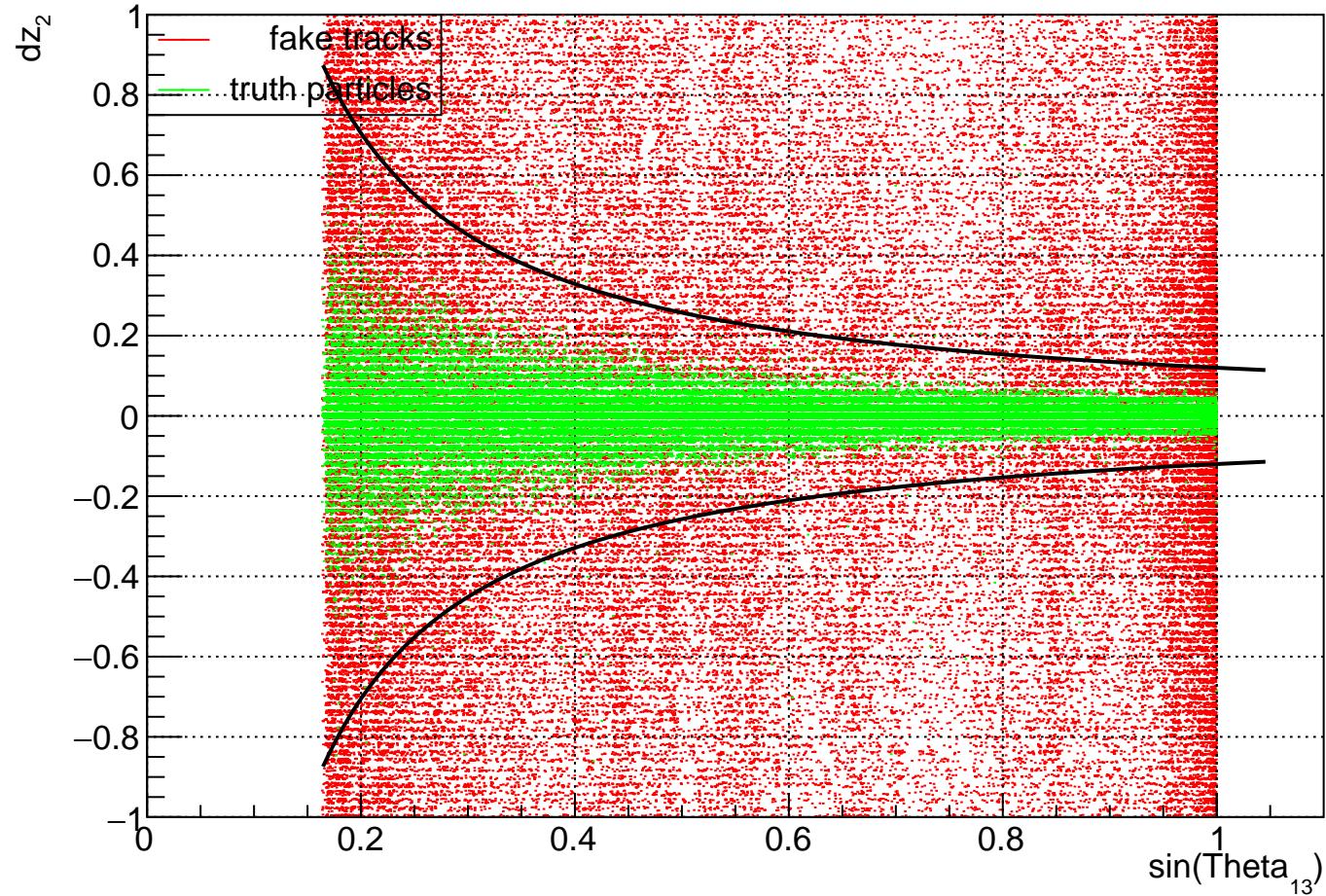
truth particles



# $dz_2$ Vs $\sin(\Theta_{13})$

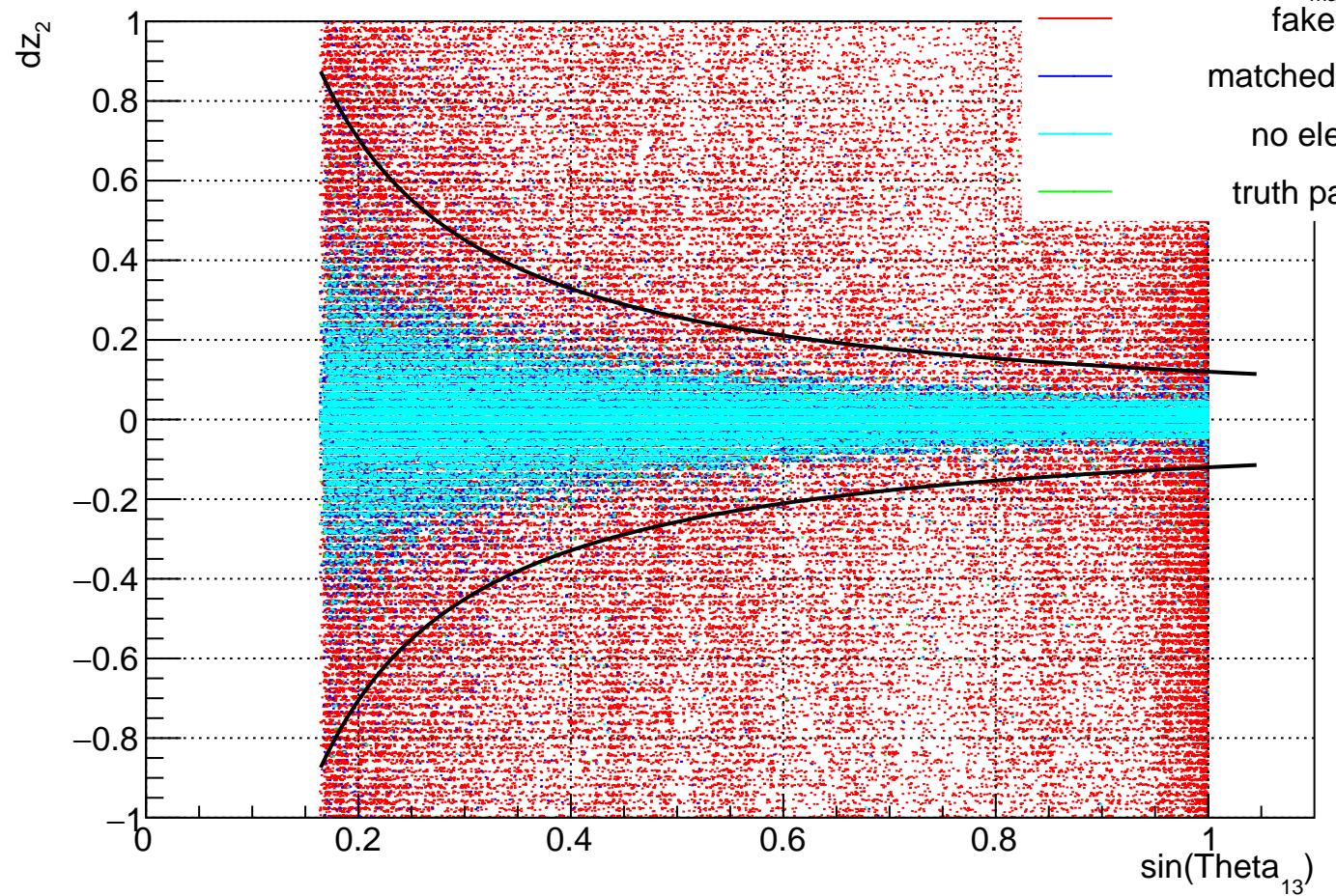


# $dz_2$ Vs $\sin(\Theta_{13})$



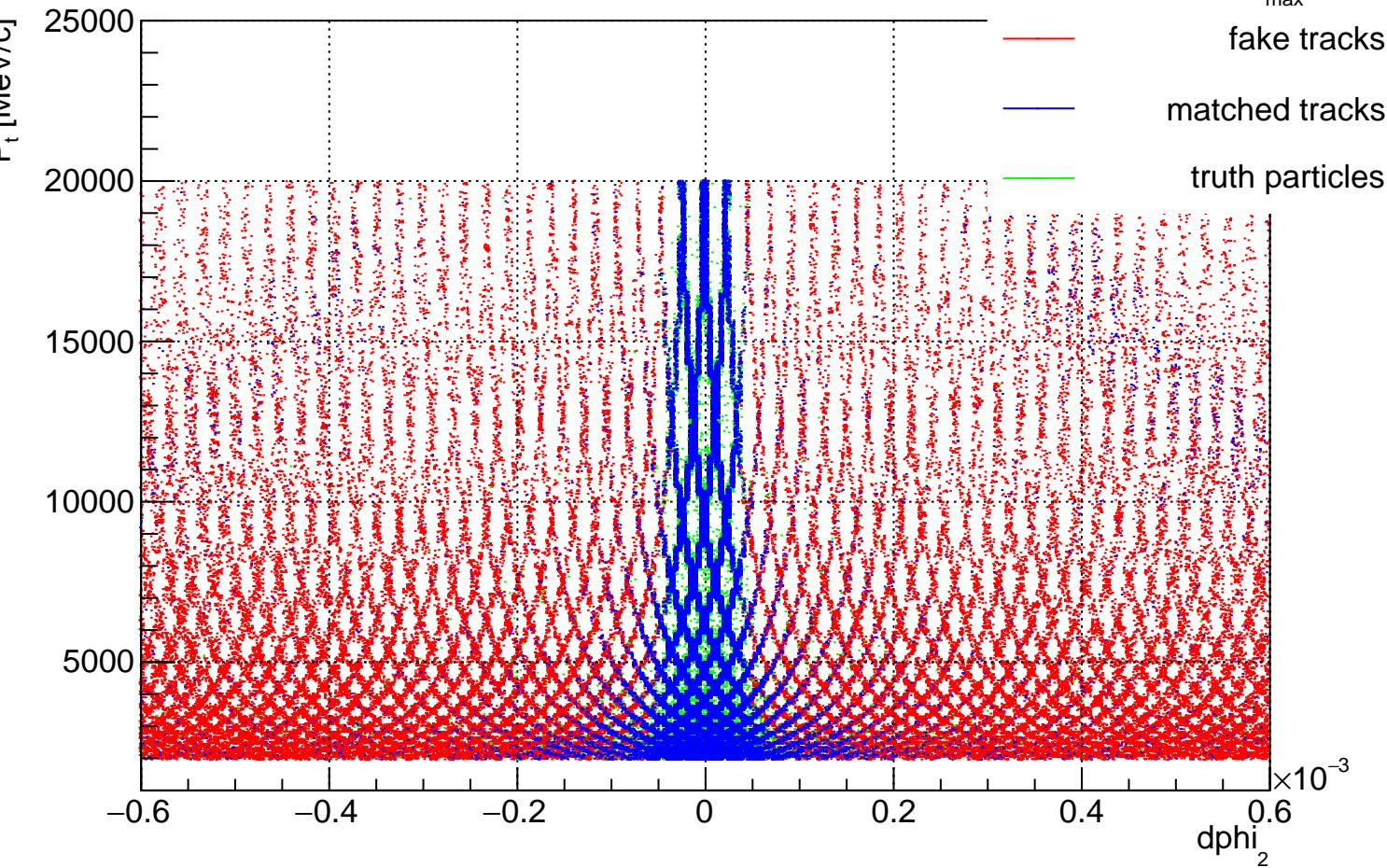
# $dz_2$ Vs $\sin(\Theta_{13})$

$\phi_{\text{Barrel}} = 0.02 +$   
 $Z_{\text{Barrel}} = 160 + Z_0^{\max} = 150$   
fake tracks  
matched tracks  
no electrons  
truth particles



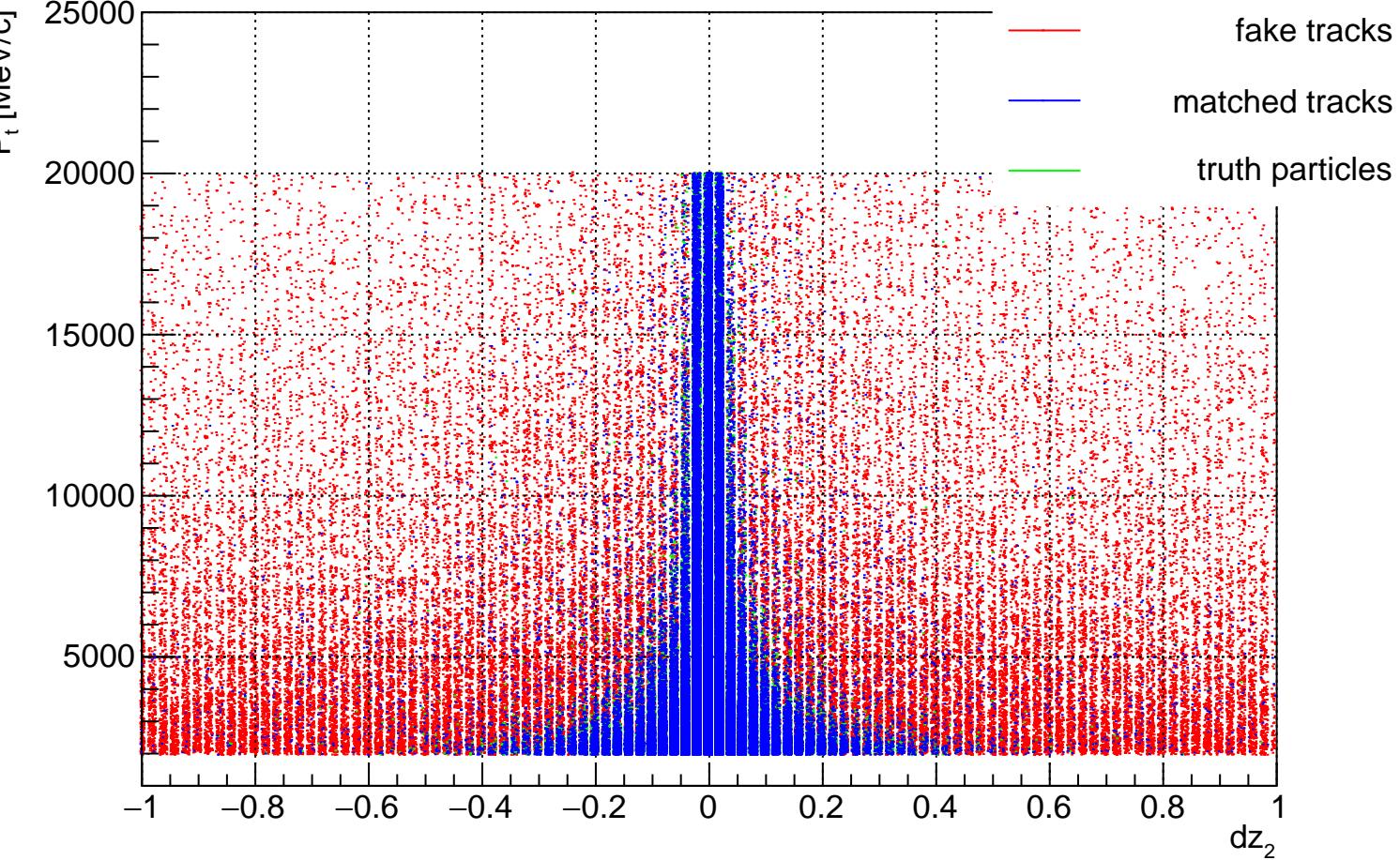
# $P_t$ Vs $d\phi_{2}$

phi Barrel = 0.02 +  
Zbarrel = 160 +  $Z_0_{max} = 150$



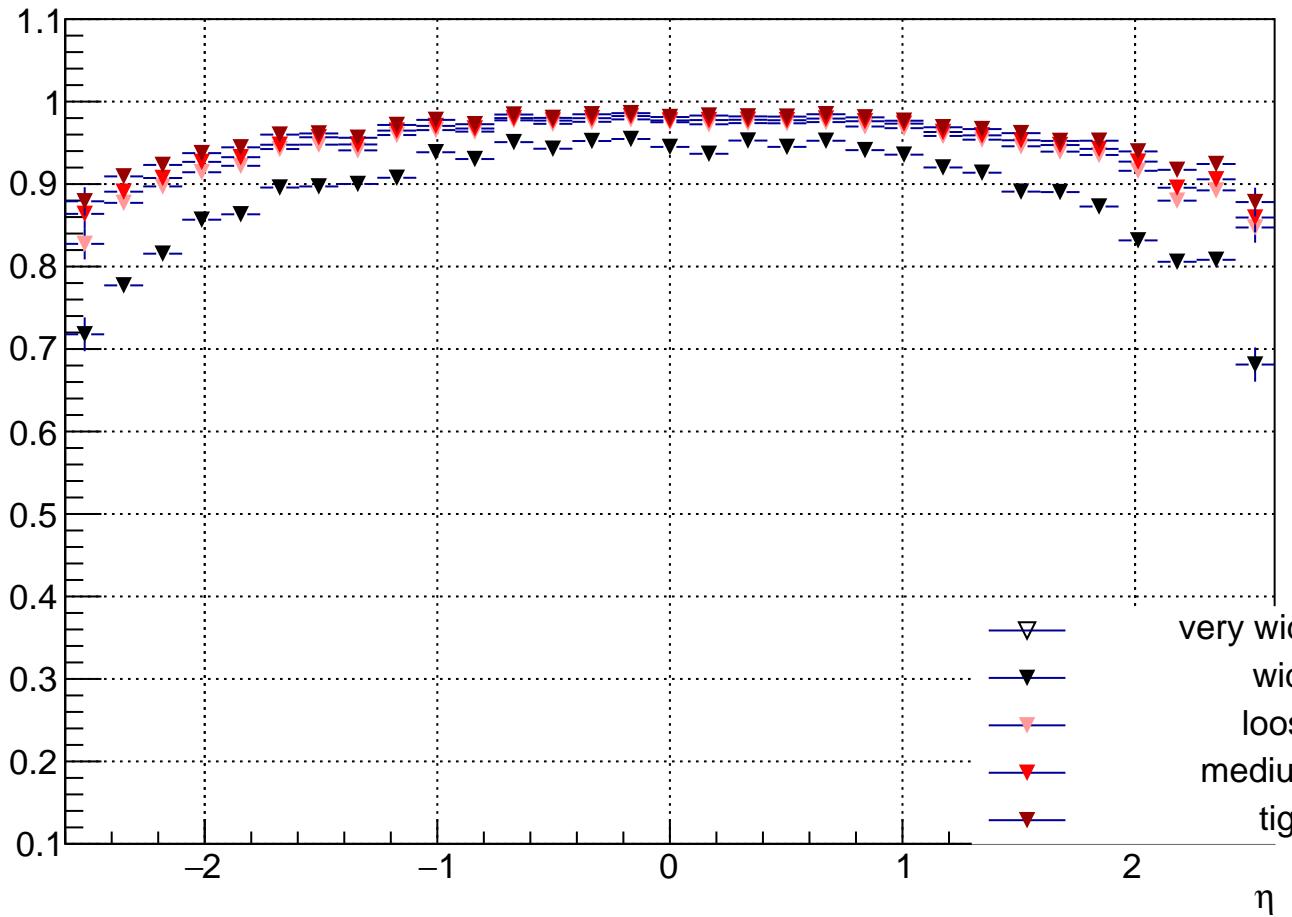
# $P_t$ Vs $dz_2$

phi Barrel = 0.02 +  
Zbarrel = 160 +  $Z_0_{\max} = 150$



# Purity vs $\eta$

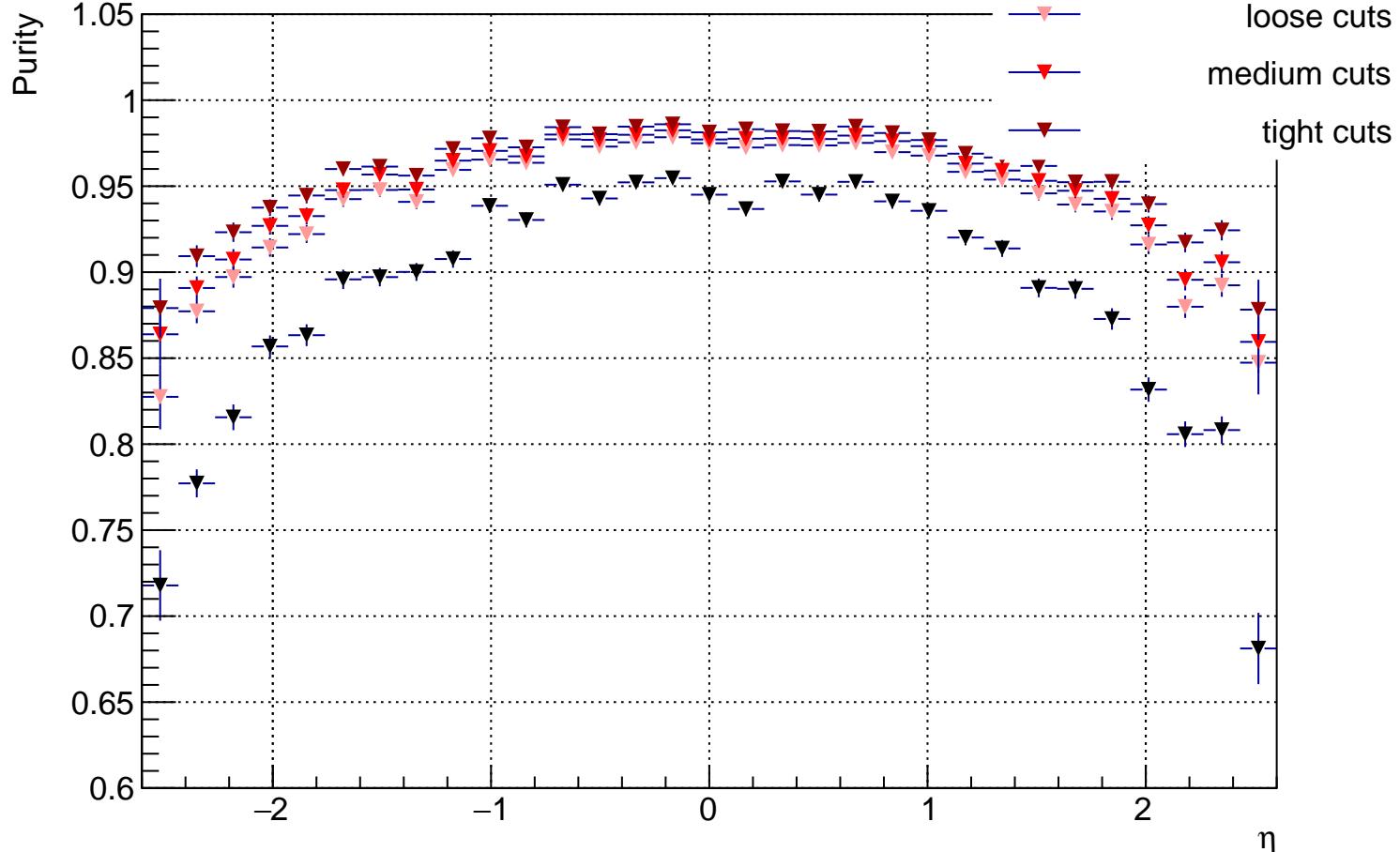
Purity



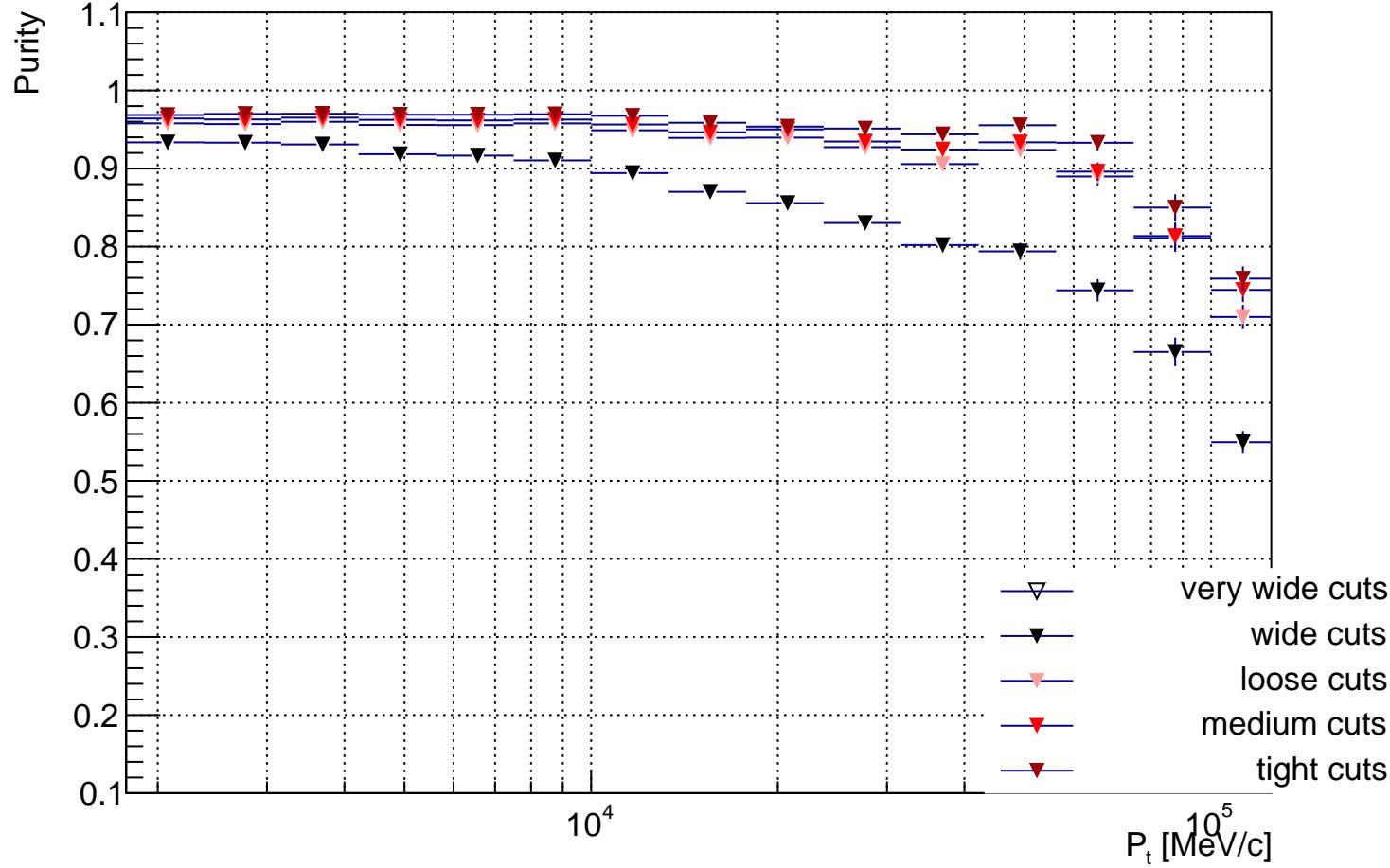
very wide cuts  
wide cuts  
loose cuts  
medium cuts  
tight cuts

$\eta$

# Purity vs $\eta$



# Purity vs $P_t$



# Purity vs $P_t$

