

# ctau 1mm

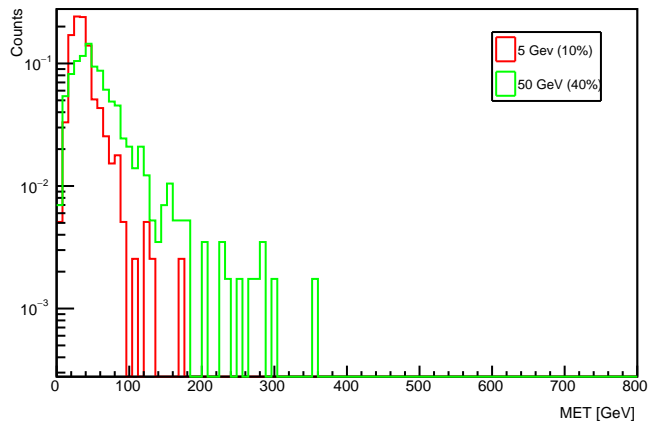
**Gen 5 Gev (10%): 393(c1:283(72.01%[72.01%]),c2:4(1.02%[1.41%]),c3:3(0.76%[75.00%]),c4:1(0.25%[33.33%]))**

**Reco 5 Gev (10%): 393(c1:209(53.18%[53.18%]),c2:3(0.76%[1.44%]),c3:2(0.51%[66.67%]),c4:0(0.00%[0.00%]))**

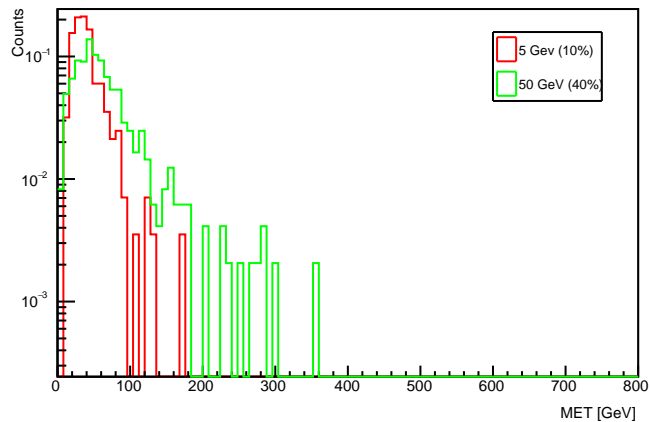
**Gen 50 GeV (40%): 573(c1:485(84.64%[84.64%]),c2:43(7.50%[8.87%]),c3:36(6.28%[83.72%]),c4:18(3.14%[50.00%]))**

**Reco 50 GeV (40%): 573(c1:426(74.35%[74.35%]),c2:41(7.16%[9.62%]),c3:36(6.28%[87.80%]),c4:13(2.27%[36.11%]))**

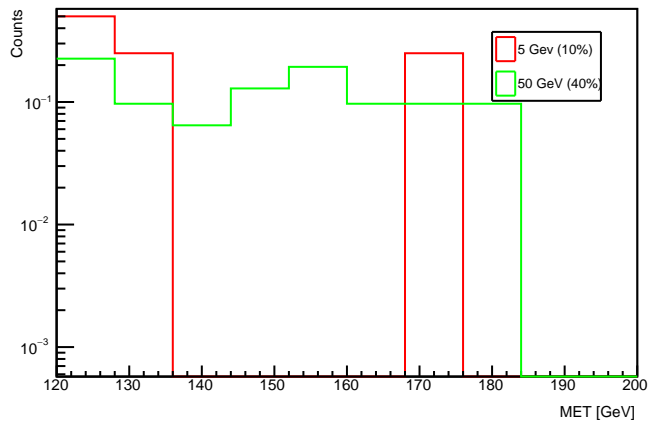
gen leading MET: no cuts



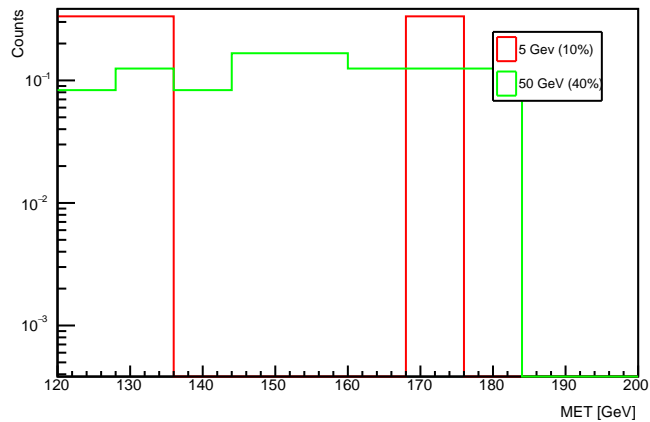
gen leading MET: n\_jet &gt;=1, j1pt &gt; 30 GeV



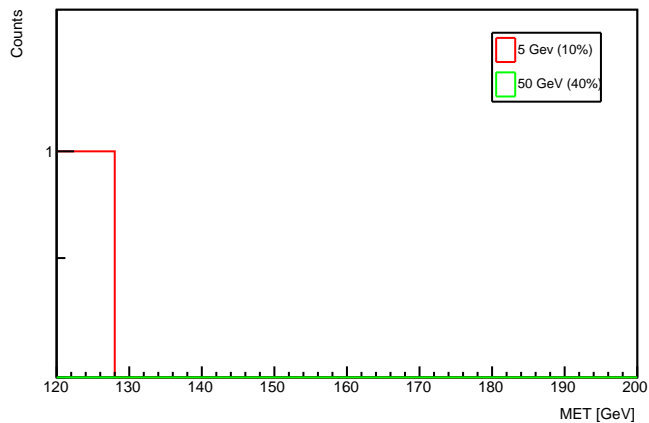
gen leading MET: MET &gt; 120 GeV



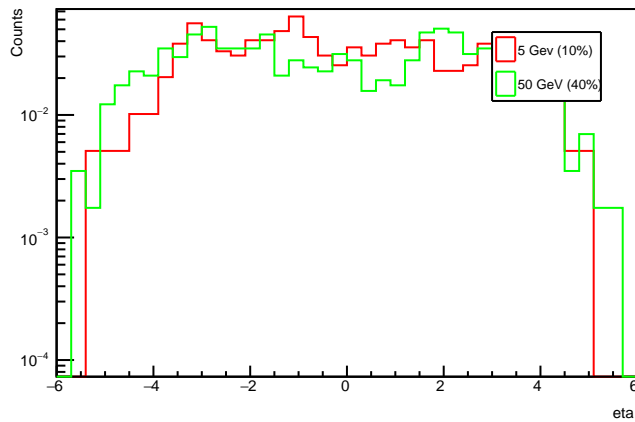
gen leading MET: j1pt &gt;120, at most 2 jets w/ pt &gt;30 GeV



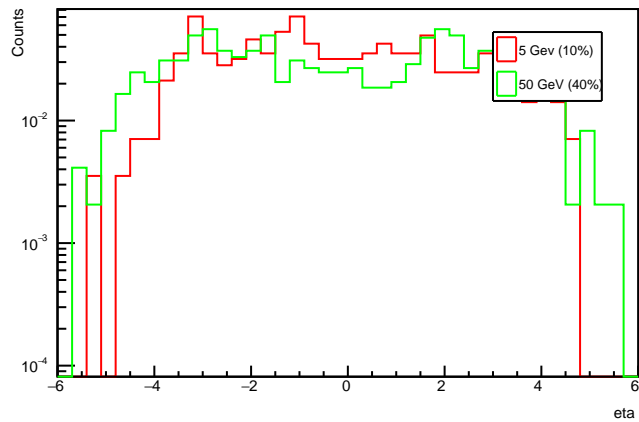
gen leading MET: at least 2 mu w/ vxy&lt; 740 cm, |vz|&lt;960cm &amp; |eta|&lt;2.4



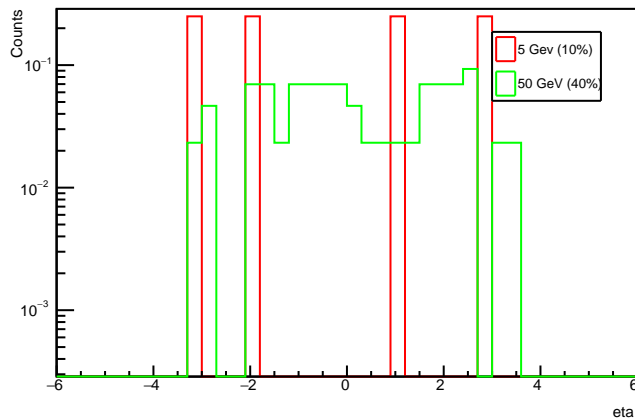
gen leading Met eta: no cuts



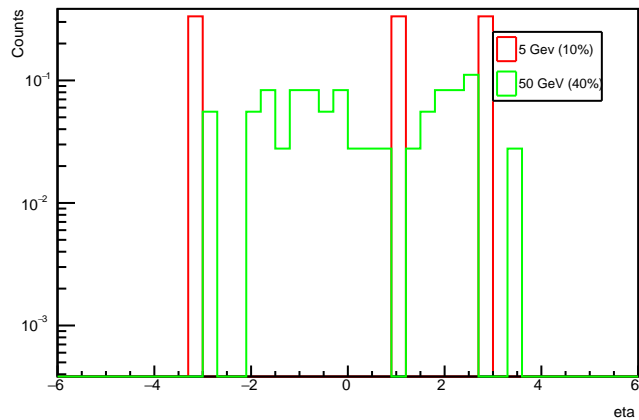
gen leading Met eta: n\_jet &gt;=1, j1pt &gt; 30 GeV



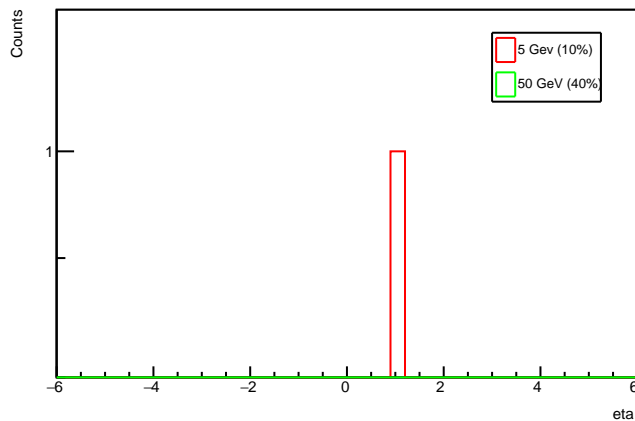
gen leading Met eta: MET &gt; 120 GeV



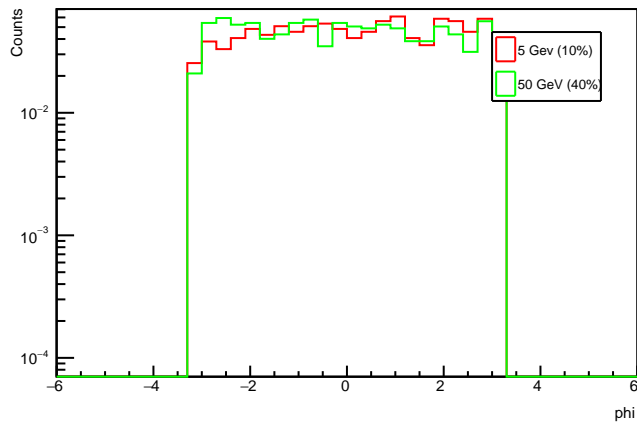
gen leading Met eta: j1pt &gt;120, at most 2 jets w/ pt &gt;30 GeV



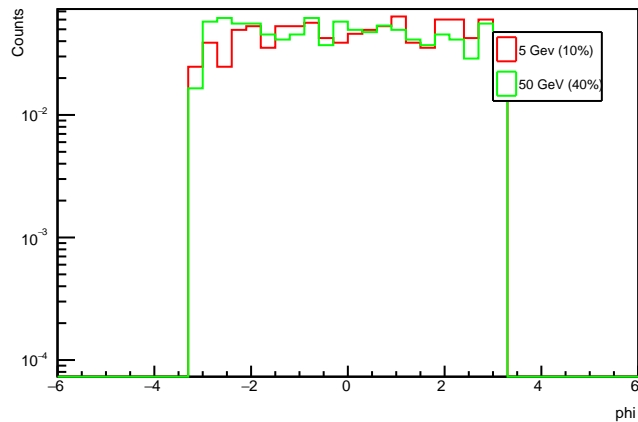
gen leading Met eta: at least 2 mu w/ vx &lt; 740 cm, |vz| &lt; 960 cm &amp; |eta| &lt; 2.4



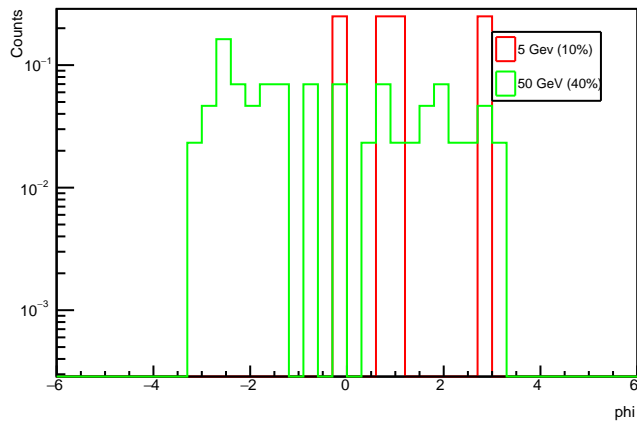
gen leading Met phi: no cuts



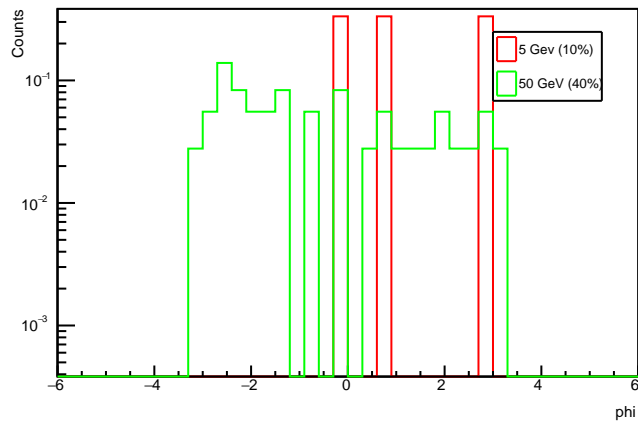
gen leading Met phi: n\_jet &gt;=1, j1pt &gt; 30 GeV



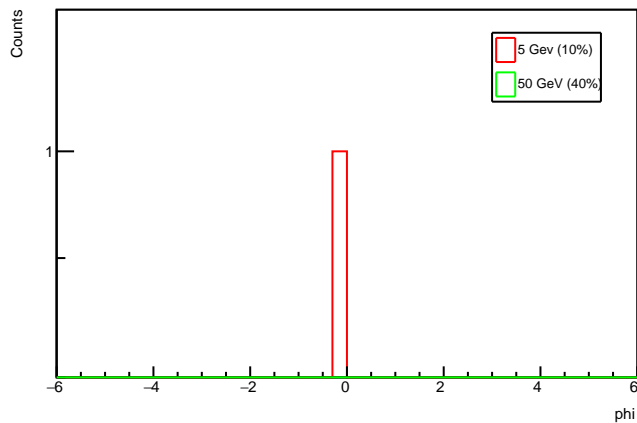
gen leading Met phi: MET &gt; 120 GeV



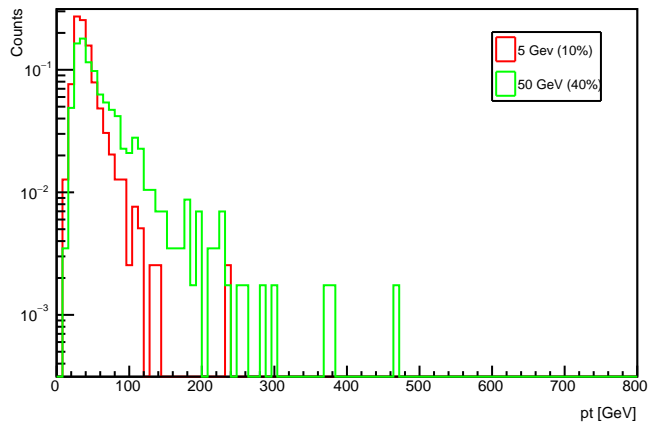
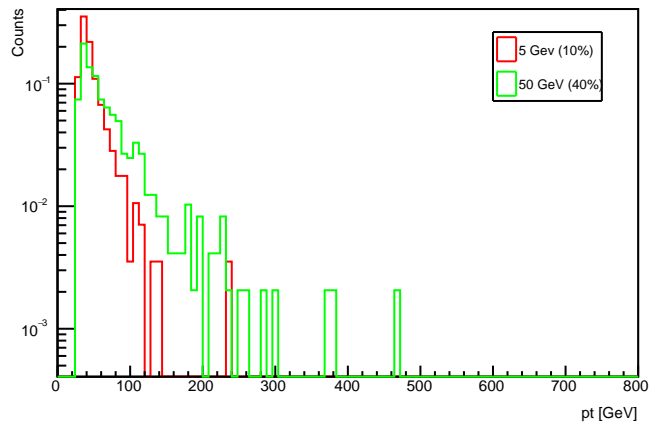
gen leading Met phi: j1pt &gt;120, at most 2 jets w/ pt &gt;30 GeV



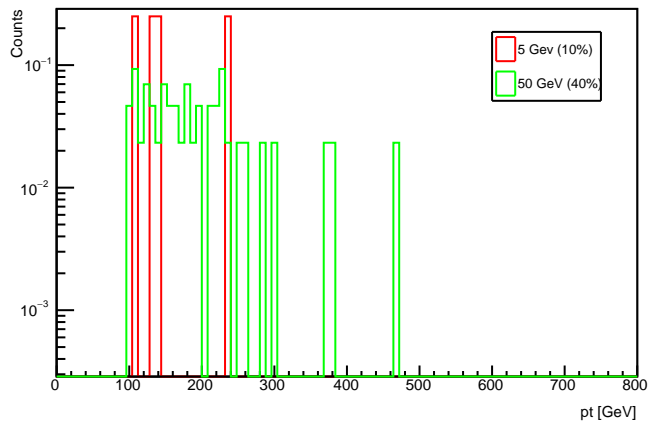
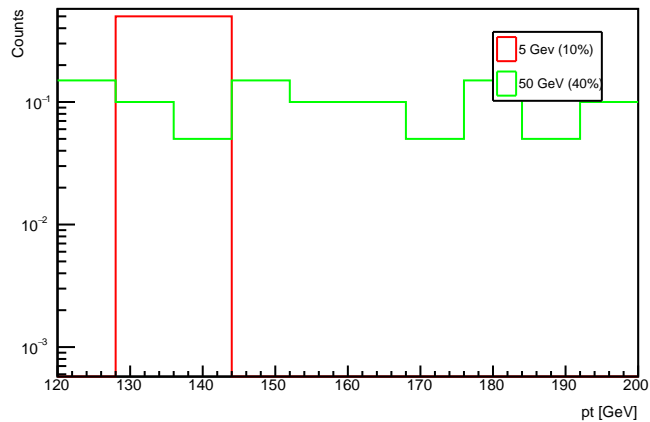
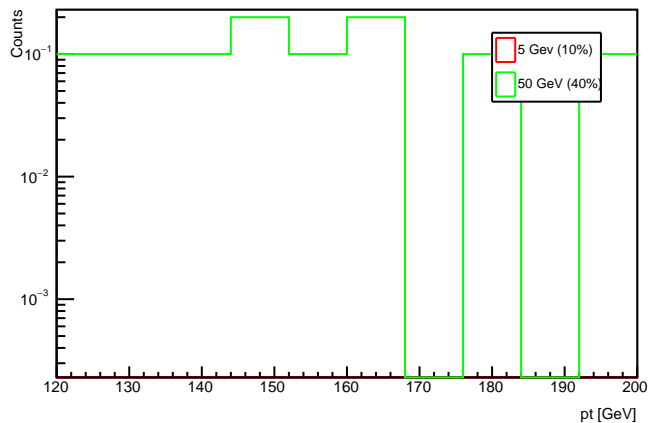
gen leading Met phi: at least 2 mu w/ vx &lt; 740 cm, |vz| &lt; 960 cm &amp; |eta| &lt; 2.4



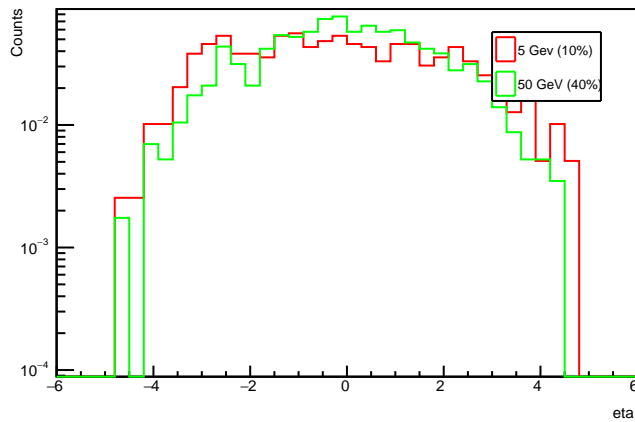
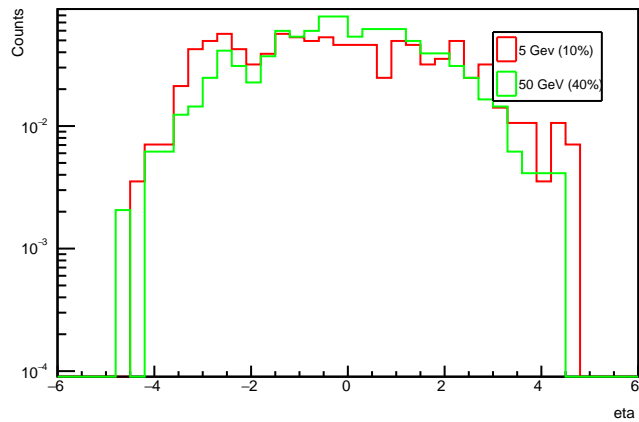
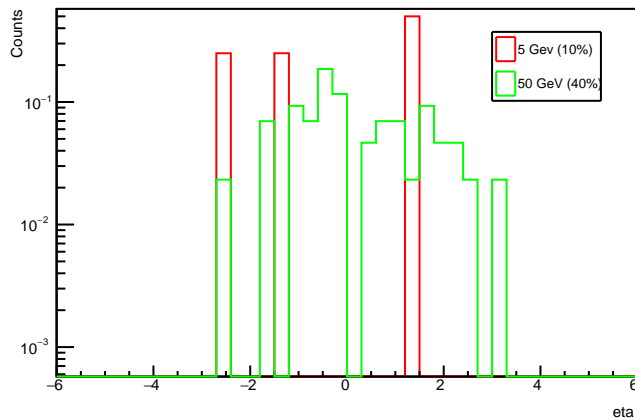
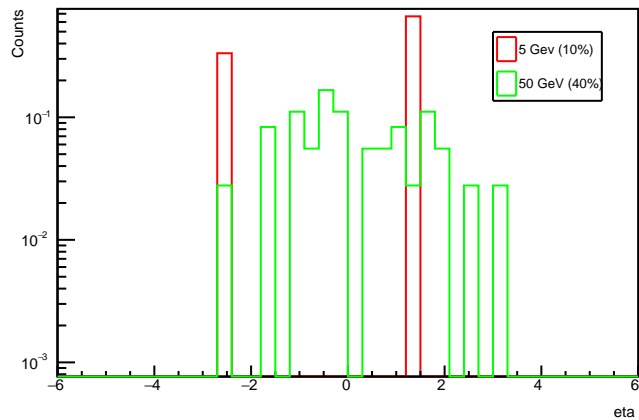
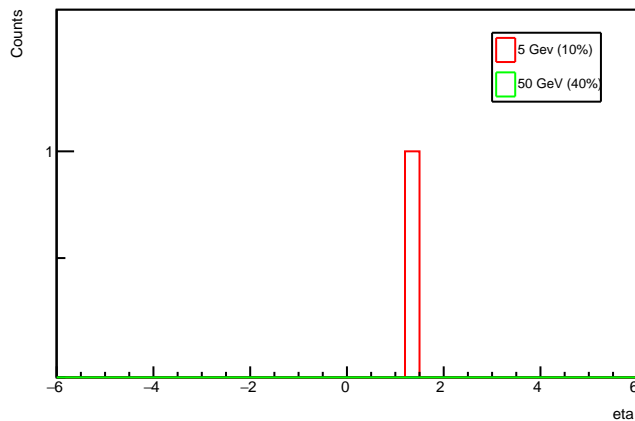
gen leading Jet pt: no cuts

gen leading Jet pt:  $n_{\text{jet}} \geq 1$ ,  $j1pt > 30$  GeV

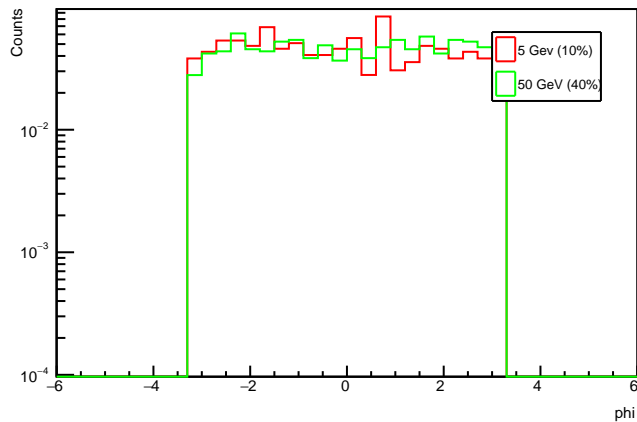
gen leading Jet pt: MET &gt; 120 GeV

gen leading Jet pt:  $j1pt > 120$ , at most 2 jets w/ pt > 30 GeVgen leading Jet pt: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta| < 2.4$ 

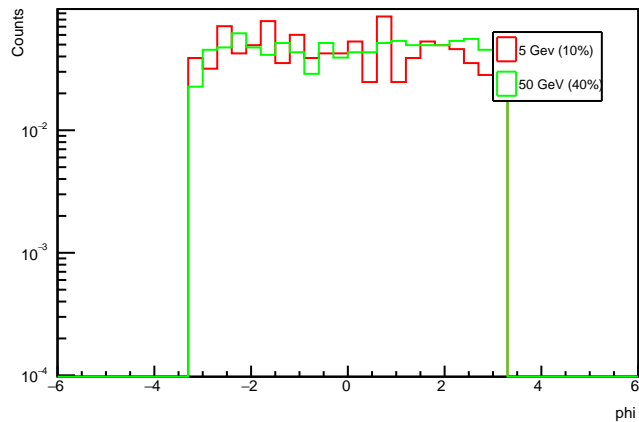
gen leading Jet eta: no cuts

gen leading Jet eta:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeVgen leading Jet eta:  $\text{MET} > 120$  GeVgen leading Jet eta:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVgen leading Jet eta: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta| < 2.4$ 

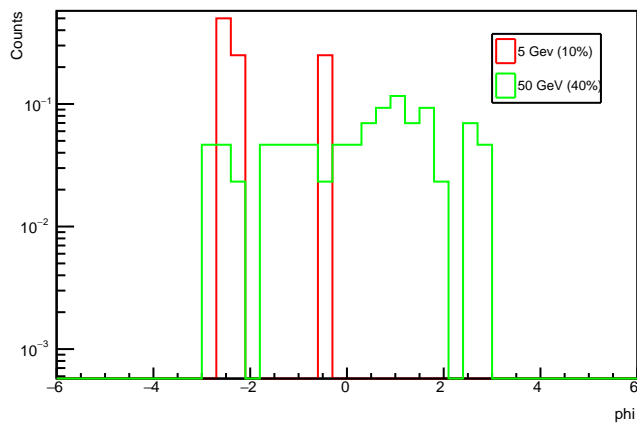
gen leading Jet phi: no cuts



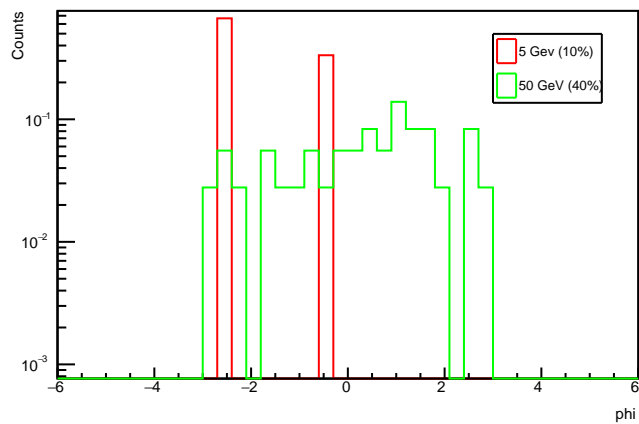
gen leading Jet phi: n\_jet &gt;=1, j1pt &gt; 30 GeV



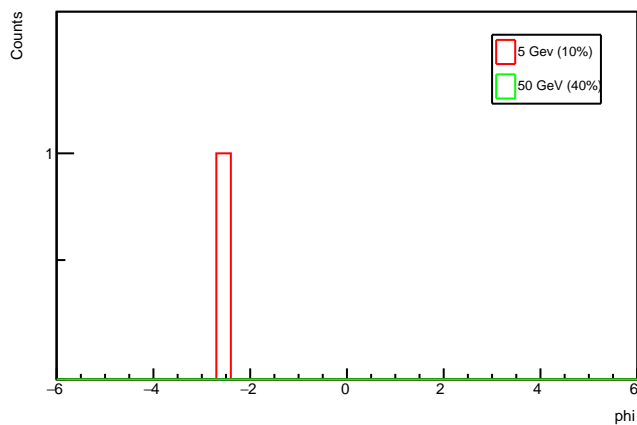
gen leading Jet phi: MET &gt; 120 GeV



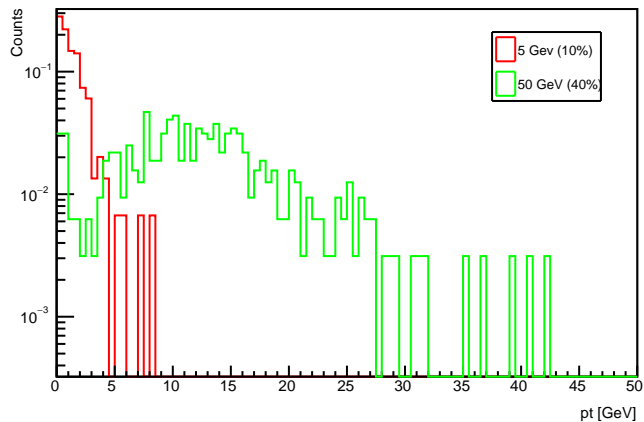
gen leading Jet phi: j1pt &gt;120, at most 2 jets w/ pt &gt;30 GeV



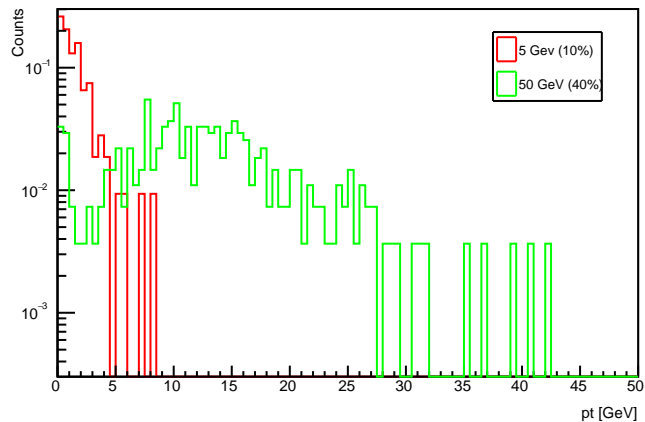
gen leading Jet phi: at least 2 mu w/ vxy &lt; 740 cm, |vz| &lt; 960 cm &amp; |eta| &lt; 2.4



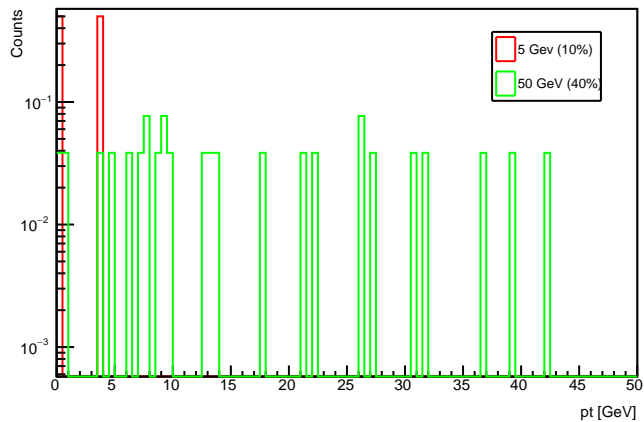
ctau 1mm leading vs subleading Mu pt: no cuts



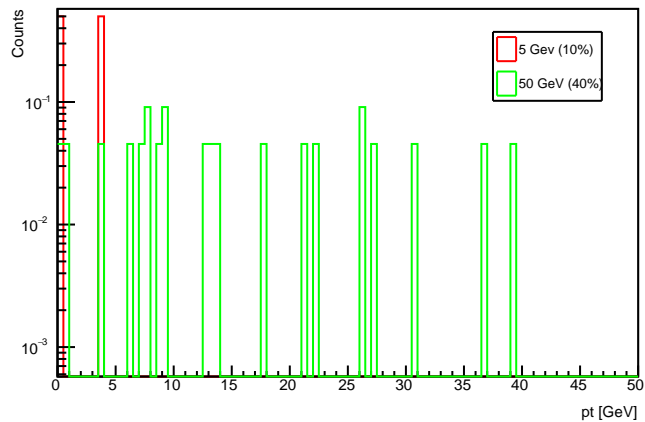
ctau 1mm leading vs subleading Mu pt:  $n_{\text{jet}} \geq 1$ ,  $j_1 \text{pt} > 30 \text{ GeV}$



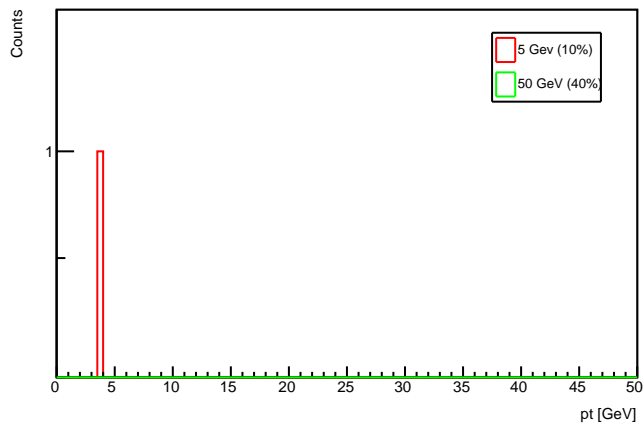
ctau 1mm leading vs subleading Mu pt: MET > 120 GeV



ctau 1mm leading vs subleading Mu pt:  $j_1 \text{pt} > 120$ , at most 2 jets w/  $\text{pt} > 30 \text{ GeV}$

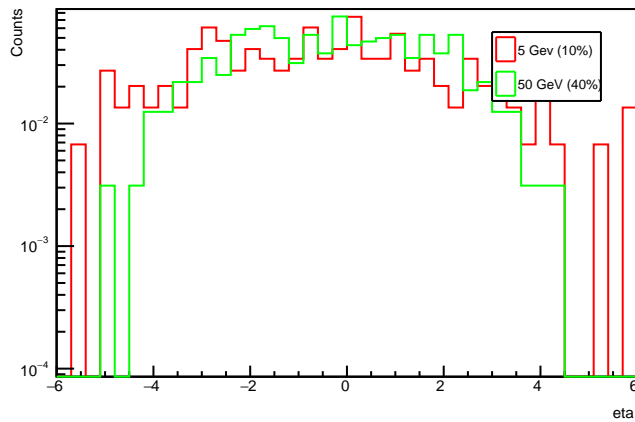
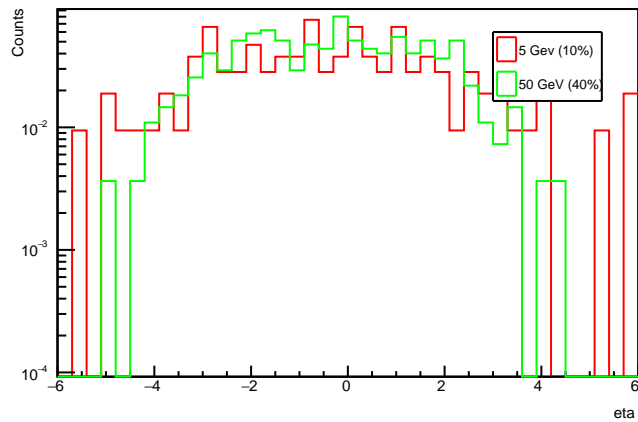
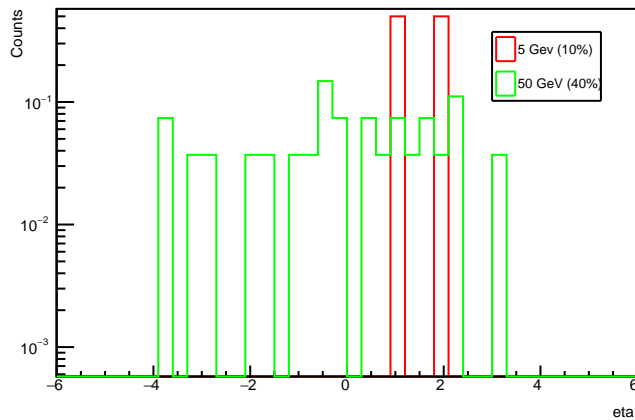
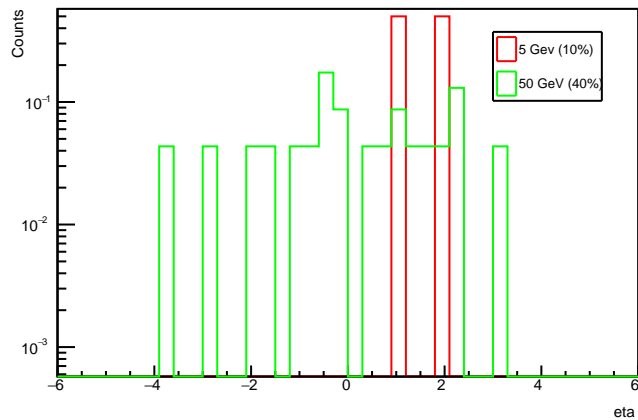
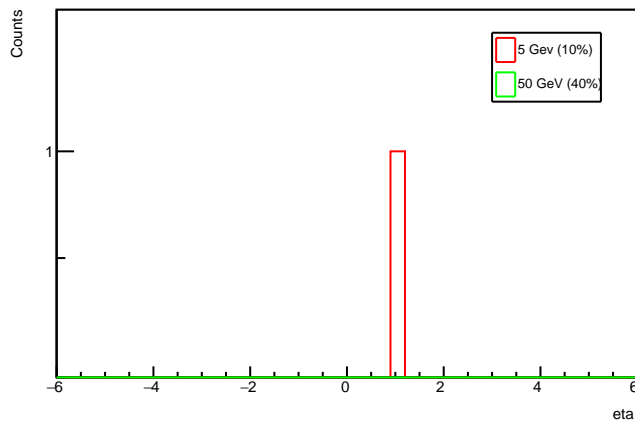


ctau 1mm leading vs subleading Mu pt: at least 2 mu w/  $v_{xy} < 740 \text{ cm}$ ,  $|v_z| < 960 \text{ cm}$  &  $|\text{eta}| < 2.4$

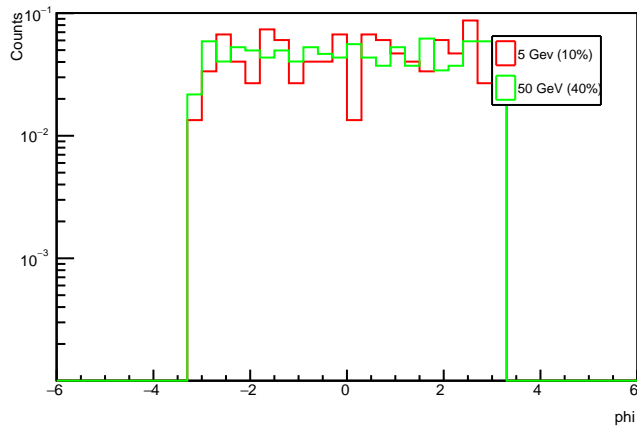
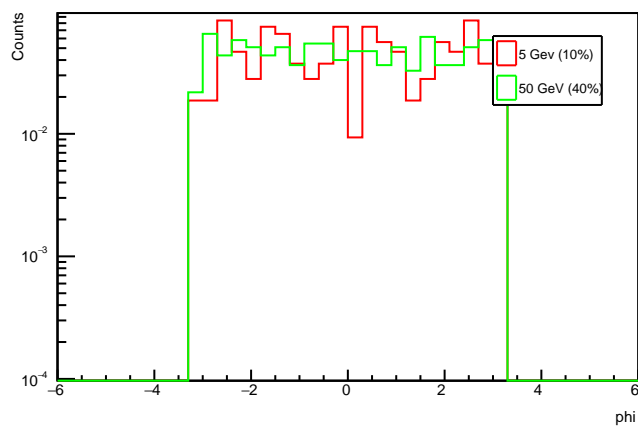




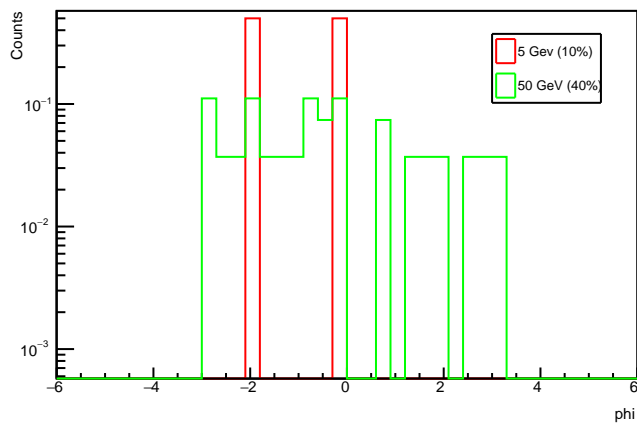
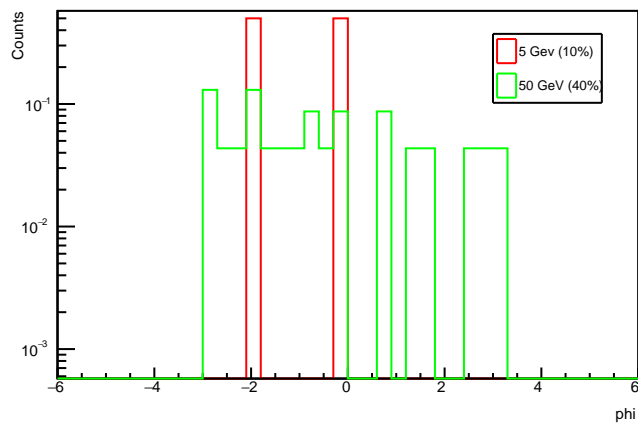
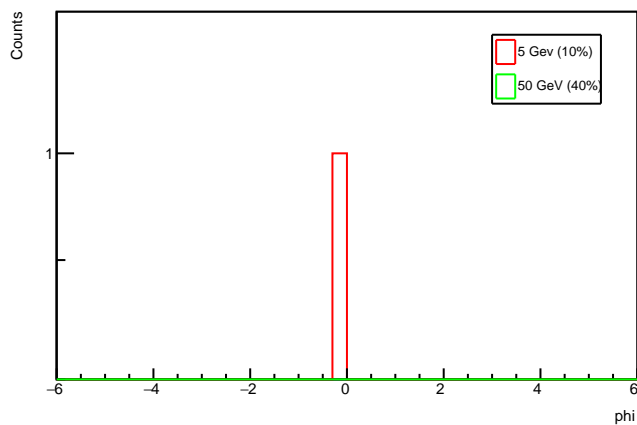
gen leading Mu eta: no cuts

gen leading Mu eta:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeVgen leading Mu eta:  $\text{MET} > 120$  GeVgen leading Mu eta:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVgen leading Mu eta: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\text{eta}| < 2.4$ 

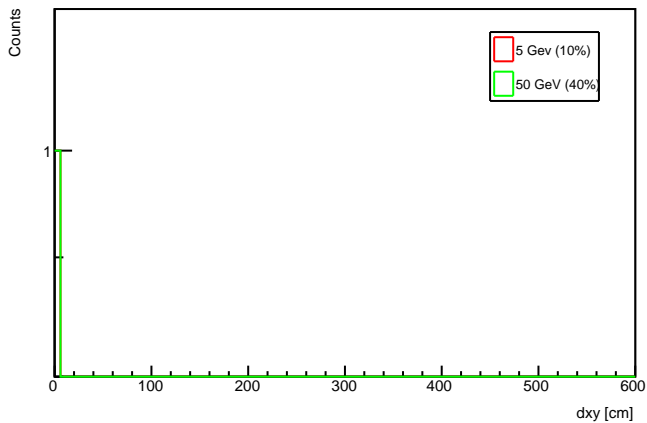
gen leading Mu phi: no cuts

gen leading Mu phi:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

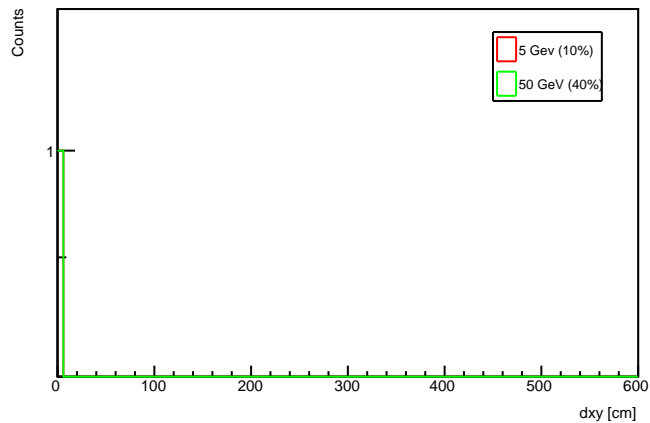
gen leading Mu phi: MET &gt; 120 GeV

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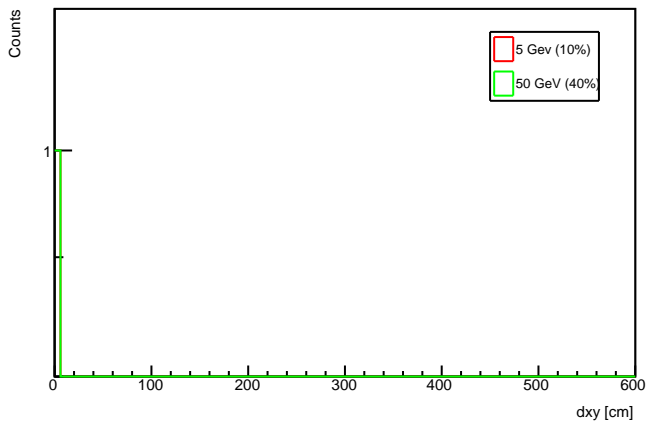
gen leading Mu vxy: no cuts



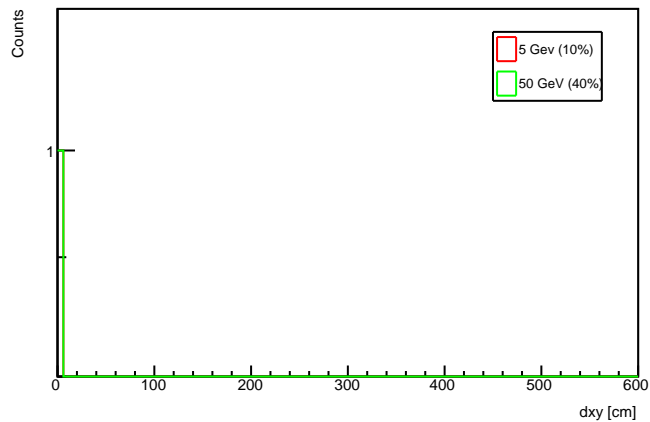
gen leading Mu vxy: n\_jet &gt;=1, j1pt &gt; 30 GeV



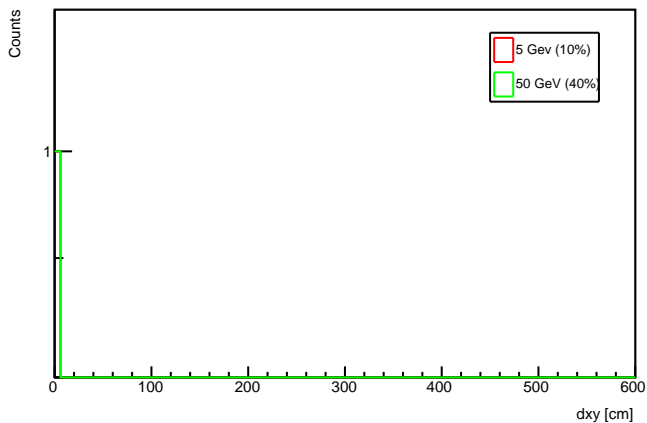
gen leading Mu vxy: MET &gt; 120 GeV



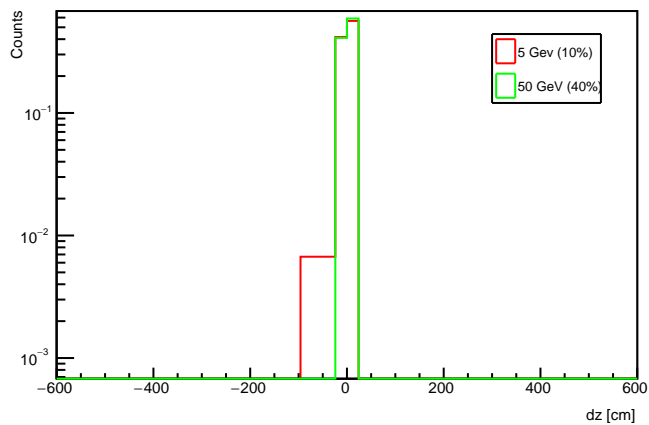
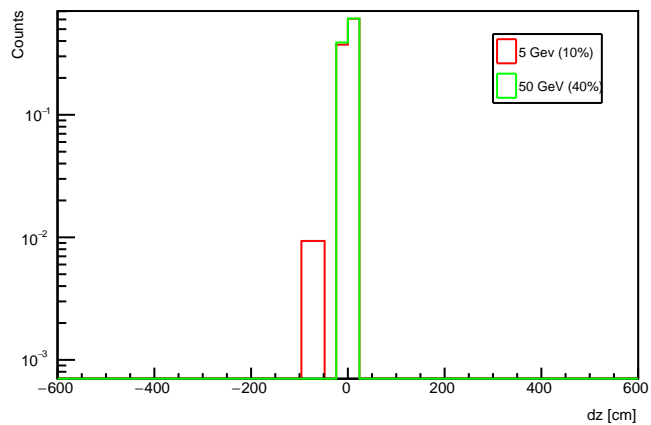
gen leading Mu vxy: j1pt &gt;120, at most 2 jets w/ pt &gt;30 GeV



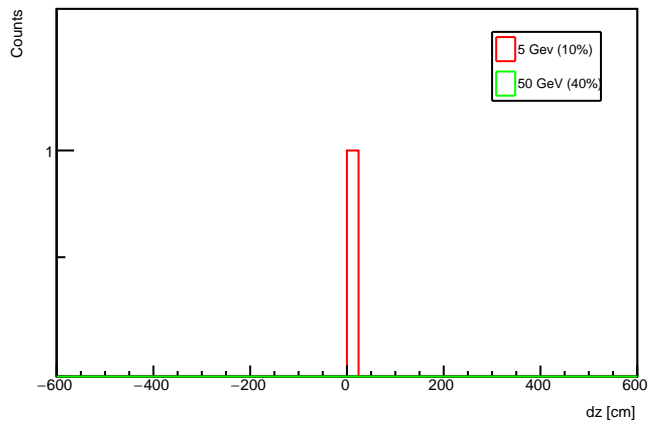
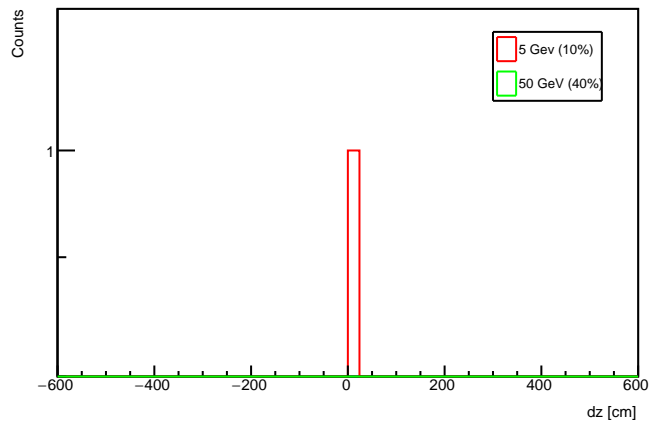
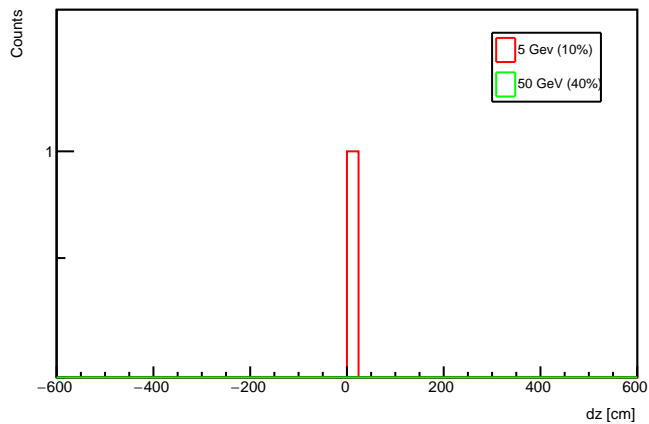
gen leading Mu vxy: at least 2 mu w/ vxy &lt; 740 cm, |vz| &lt; 960 cm &amp; |eta| &lt; 2.4



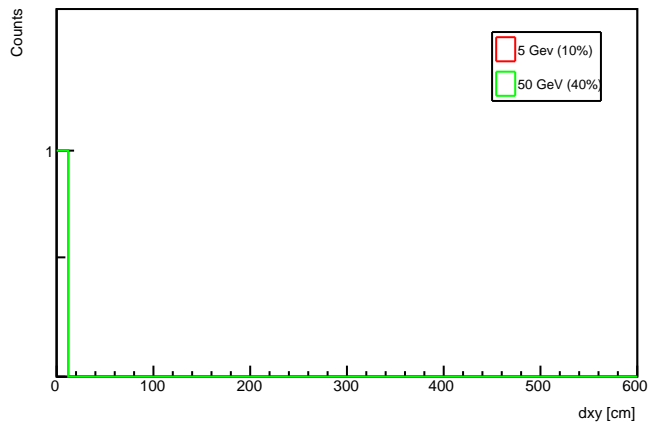
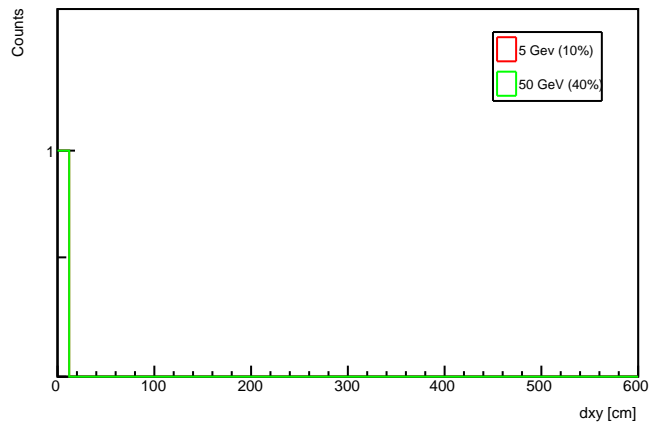
gen leading Mu vz: no cuts

gen leading Mu vz:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

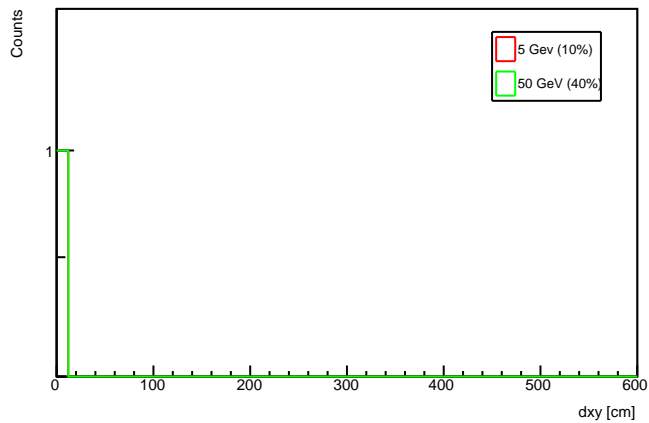
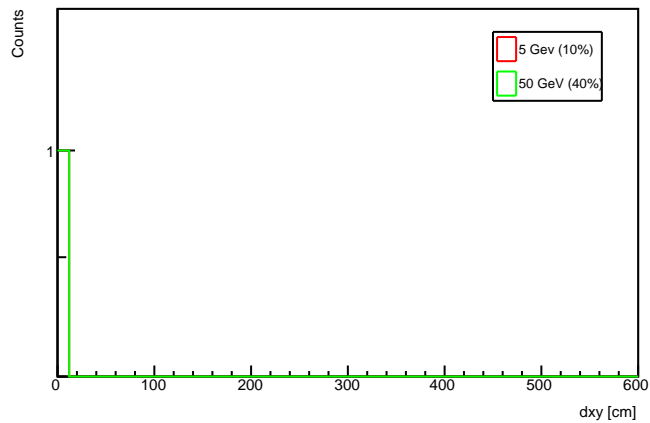
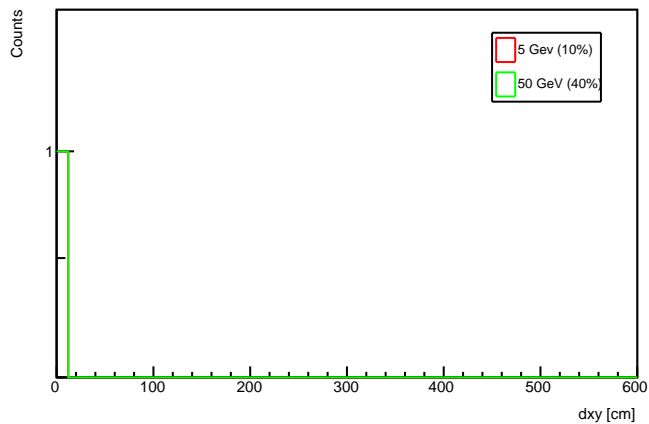
gen leading Mu vz: MET &gt; 120 GeV

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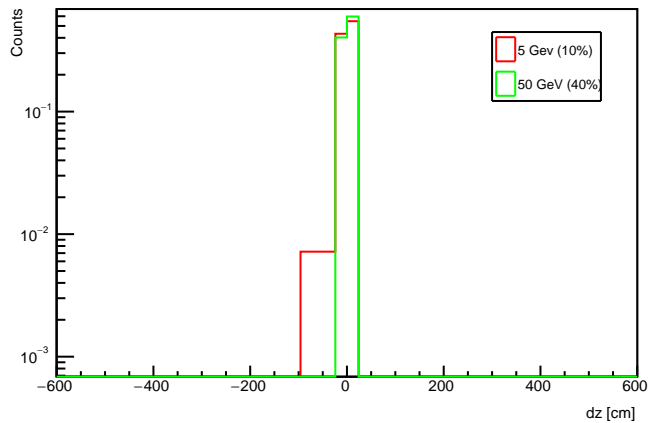
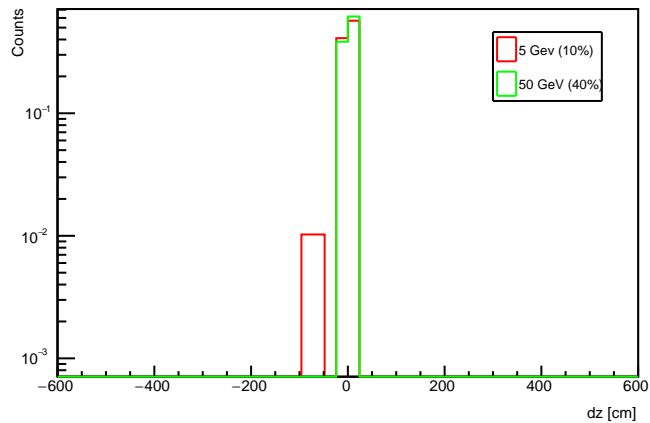
gen all Mu vxy: no cuts

gen all Mu vxy:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

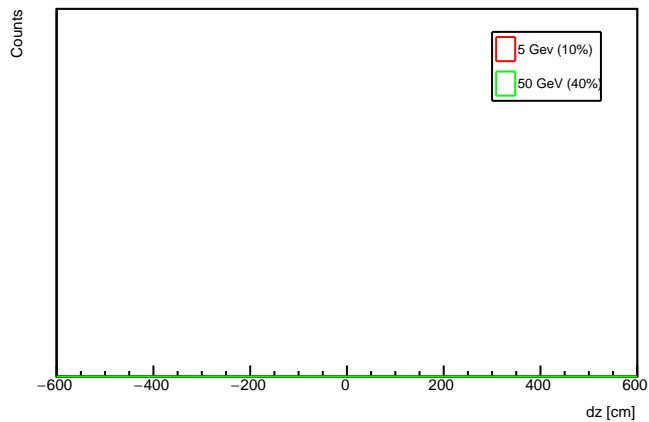
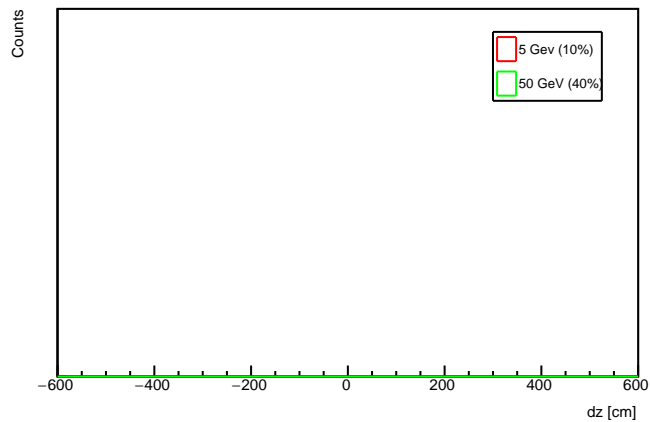
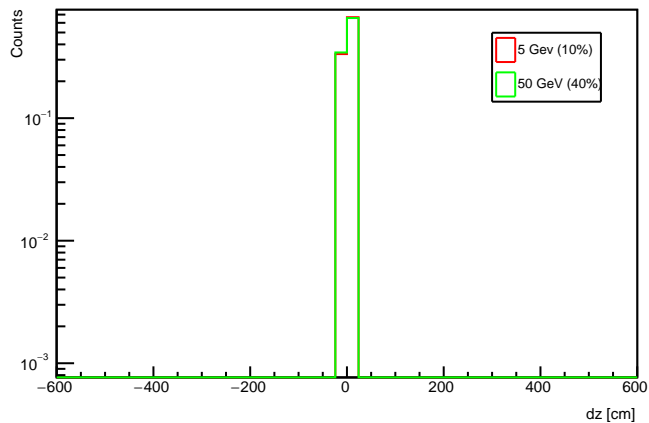
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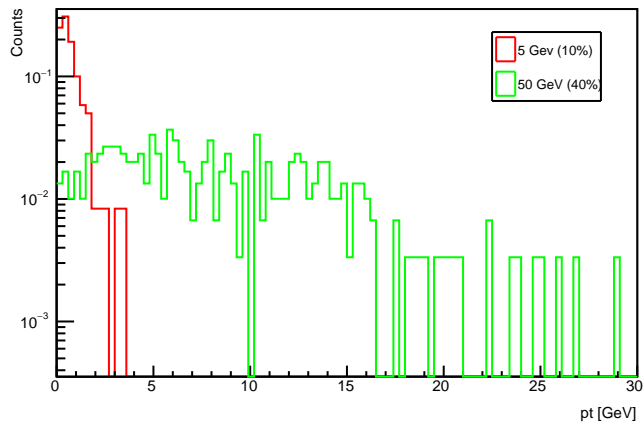
gen all Mu vz: no cuts

gen all Mu vz:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

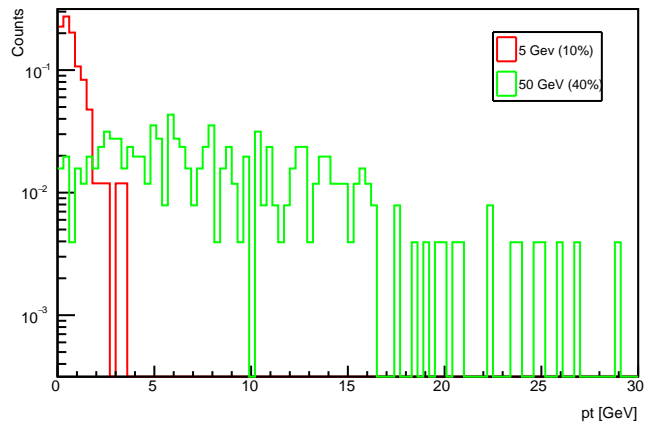
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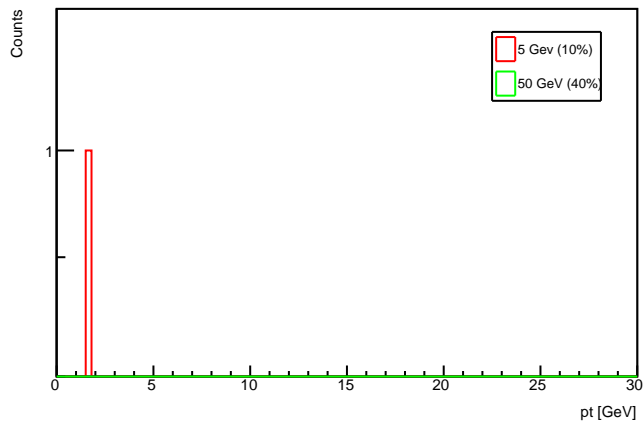
ctau 1mm leading vs subleading Mu pt: no cuts



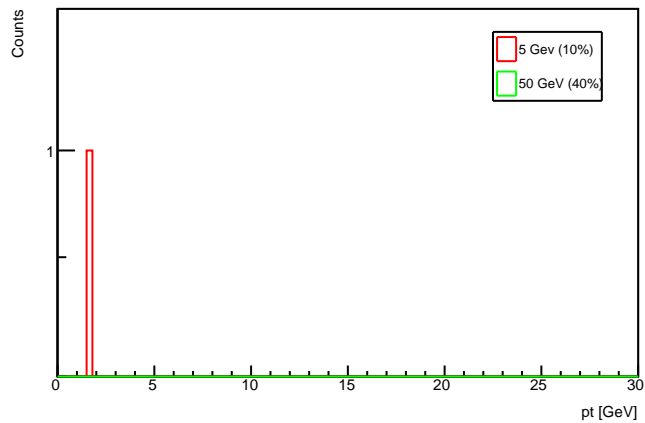
ctau 1mm leading vs subleading Mu pt:  $n_{\text{jet}} \geq 1$ ,  $j1pt > 30$  GeV



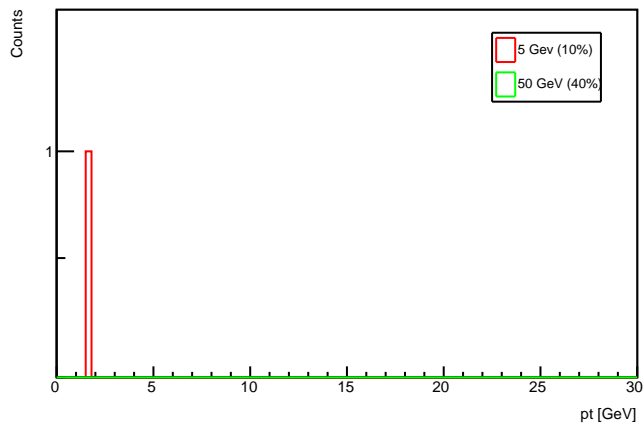
ctau 1mm leading vs subleading Mu pt: MET > 120 GeV



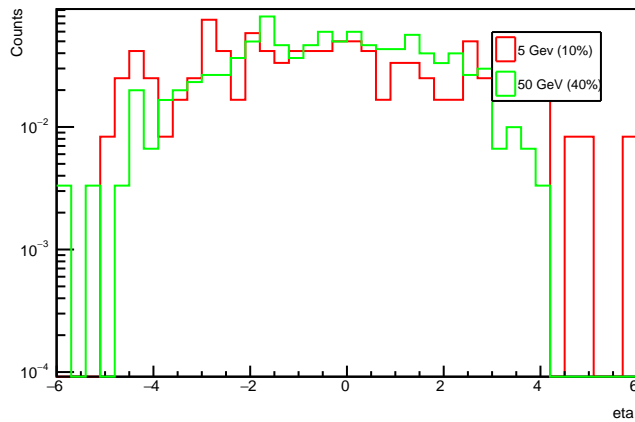
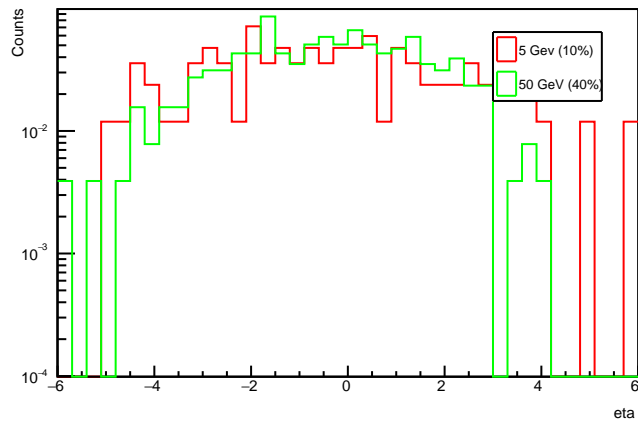
ctau 1mm leading vs subleading Mu pt:  $j1pt > 120$ , at most 2 jets w/  $pt > 30$  GeV



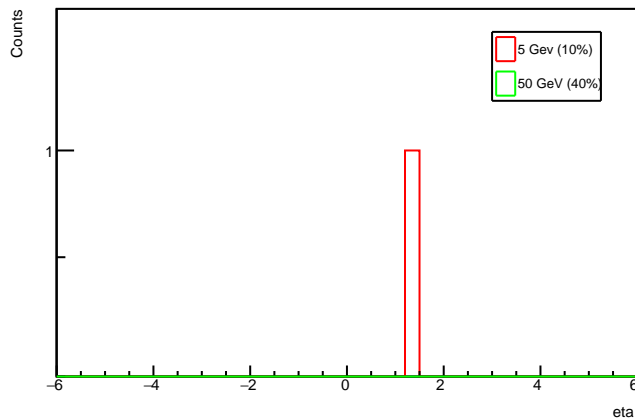
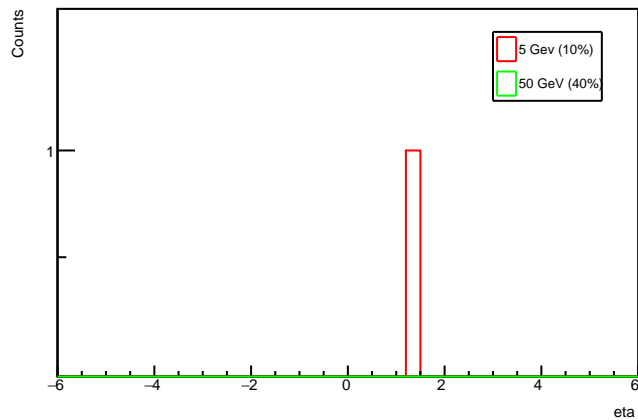
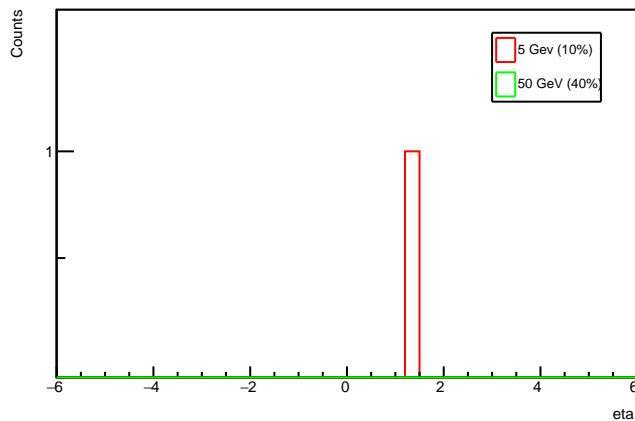
ctau 1mm leading vs subleading Mu pt: at least 2 mu w/  $vxy < 740$  cm,  $|vz| < 960$  cm &  $|\eta| < 2.4$



gen subleading Mu eta: no cuts

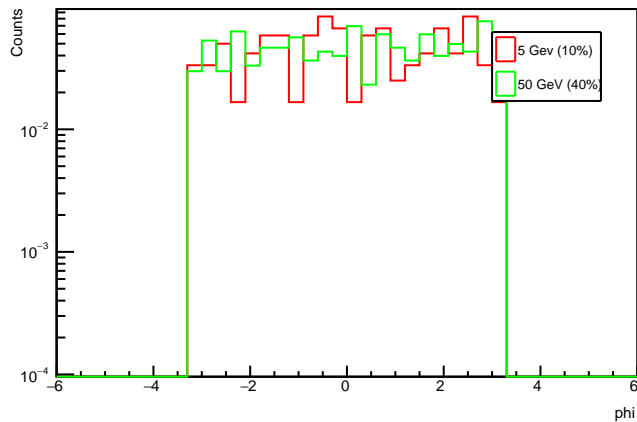
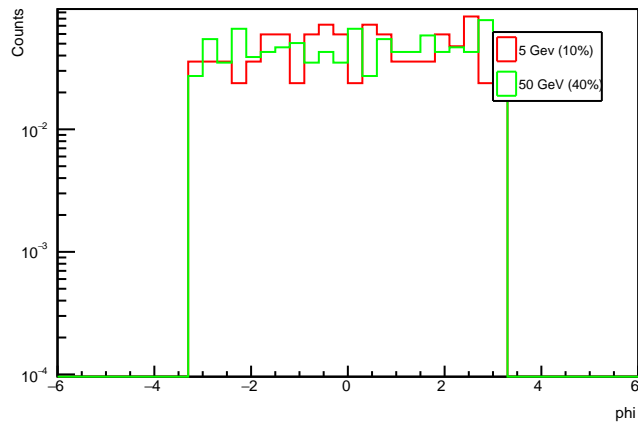
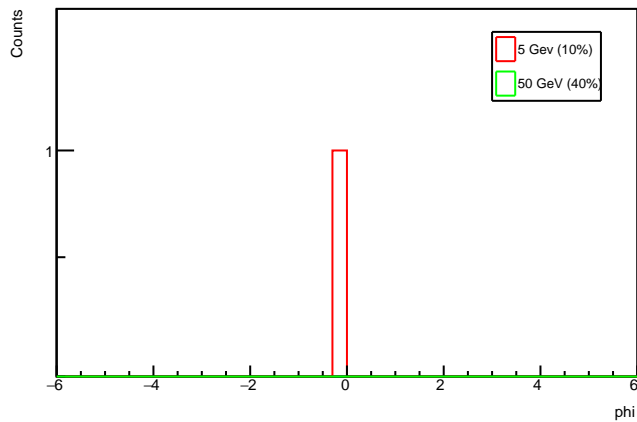
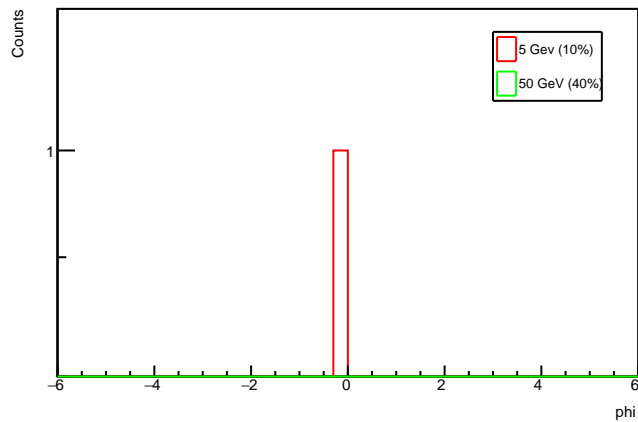
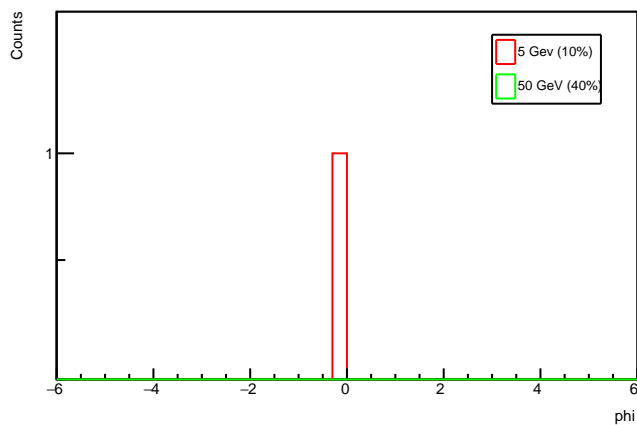
gen subleading Mu eta:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

gen subleading Mu eta: MET &gt; 120 GeV

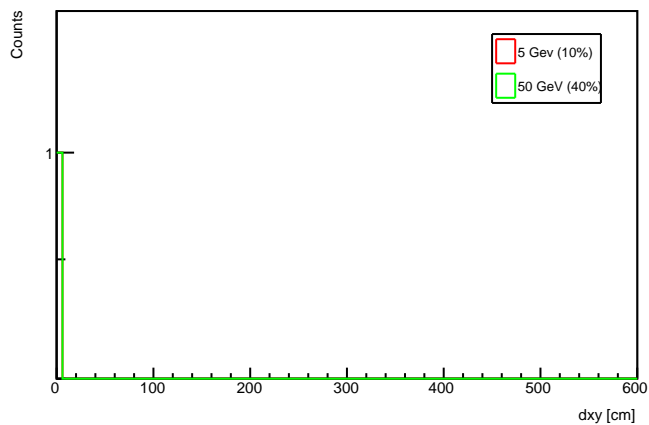
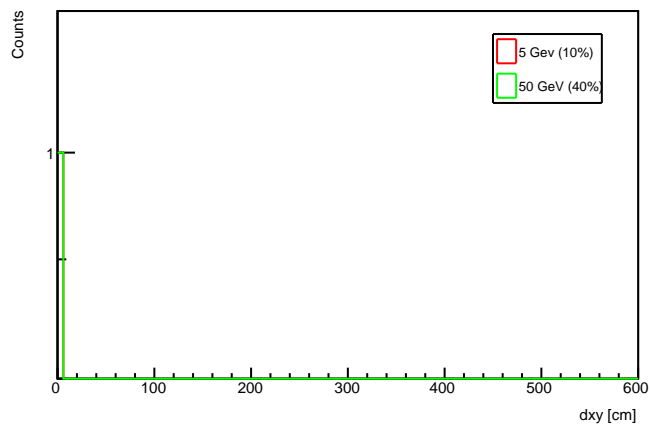
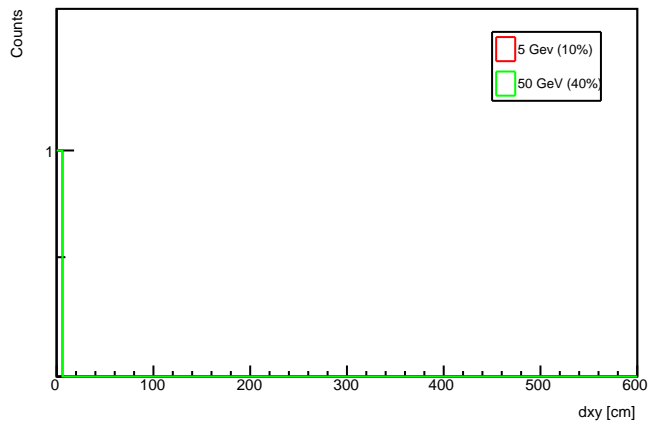
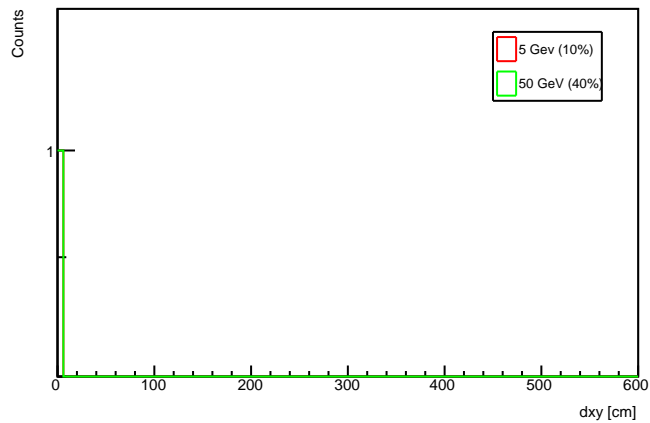
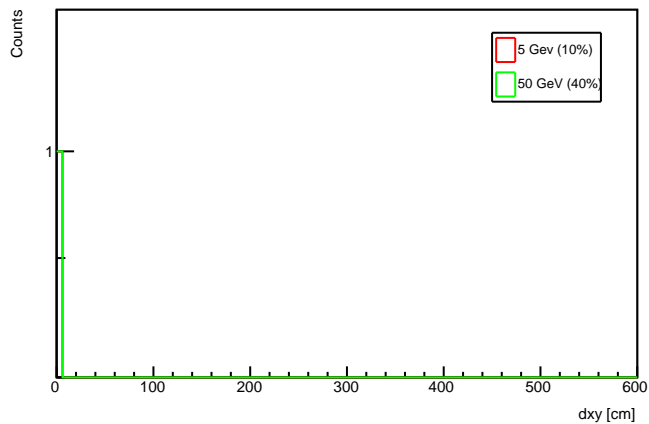
gen subleading Mu eta:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVgen subleading Mu eta: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta_{\text{jet}}| < 2.4$ 



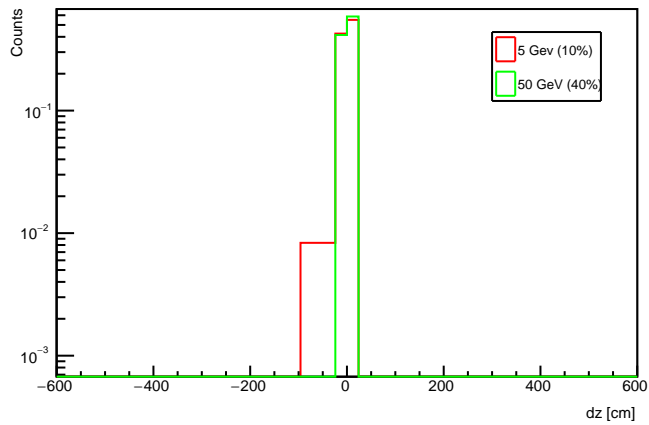
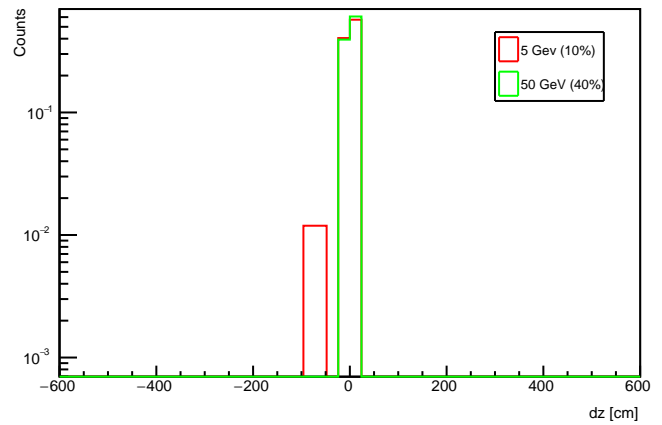
gen subleading Mu phi: no cuts

gen subleading Mu phi:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeVgen subleading Mu phi:  $\text{MET} > 120$  GeVgen subleading Mu phi:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVgen subleading Mu phi: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta_{\text{jet}}| < 2.4$ 

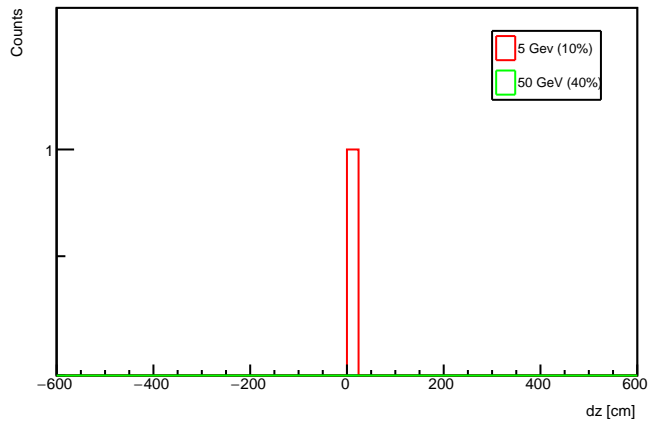
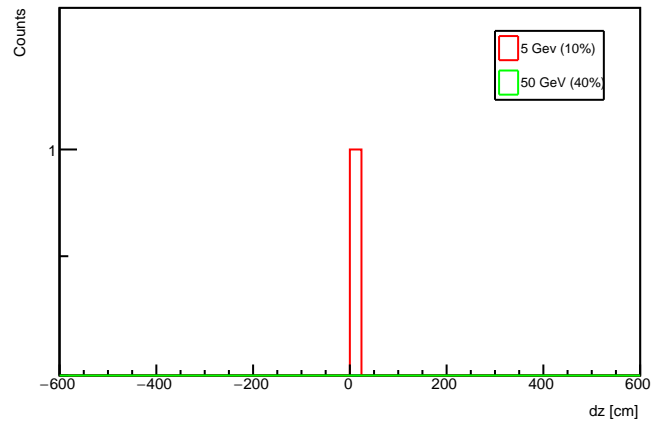
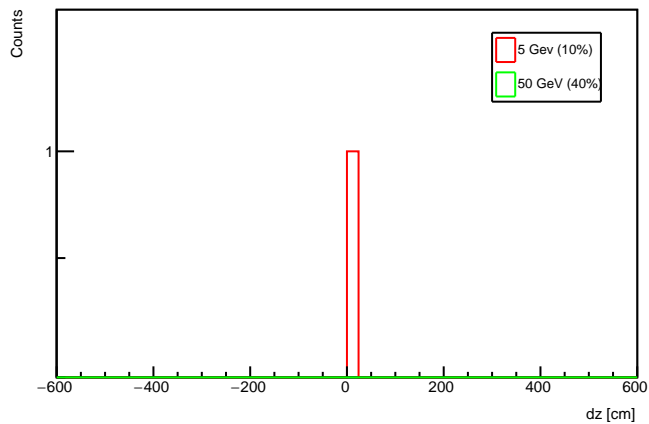
gen subleading Mu vxy: no cuts

gen subleading Mu vxy:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeVgen subleading Mu vxy:  $\text{MET} > 120$  GeVgen subleading Mu vxy:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVgen subleading Mu vxy: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta| < 2.4$ 

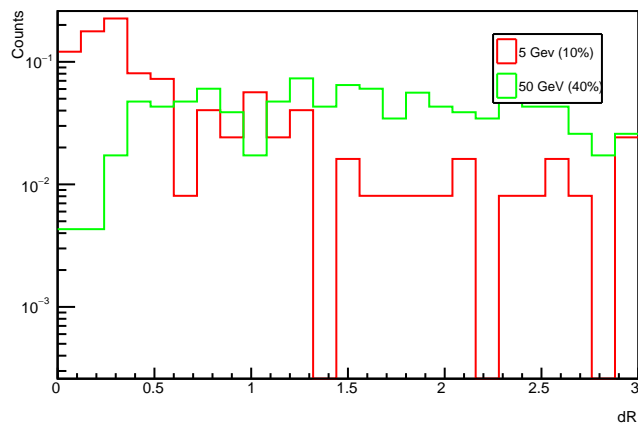
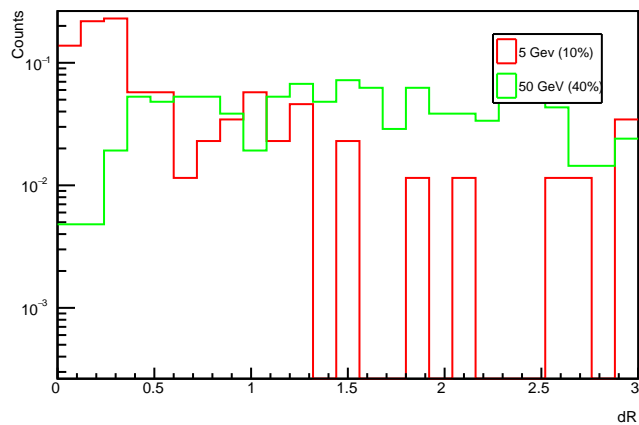
gen subleading Mu vz: no cuts

gen subleading Mu vz:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

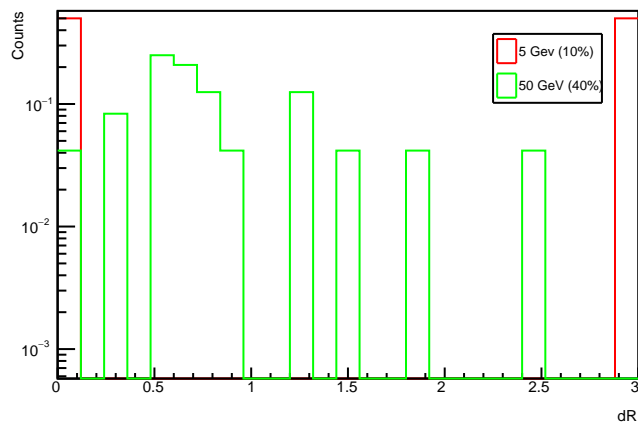
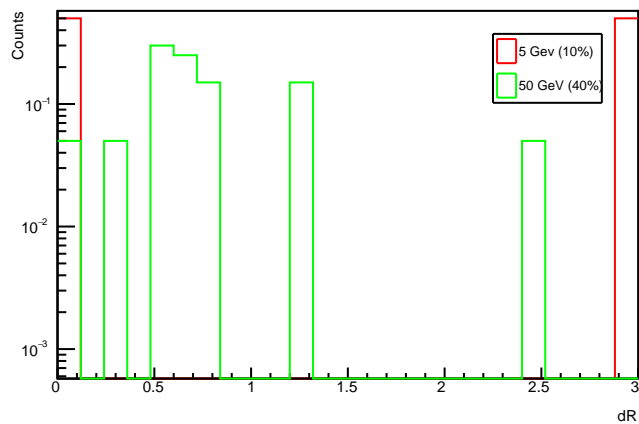
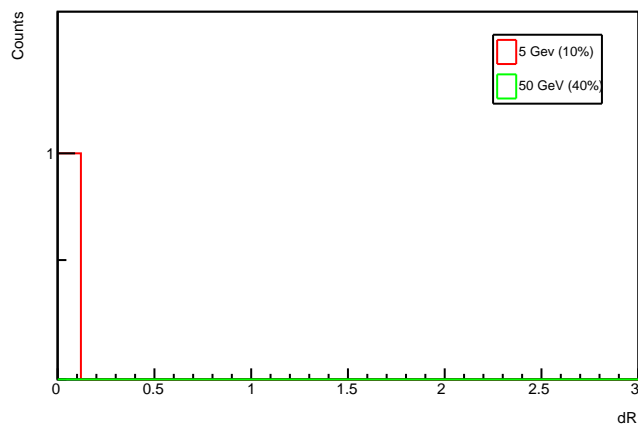
gen subleading Mu vz: MET &gt; 120 GeV

gen subleading Mu vz:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVgen subleading Mu vz: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta_{\text{jet}}| < 2.4$ 

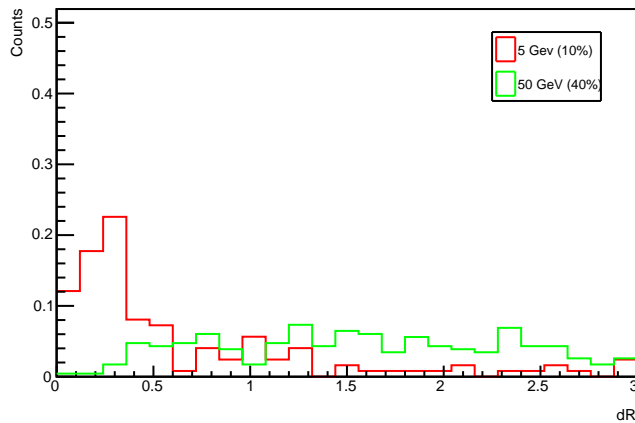
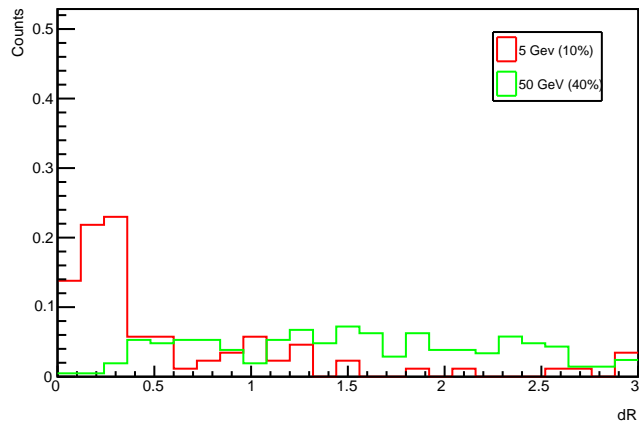
dR: gen leading mu and subleading mu: no cuts

dR: gen leading mu and subleading mu:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

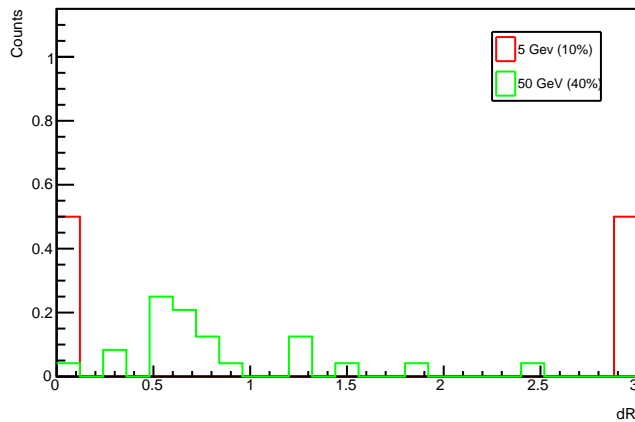
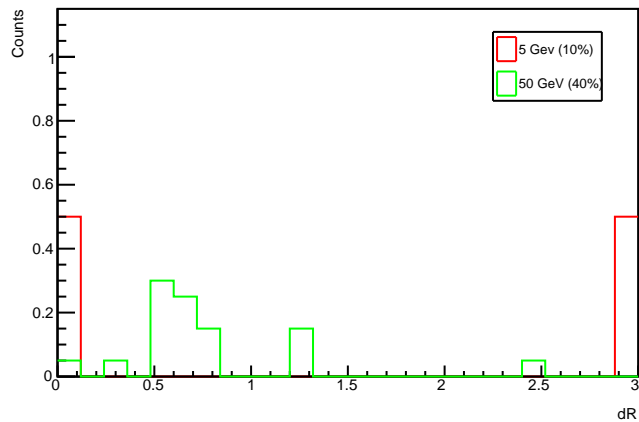
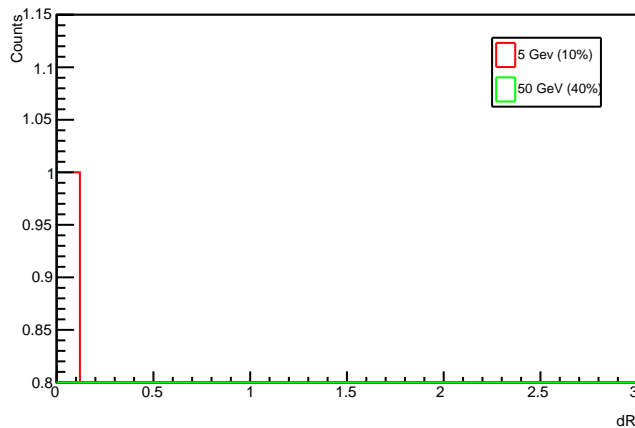
dR: gen leading mu and subleading mu: MET &gt; 120 GeV

dR: gen leading mu and subleading mu:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVdR: gen leading mu and subleading mu: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta_{\text{jet}}| < 2.4$ 

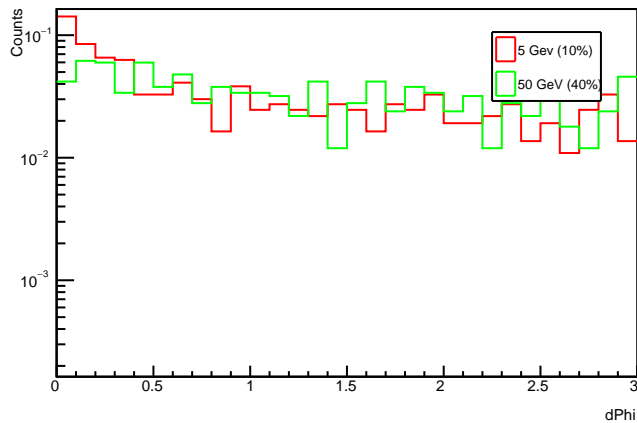
dR: gen leading mu and subleading mu: no cuts

dR: gen leading mu and subleading mu:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

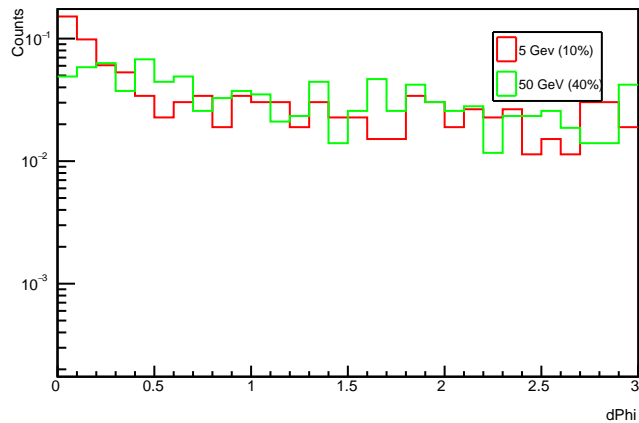
dR: gen leading mu and subleading mu: MET &gt; 120 GeV

dR: gen leading mu and subleading mu:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVdR: gen leading mu and subleading mu: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\text{eta}| < 2.4$ 

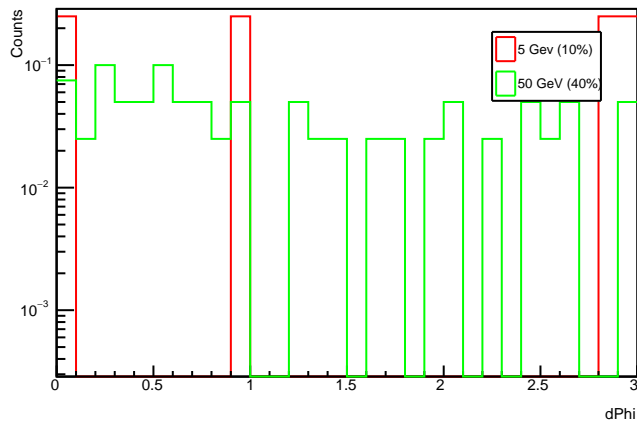
dPhi: gen MET and leading mu: no cuts



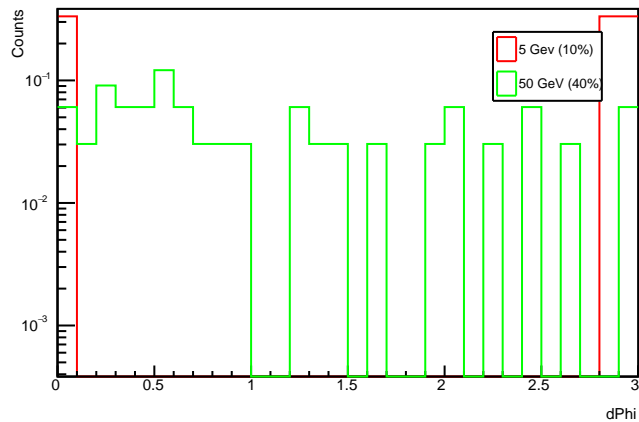
dPhi: gen MET and leading mu: n\_jet &gt;=1, j1pt &gt; 30 GeV



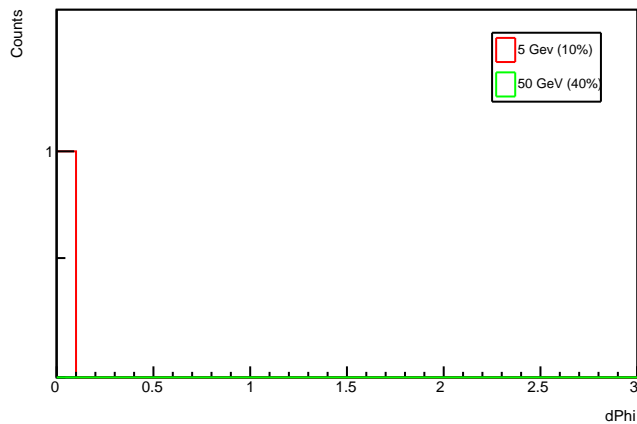
dPhi: gen MET and leading mu: MET &gt; 120 GeV



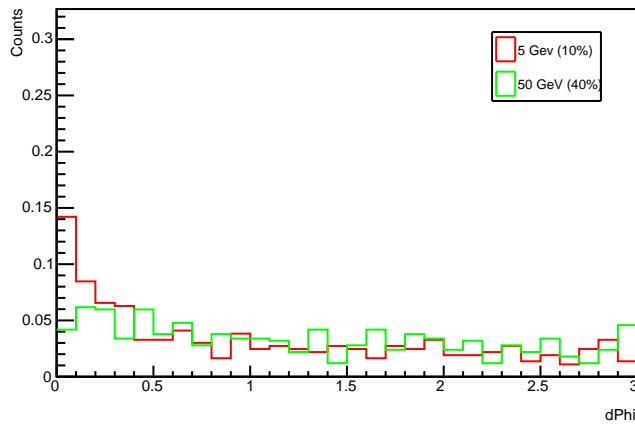
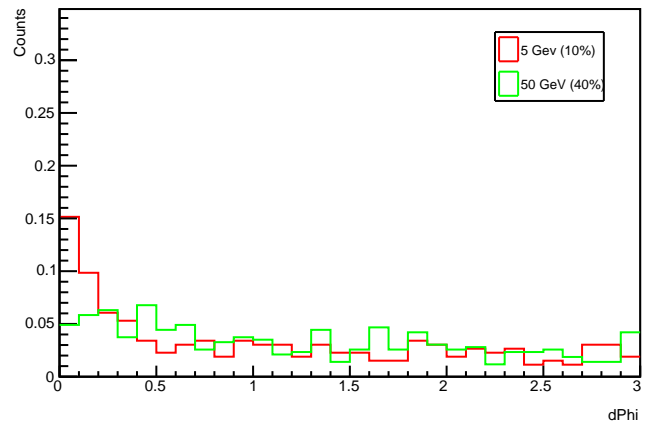
dPhi: gen MET and leading mu: j1pt &gt;120, at most 2 jets w/ pt &gt;30 GeV



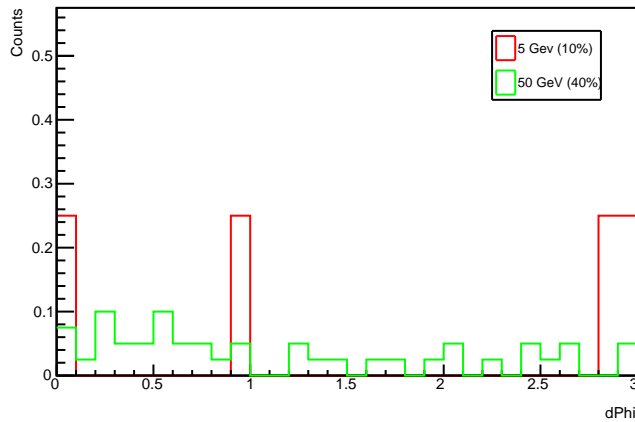
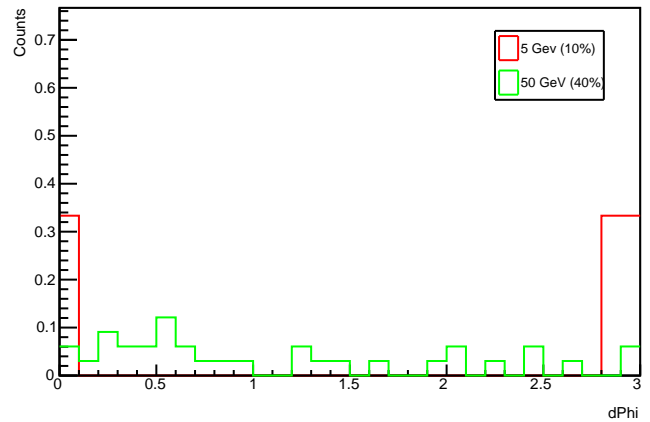
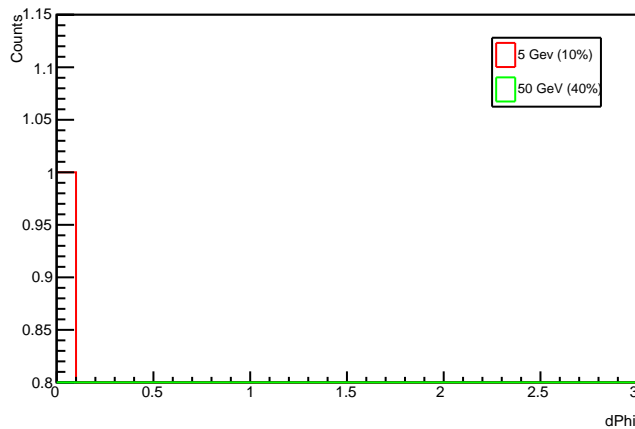
dPhi: gen MET and leading mu: at least 2 mu w/ vxy &lt; 740 cm, |vz| &lt; 960 cm &amp; |eta| &lt; 2.4



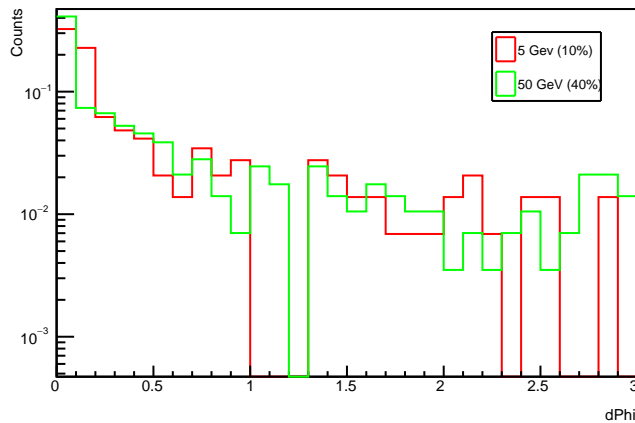
dPhi: gen MET and leading mu: no cuts

dPhi: gen MET and leading mu:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

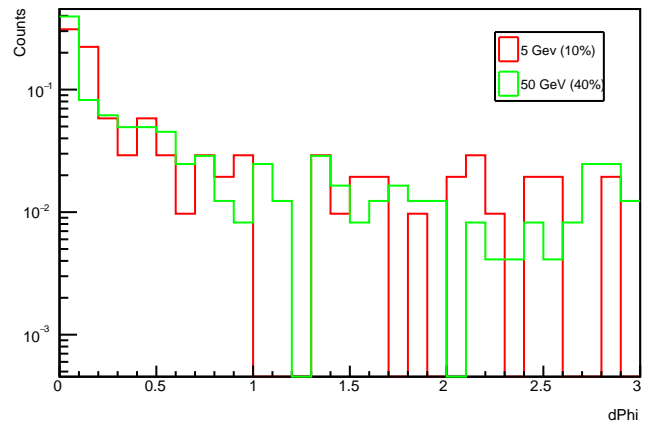
dPhi: gen MET and leading mu: MET &gt; 120 GeV

dPhi: gen MET and leading mu:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVdPhi: gen MET and leading mu: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta_{\text{jet}}| < 2.4$ 

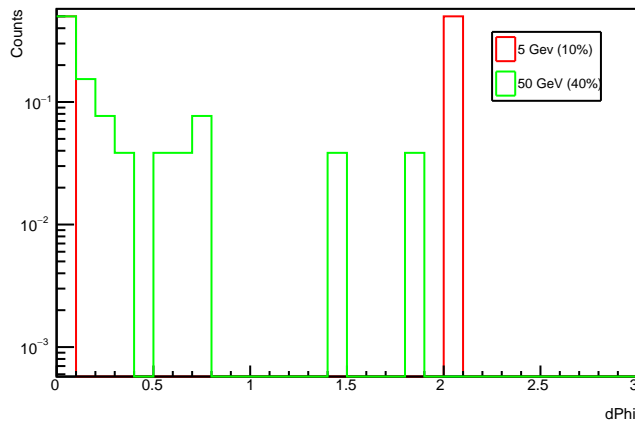
dPhi: gen leading mu and subleading mu: no cuts



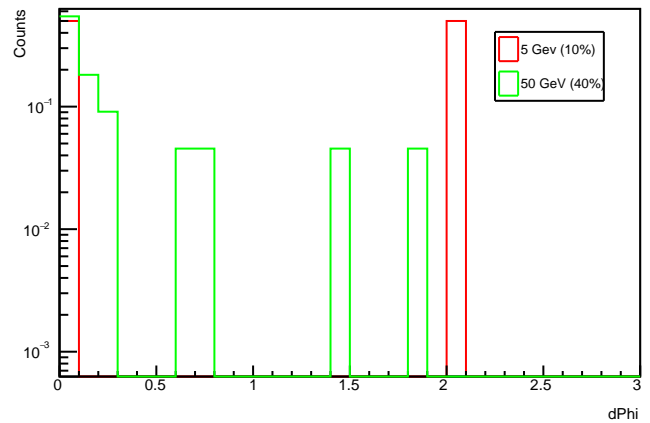
dPhi: gen leading mu and subleading mu: n\_jet &gt;= 1, j1pt &gt; 30 GeV



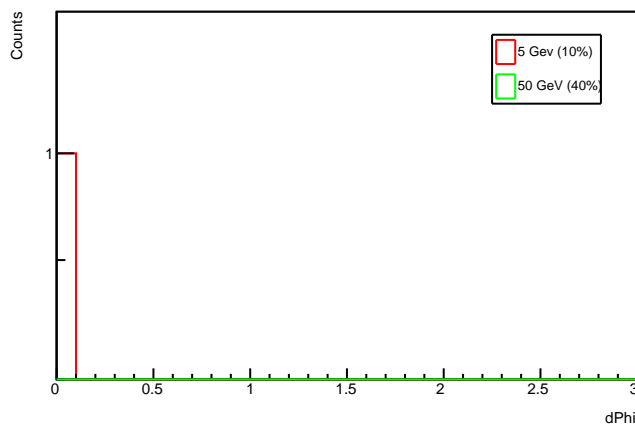
dPhi: gen leading mu and subleading mu: MET &gt; 120 GeV



dPhi: gen leading mu and subleading mu: j1pt &gt; 120, at most 2 jets w/ pt &gt; 30 GeV

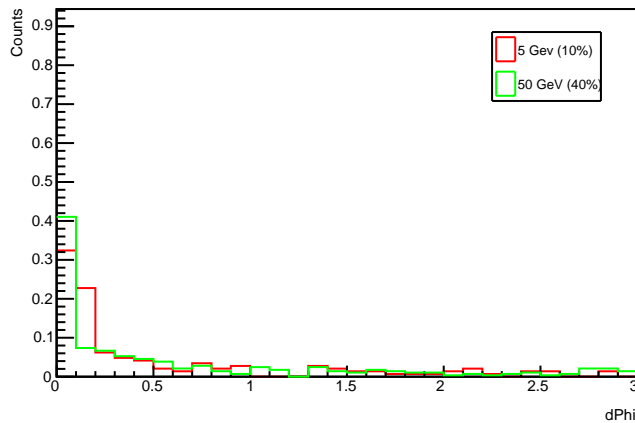


dPhi: gen leading mu and subleading mu: at least 2 mu w/ vxy &lt; 740 cm, |vz| &lt; 960 cm &amp; |eta| &lt; 2.4

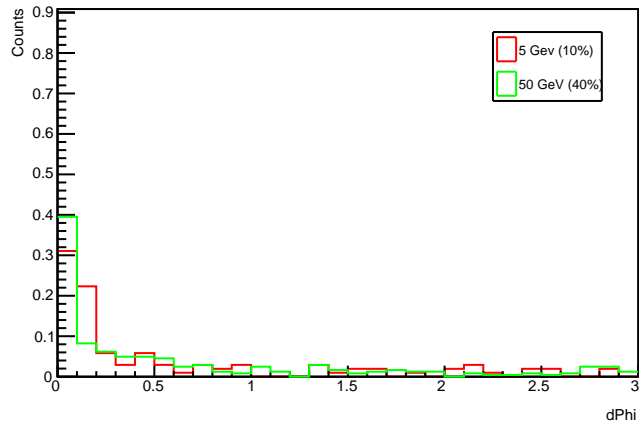




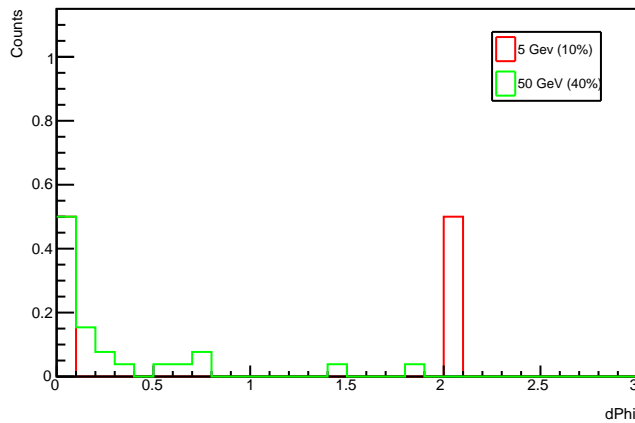
dPhi: gen leading mu and subleading mu: no cuts



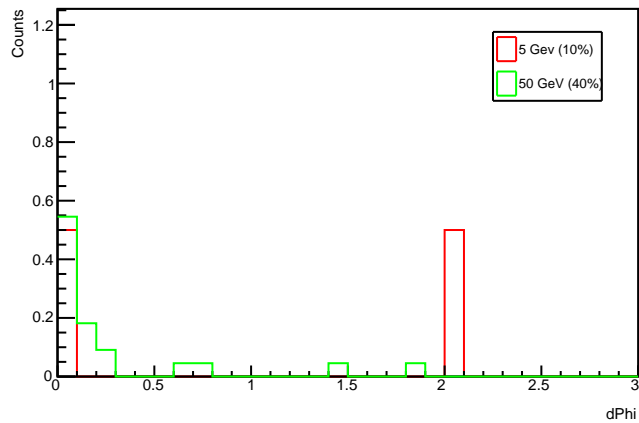
dPhi: gen leading mu and subleading mu:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV



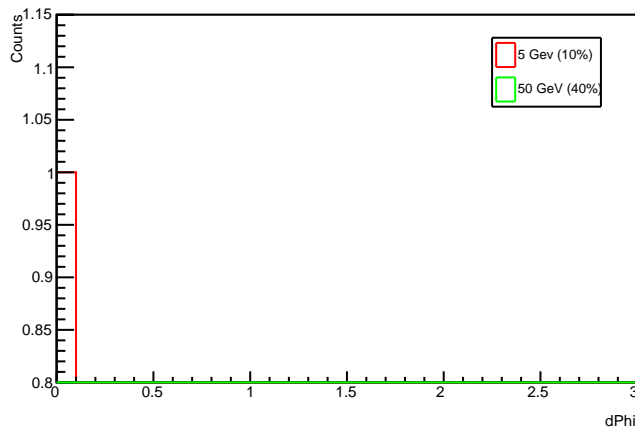
dPhi: gen leading mu and subleading mu: MET > 120 GeV



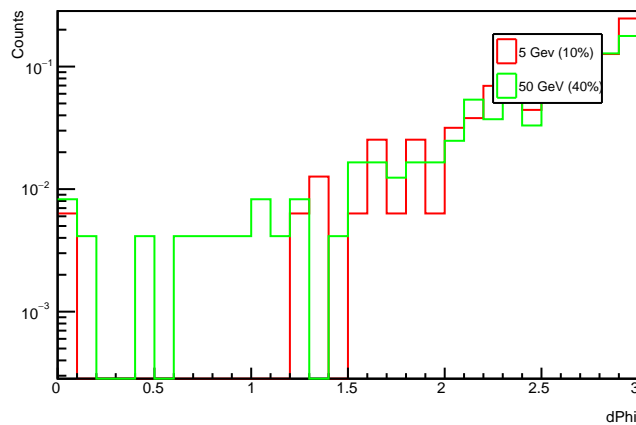
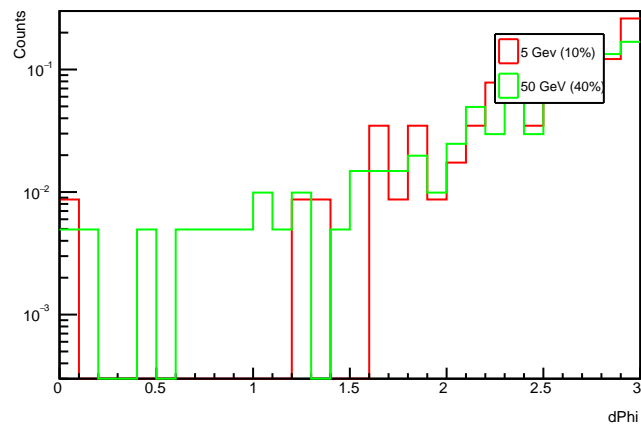
dPhi: gen leading mu and subleading mu:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_{\text{T}} > 30$  GeV



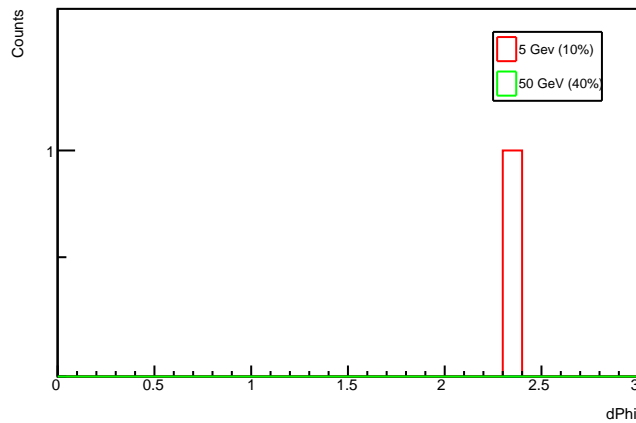
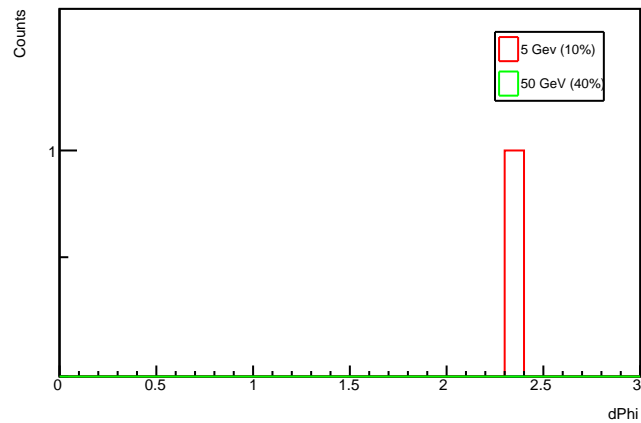
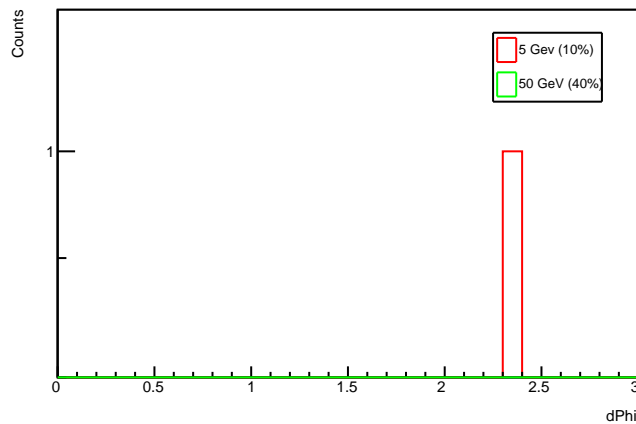
dPhi: gen leading mu and subleading mu: at least 2 mu w/  $v_{xy} < 740$  cm,  $|\nu_z| < 960$  cm &  $|\eta| < 2.4$



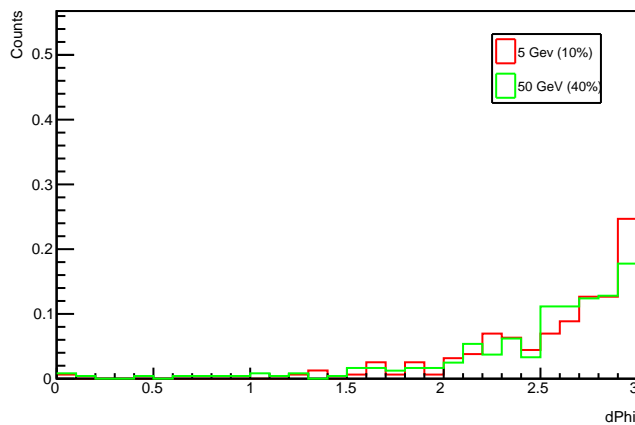
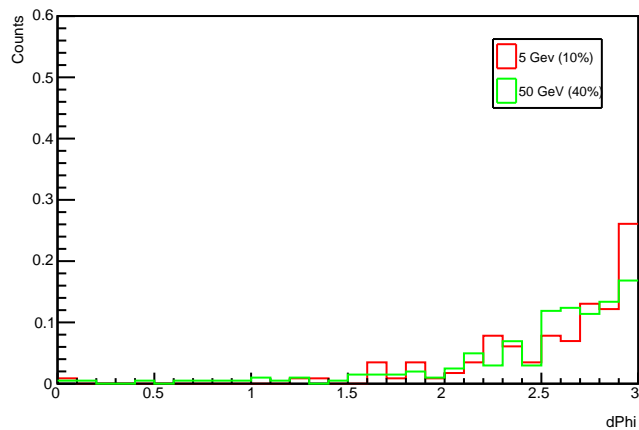
dPhi: gen MET and leading jet: no cuts

dPhi: gen MET and leading jet:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30 \text{ GeV}$ 

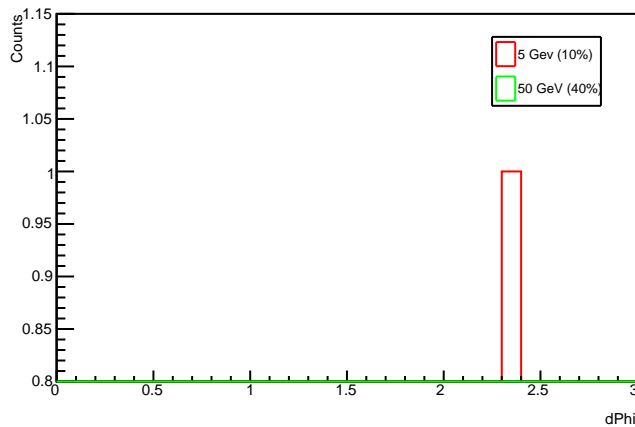
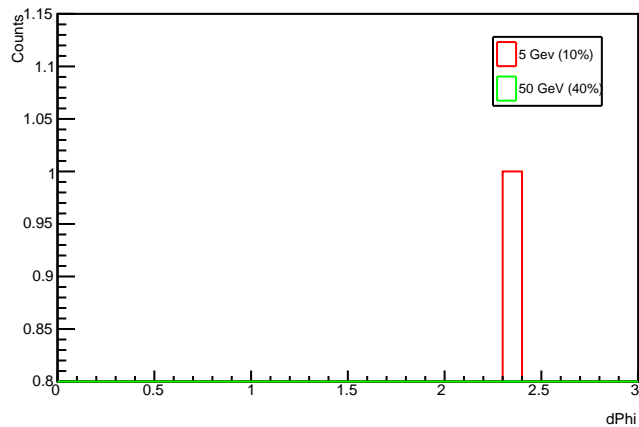
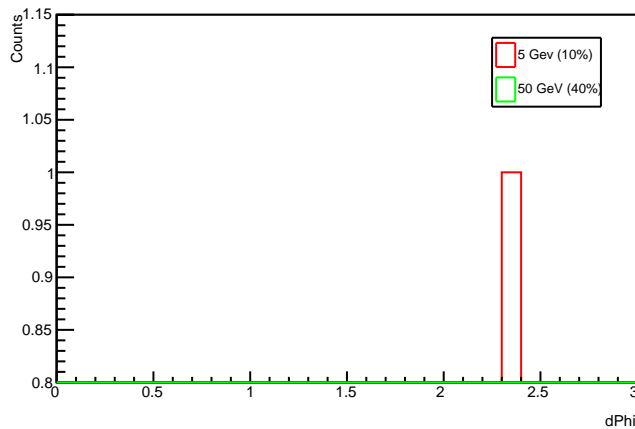
dPhi: gen MET and leading jet: MET &gt; 120 GeV

dPhi: gen MET and leading jet:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30 \text{ GeV}$ dPhi: gen MET and leading jet: at least 2 mu w/  $v_{xy} < 740 \text{ cm}$ ,  $|v_z| < 960 \text{ cm}$  &  $|\eta_{\text{jet}}| < 2.4$ 

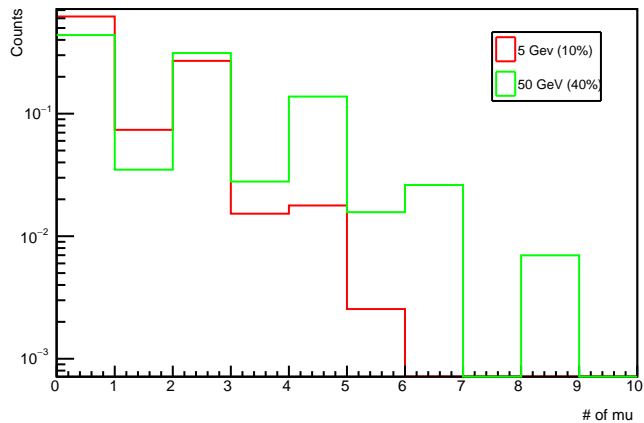
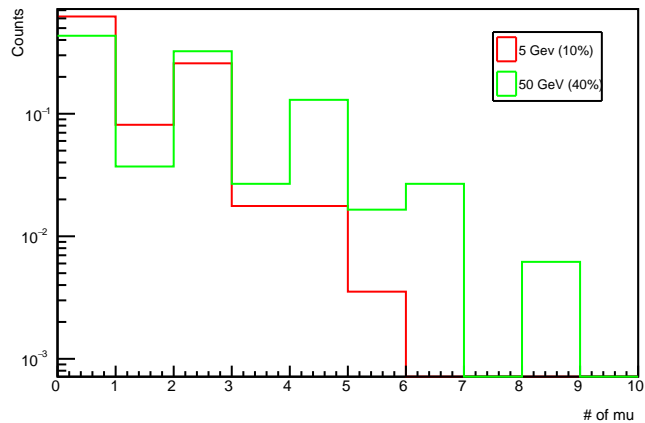
dPhi: gen MET and leading jet: no cuts

dPhi: gen MET and leading jet:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

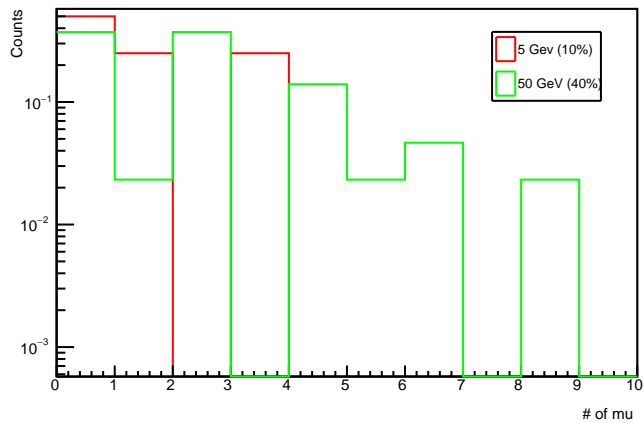
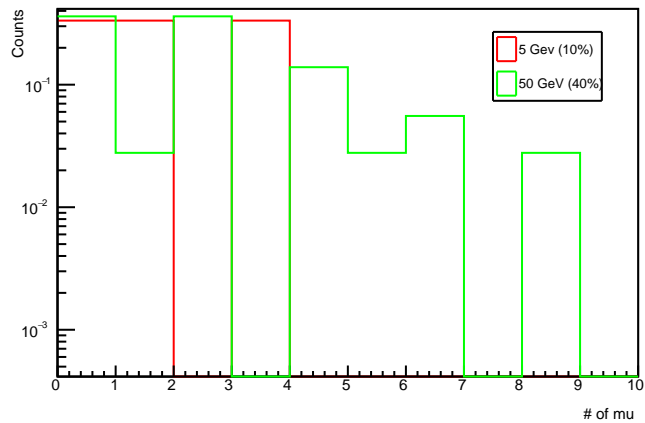
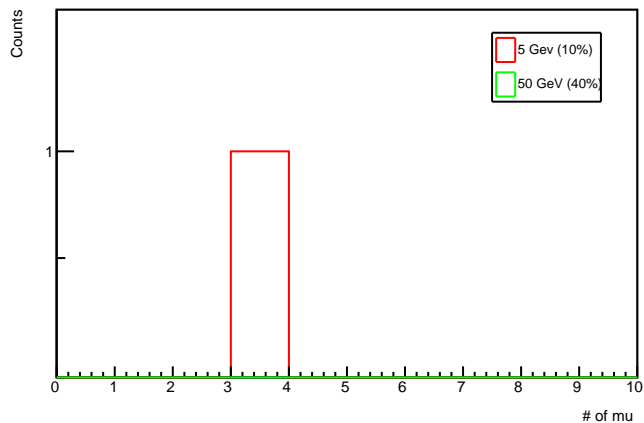
dPhi: gen MET and leading jet: MET &gt; 120 GeV

dPhi: gen MET and leading jet:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVdPhi: gen MET and leading jet: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta| < 2.4$ 

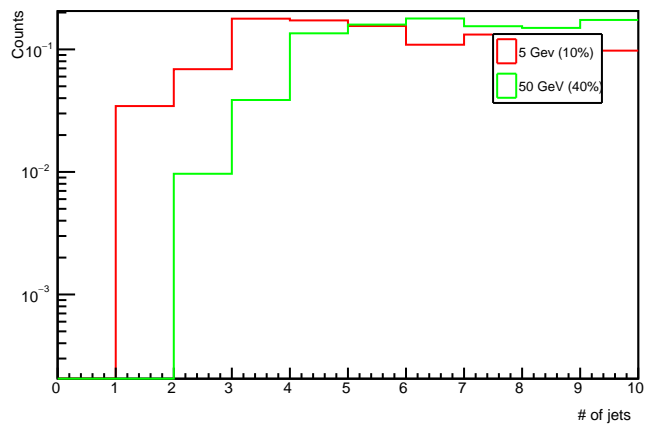
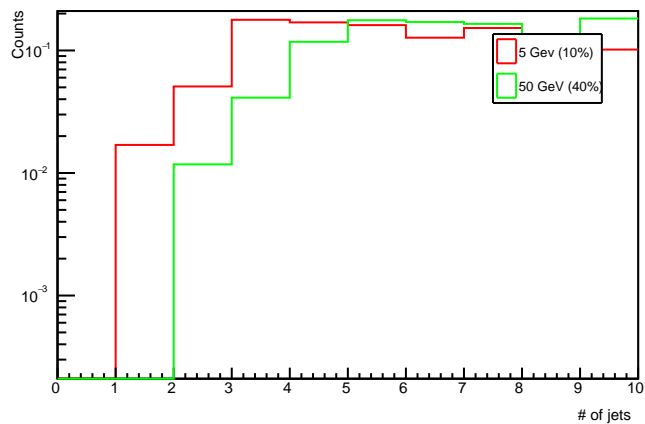
gen number of mu: no cuts

gen number of mu:  $n_{\text{jet}} \geq 1, j_{1\text{pt}} > 30 \text{ GeV}$ 

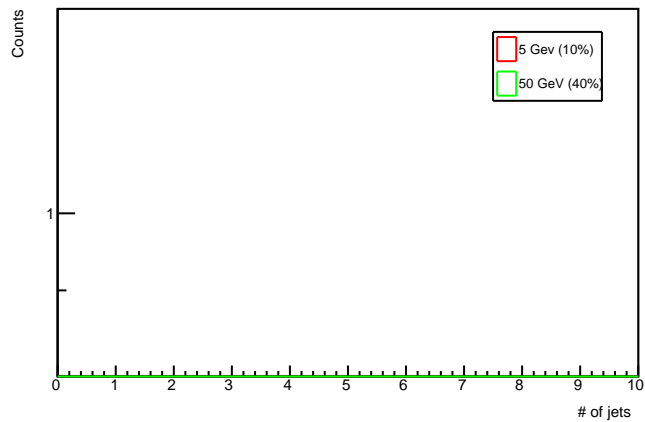
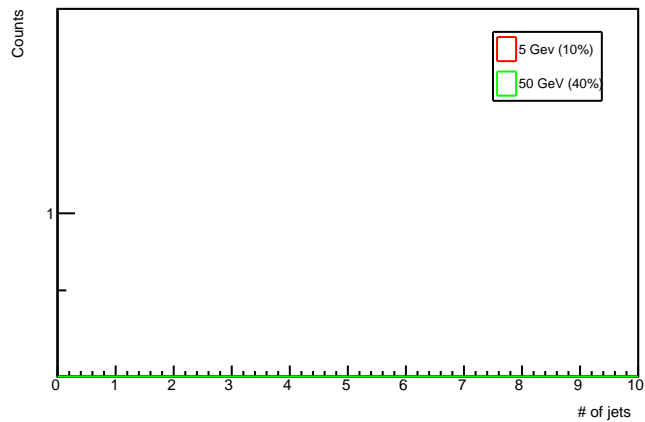
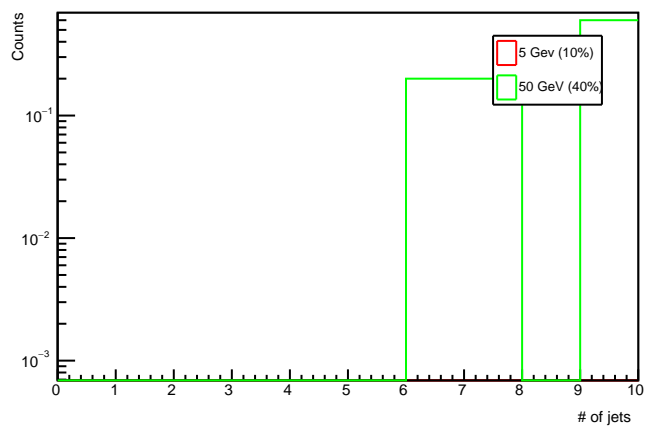
gen number of mu: MET &gt; 120 GeV

gen number of mu:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30 \text{ GeV}$ gen number of mu: at least 2 mu w/  $v_{xy} < 740 \text{ cm}$ ,  $|v_z| < 960 \text{ cm}$  &  $|\text{eta}| < 2.4$ 

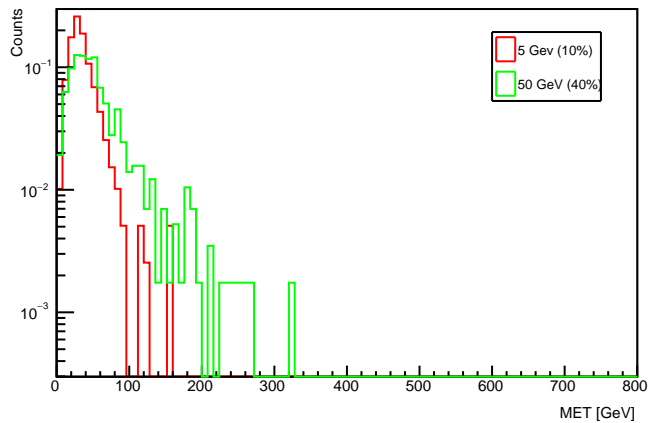
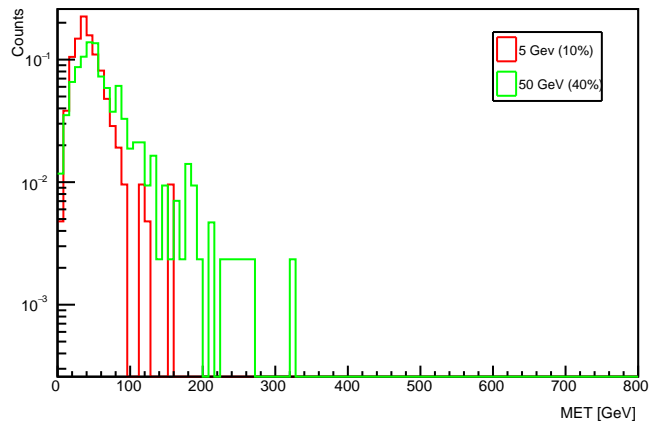
gen number of jets: no cuts

gen number of jets:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

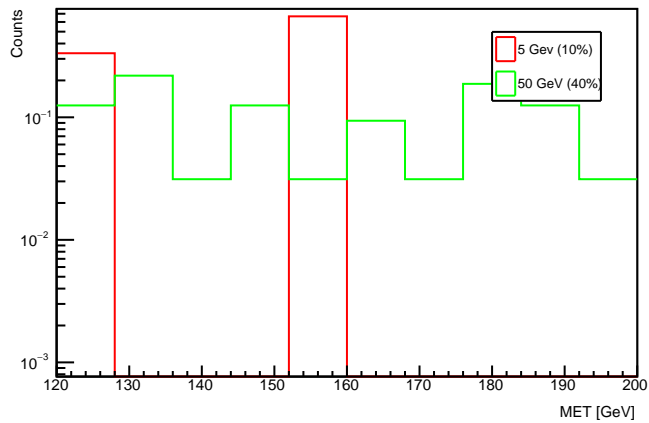
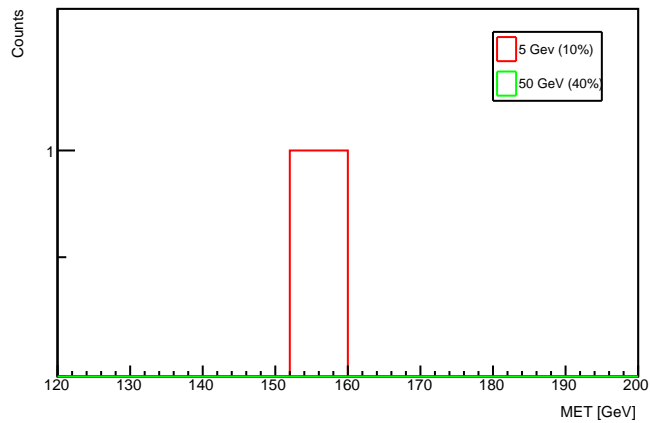
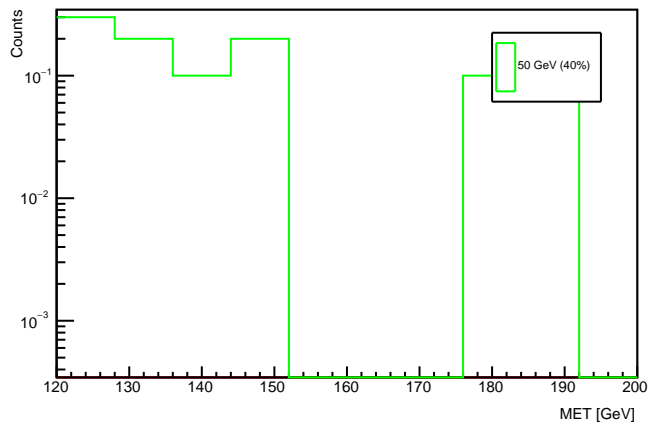
gen number of jets: MET &gt; 120 GeV

gen number of jets:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVgen number of jets: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta_{\text{jet}}| < 2.4$ 

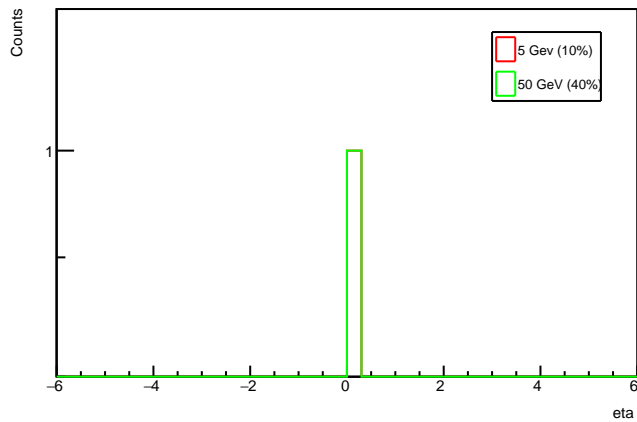
reco leading MET: no cuts

reco leading MET:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

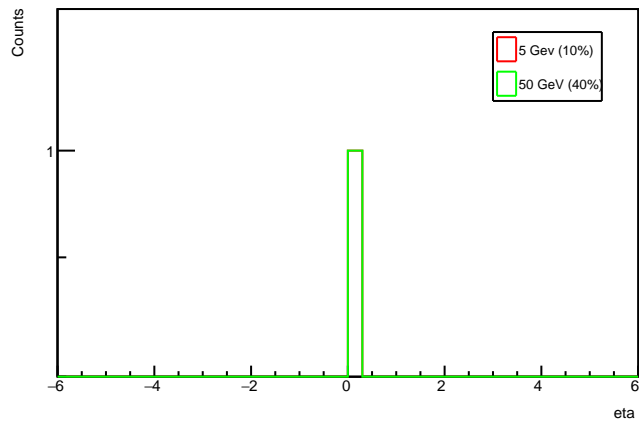
reco leading MET: MET &gt; 120 GeV

reco leading MET:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVreco leading MET: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta| < 2.4$ 

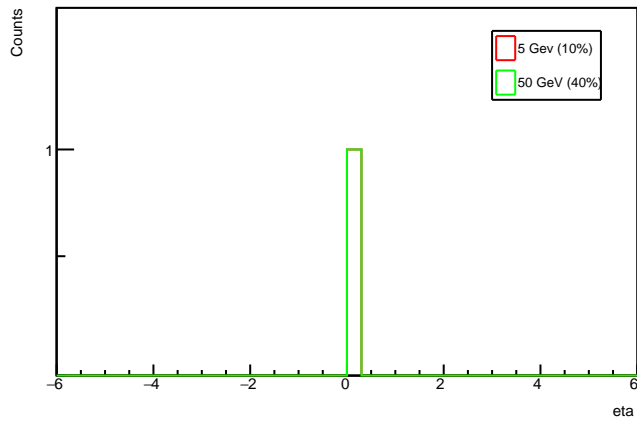
reco leading Met eta: no cuts



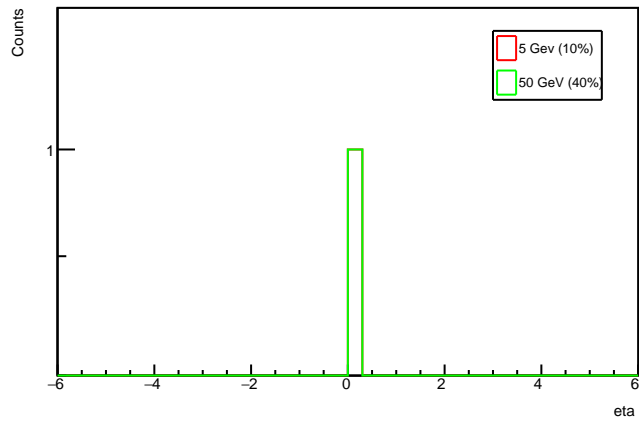
reco leading Met eta: n\_jet &gt;=1, j1pt &gt; 30 GeV



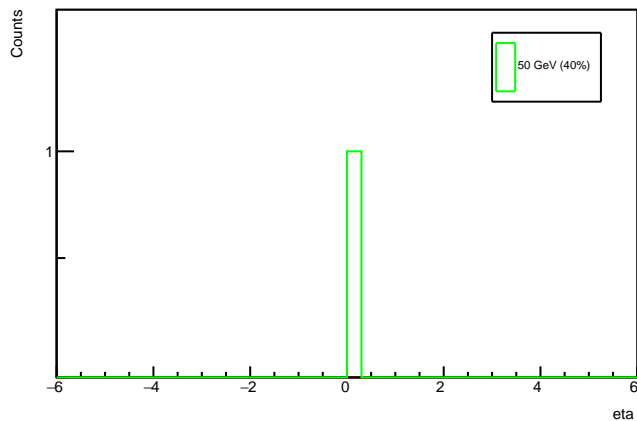
reco leading Met eta: MET &gt; 120 GeV



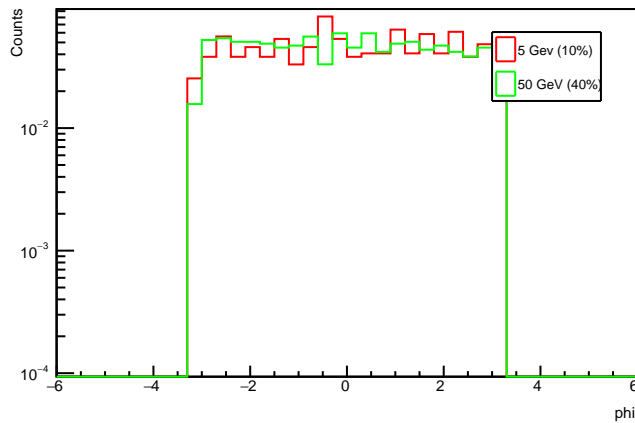
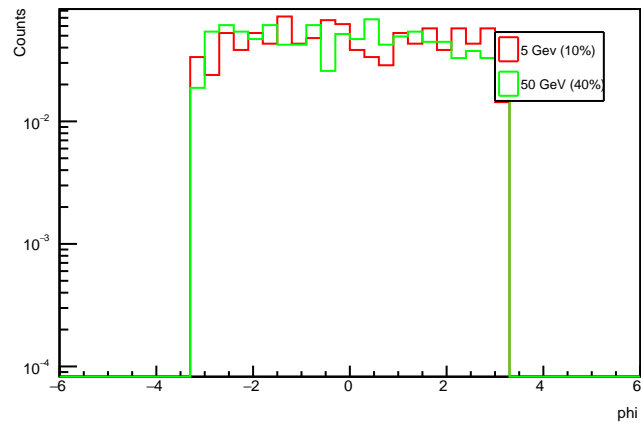
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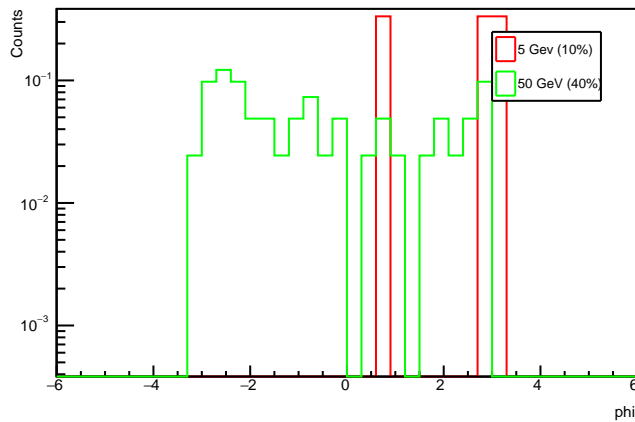
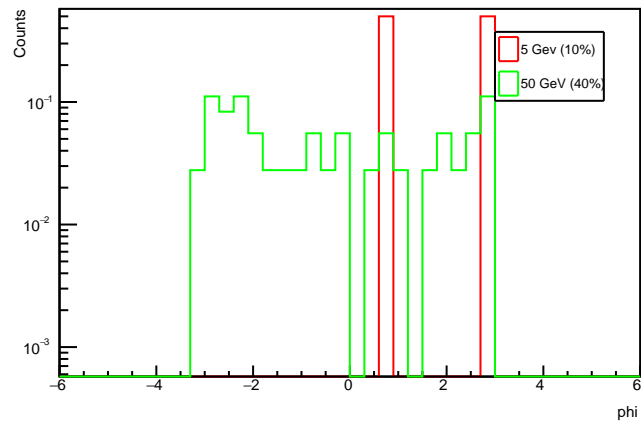
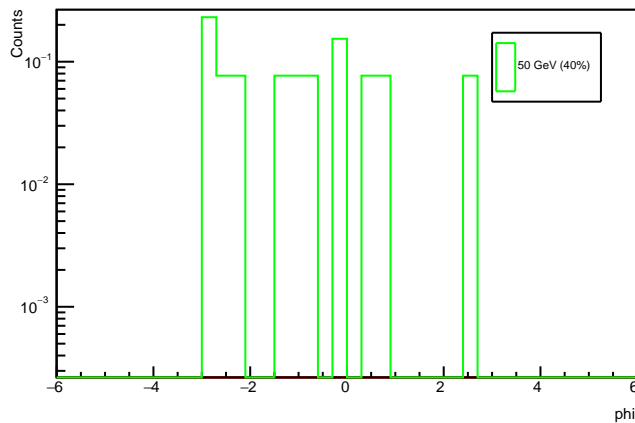
reco leading Met eta: at least 2 mu w/ vx &lt; 740 cm, |vz| &lt; 960 cm &amp; |eta| &lt; 2.4



reco leading Met phi: no cuts

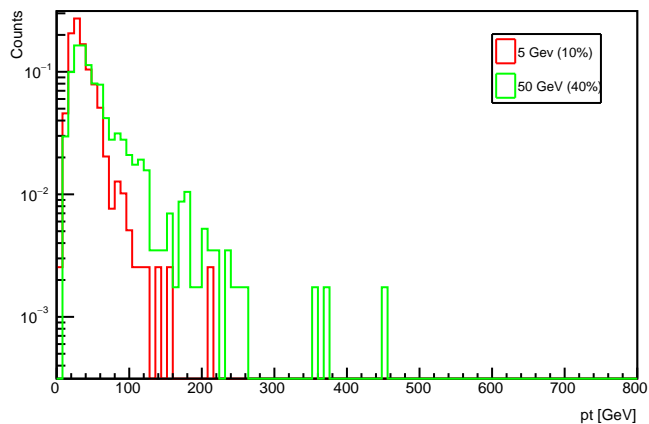
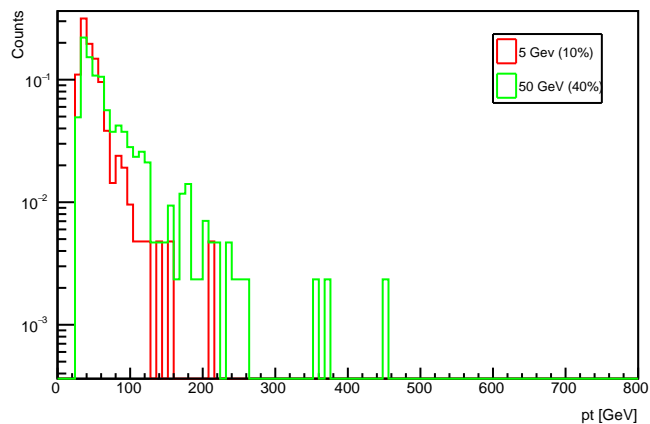
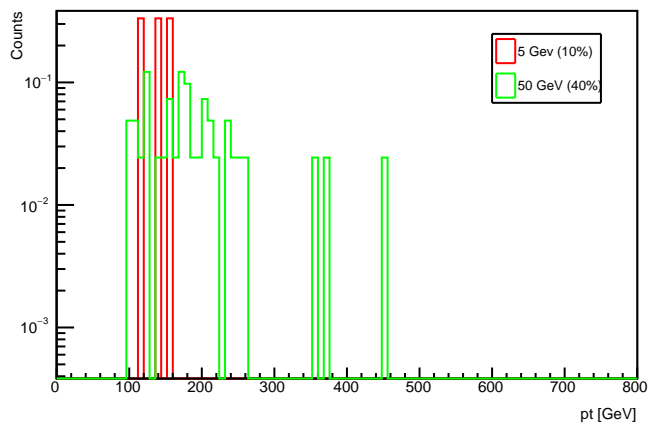
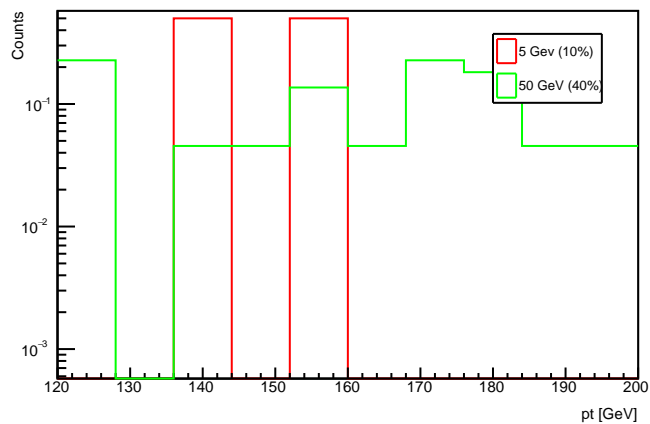
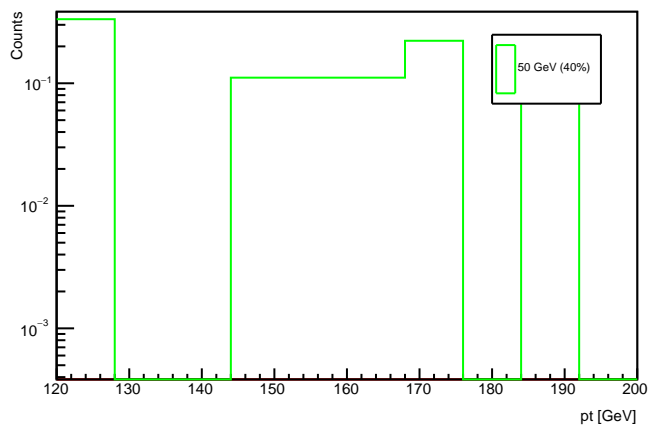
reco leading Met phi:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

reco leading Met phi: MET &gt; 120 GeV

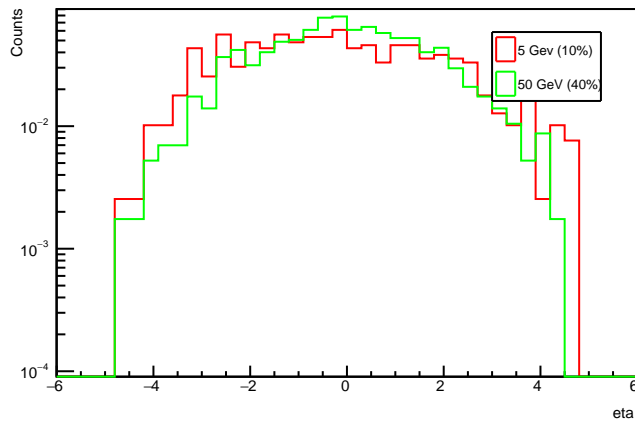
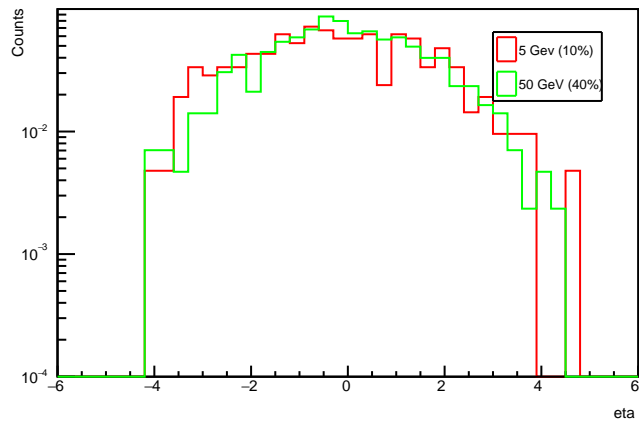
reco leading Met phi:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVreco leading Met phi: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta| < 2.4$ 



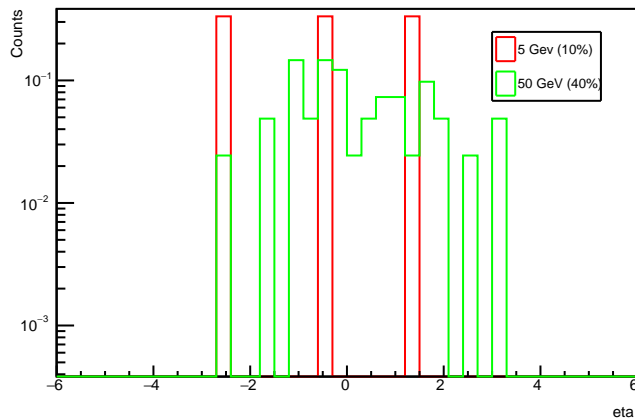
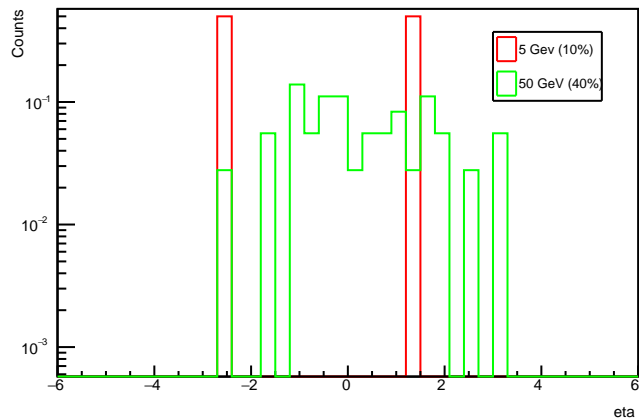
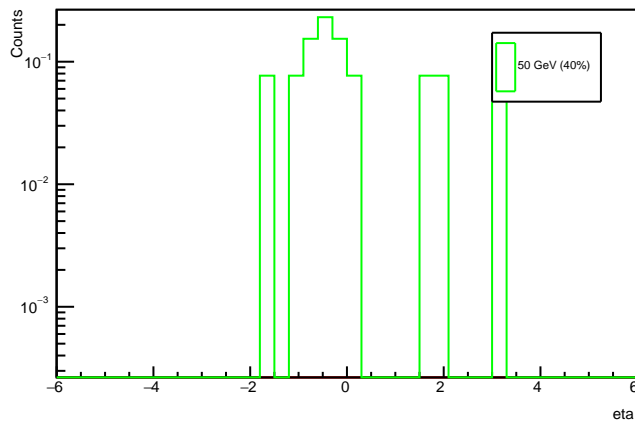
reco leading Jet pt: no cuts

reco leading Jet pt:  $n_{\text{jet}} \geq 1$ ,  $j_1 \text{pt} > 30 \text{ GeV}$ reco leading Jet pt:  $\text{MET} > 120 \text{ GeV}$ reco leading Jet pt:  $j_1 \text{pt} > 120$ , at most 2 jets w/  $\text{pt} > 30 \text{ GeV}$ reco leading Jet pt: at least 2 mu w/  $v_{xy} < 740 \text{ cm}$ ,  $|v_z| < 960 \text{ cm}$  &  $|\eta_a| < 2.4$ 

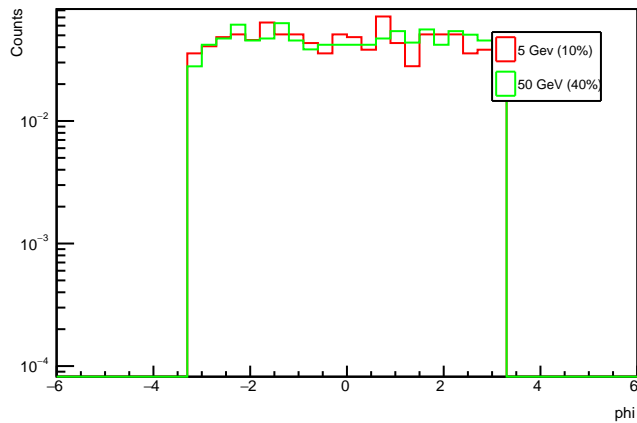
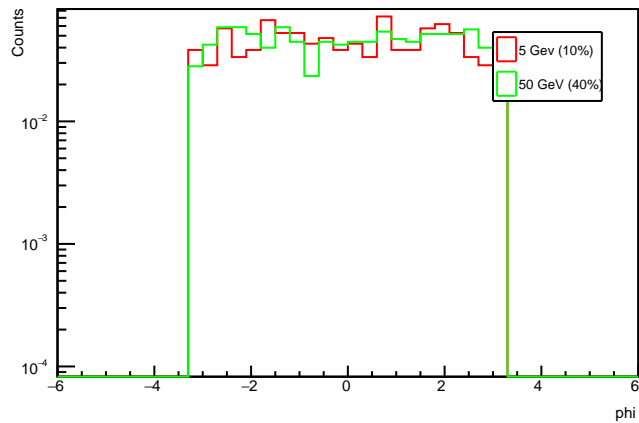
reco leading Jet eta: no cuts

reco leading Jet eta:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

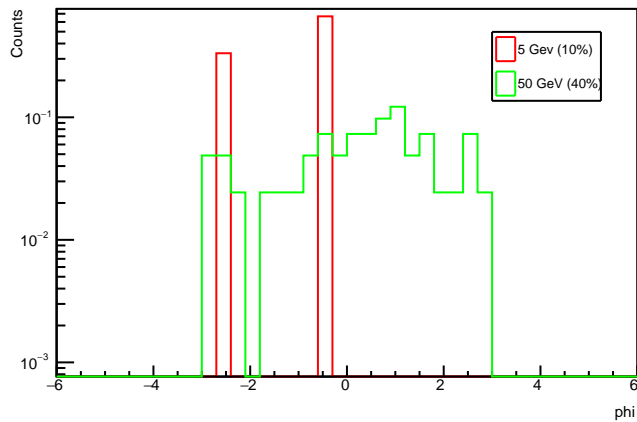
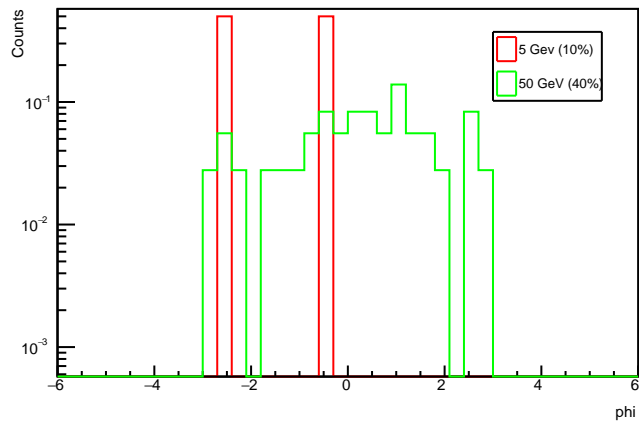
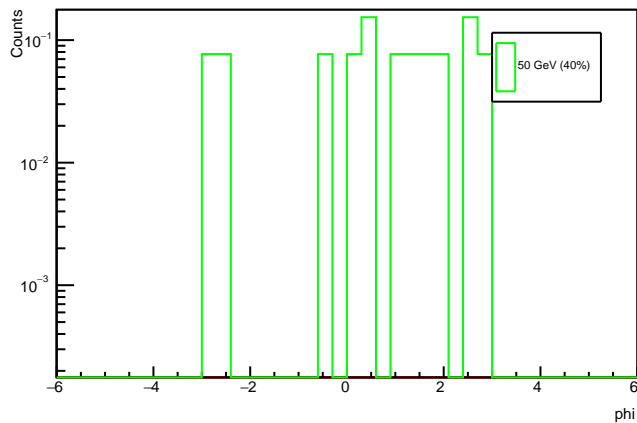
reco leading Jet eta: MET &gt; 120 GeV

reco leading Jet eta:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVreco leading Jet eta: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta| < 2.4$ 

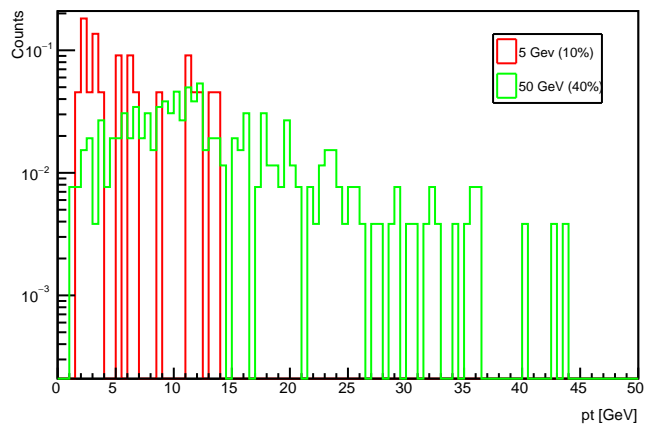
reco leading Jet phi: no cuts

reco leading Jet phi:  $n_{\text{jet}} \geq 1$ ,  $j1pt > 30$  GeV

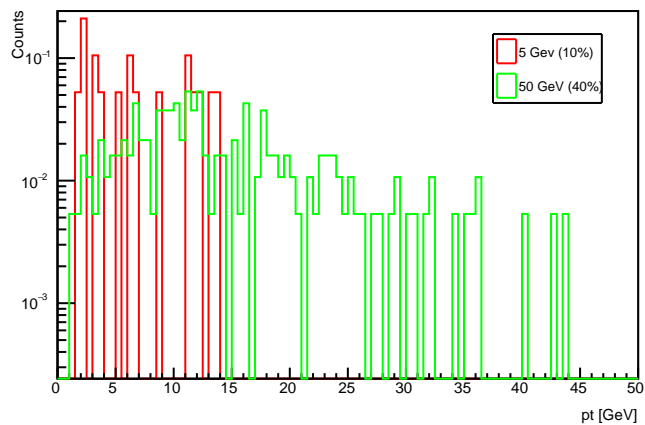
reco leading Jet phi: MET &gt; 120 GeV

reco leading Jet phi:  $j1pt > 120$ , at most 2 jets w/  $pt > 30$  GeVreco leading Jet phi: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta_{\text{jet}}| < 2.4$ 

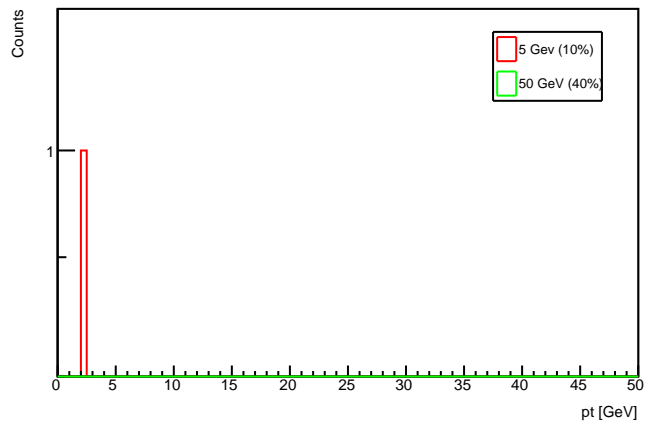
reco leading Mu pt: no cuts



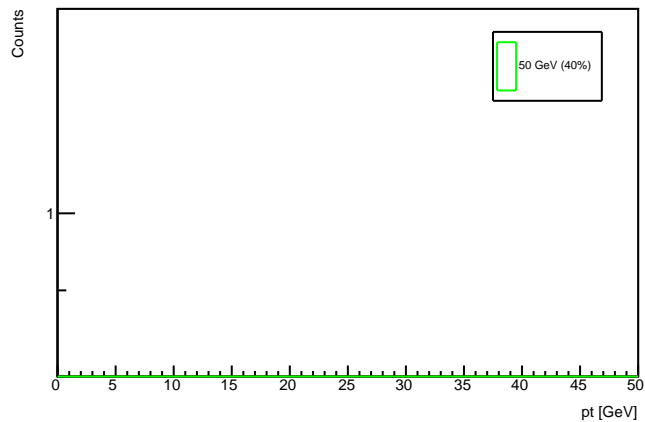
reco leading Mu pt: n\_jet &gt;= 1, j1pt &gt; 30 GeV



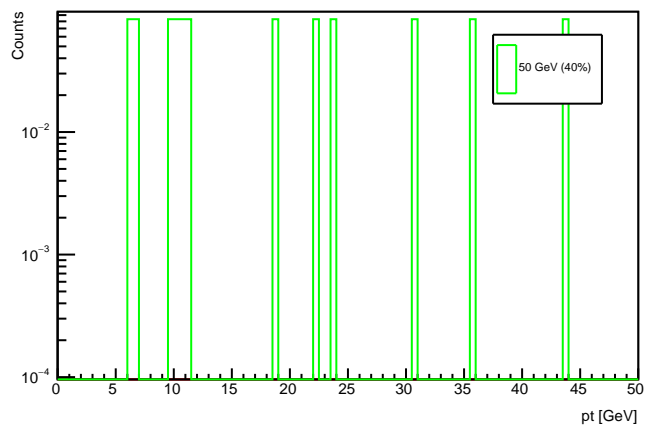
reco leading Mu pt: MET &gt; 120 GeV



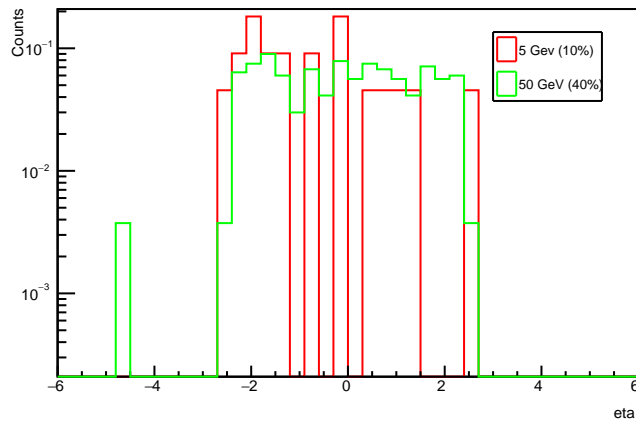
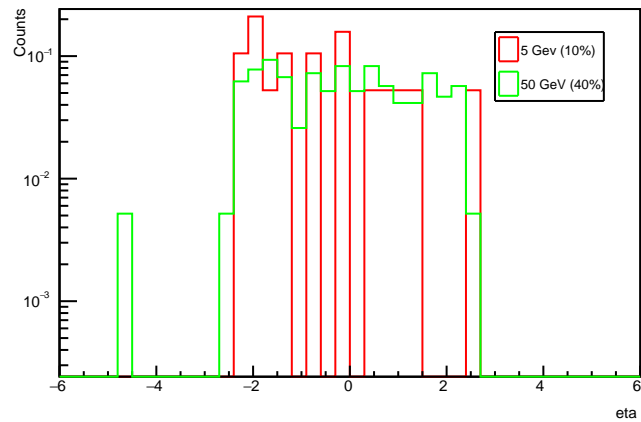
reco leading Mu pt: j1pt &gt; 120, at most 2 jets w/ pt &gt; 30 GeV



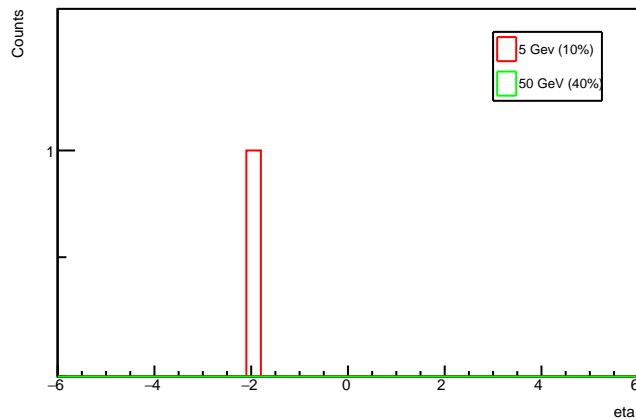
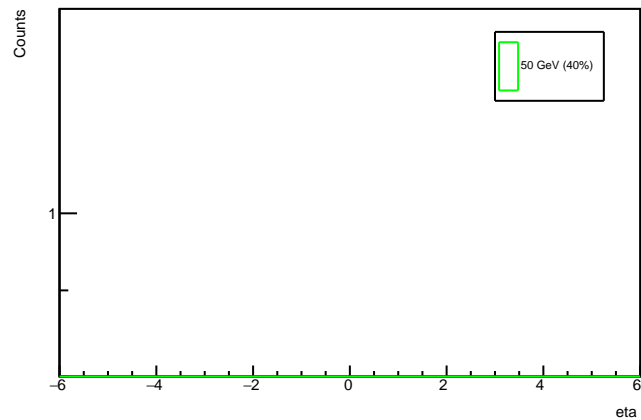
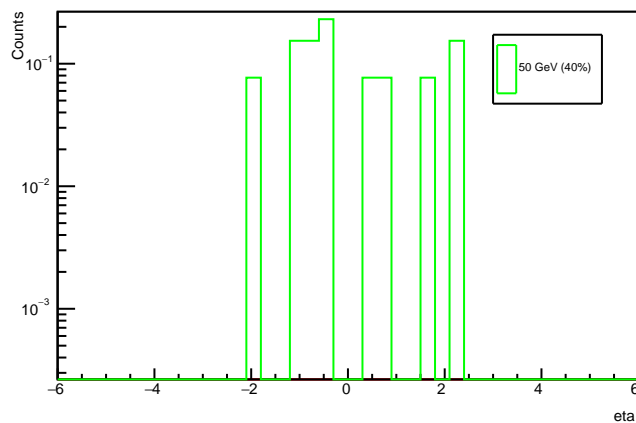
reco leading Mu pt: at least 2 mu w/ vxy &lt; 740 cm, |vz| &lt; 960 cm &amp; |eta| &lt; 2.4



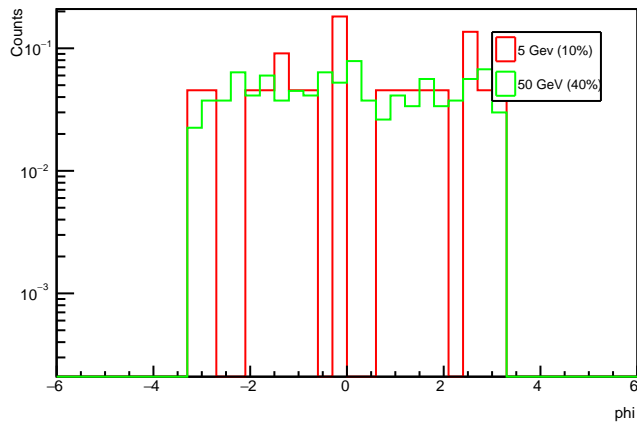
reco leading Mu eta: no cuts

reco leading Mu eta:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

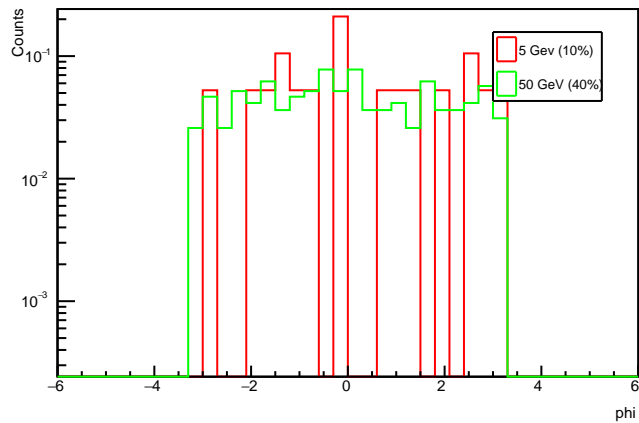
reco leading Mu eta: MET &gt; 120 GeV

reco leading Mu eta:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVreco leading Mu eta: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta| < 2.4$ 

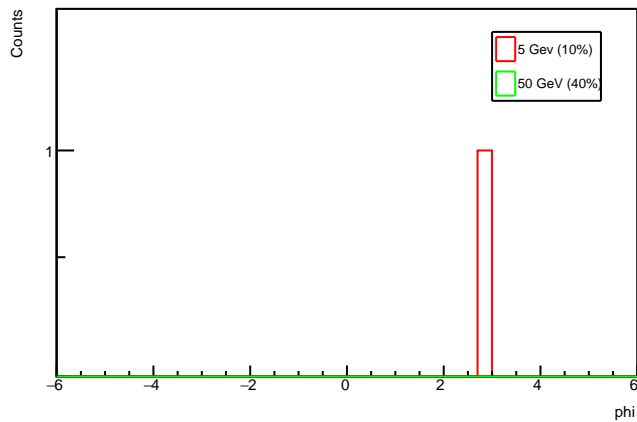
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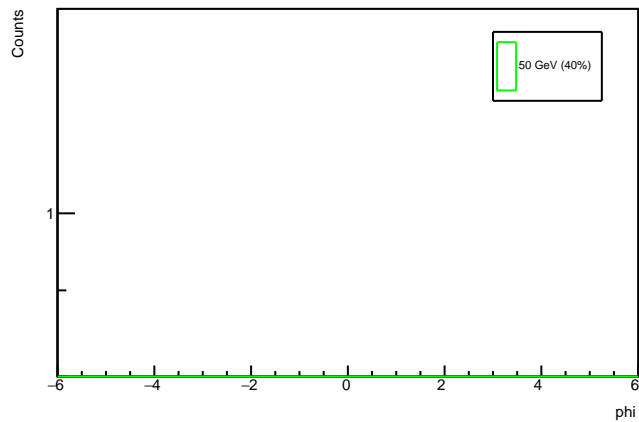
reco leading Mu phi: n\_jet &gt;=1, j1pt &gt; 30 GeV



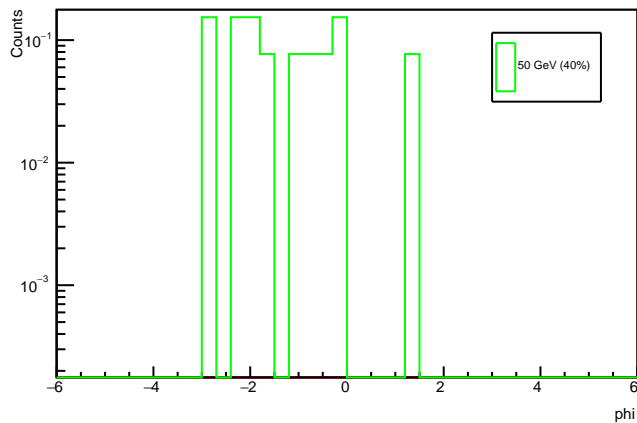
reco leading Mu phi: MET &gt; 120 GeV



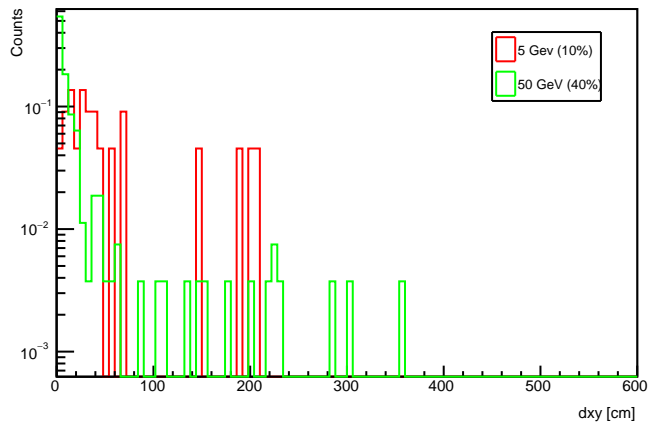
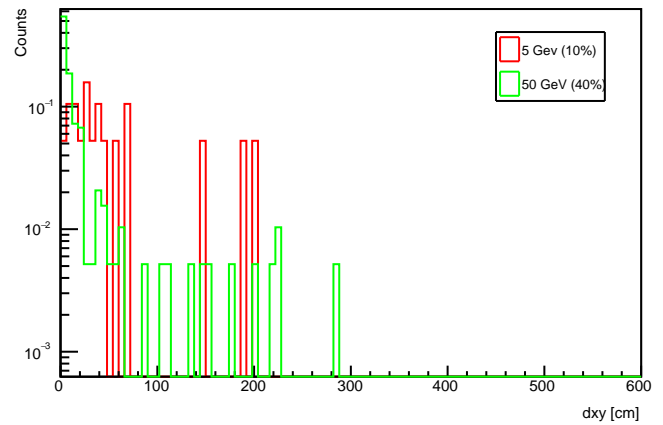
reco leading Mu phi: j1pt &gt;120, at most 2 jets w/ pt &gt;30 GeV



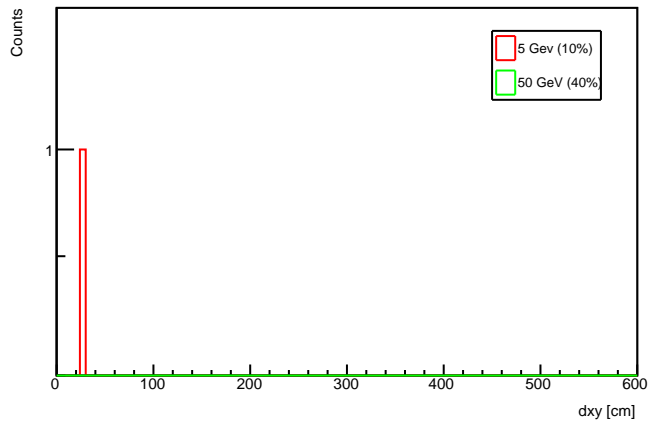
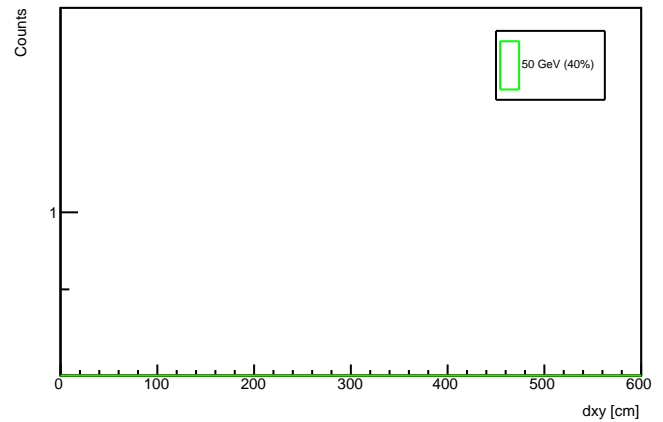
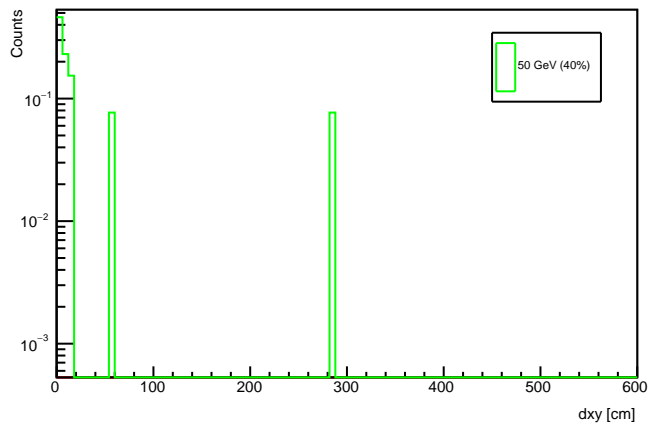
reco leading Mu phi: at least 2 mu w/ vxy &lt; 740 cm, |vz| &lt; 960 cm &amp; |eta| &lt; 2.4



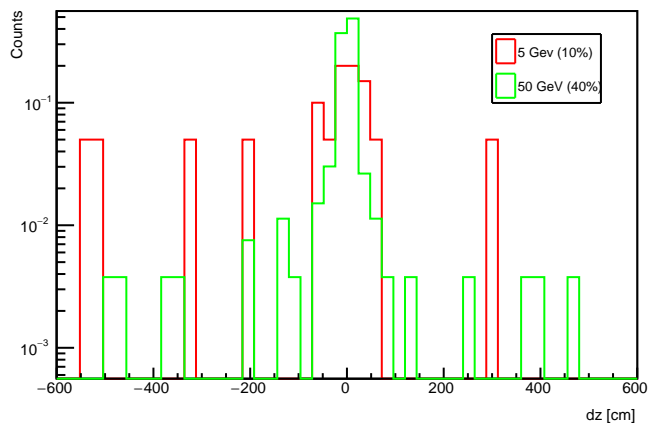
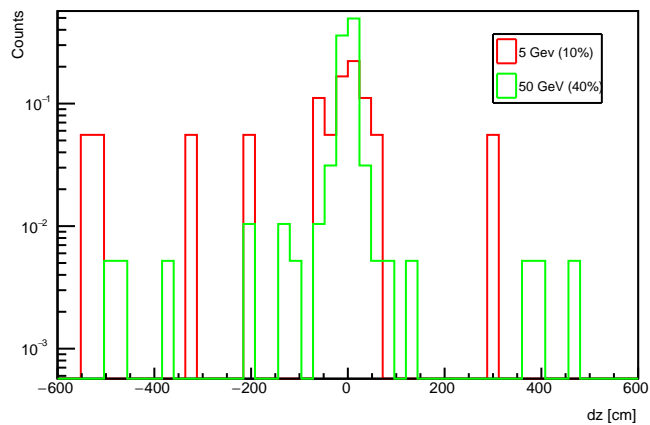
reco leading Mu vxy: no cuts

reco leading Mu vxy:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

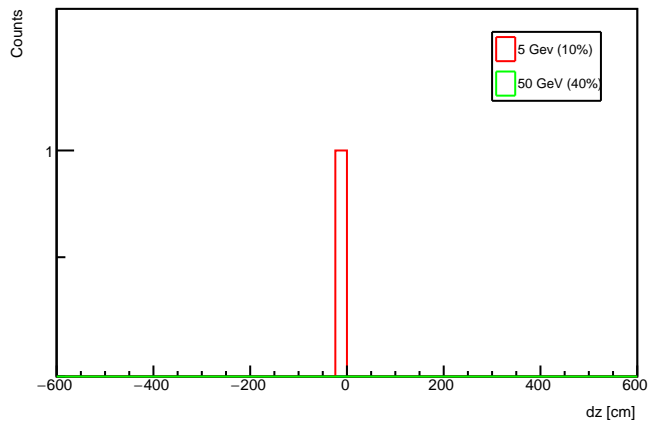
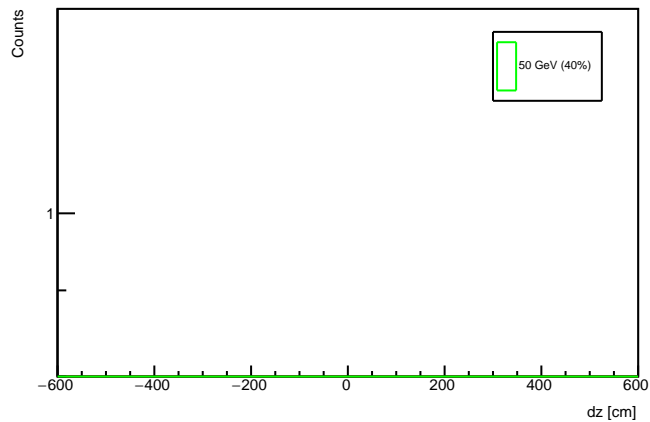
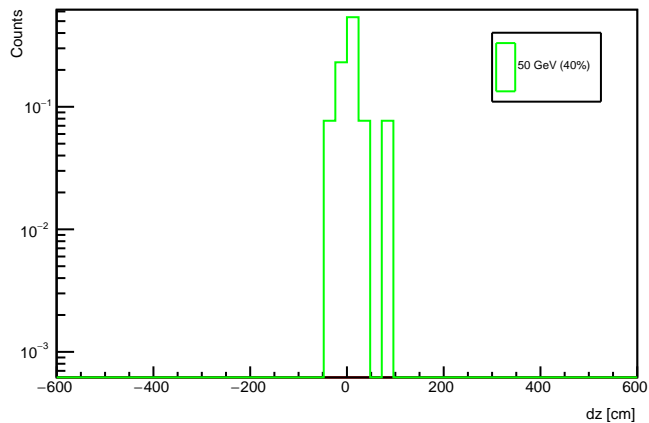
reco leading Mu vxy: MET &gt; 120 GeV

reco leading Mu vxy:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVreco leading Mu vxy: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta| < 2.4$ 

reco leading Mu vz: no cuts

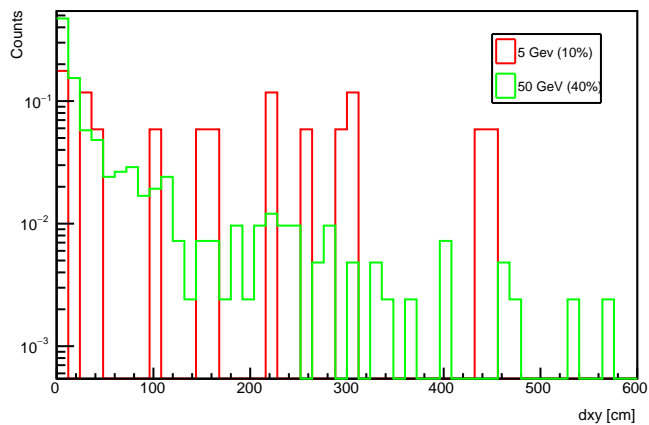
reco leading Mu vz:  $n_{\text{jet}} \geq 1$ ,  $j1_{\text{pt}} > 30$  GeV

reco leading Mu vz: MET &gt; 120 GeV

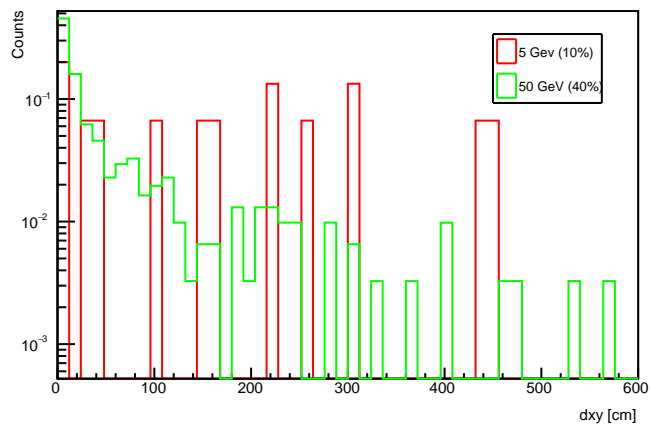
reco leading Mu vz:  $j1_{\text{pt}} > 120$ , at most 2 jets w/  $p_{\text{T}} > 30$  GeVreco leading Mu vz: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta| < 2.4$ 



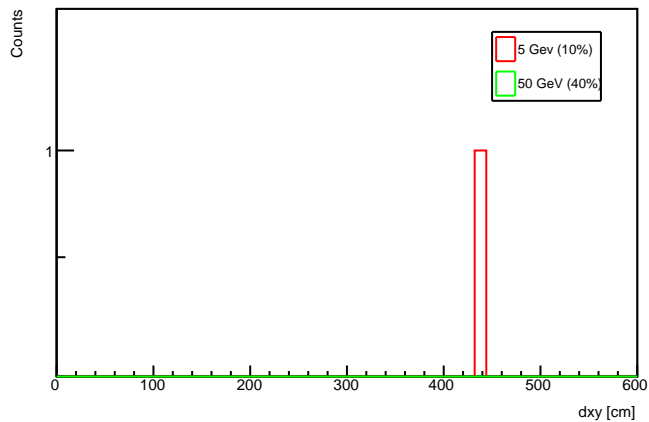
reco all Mu vxy: no cuts



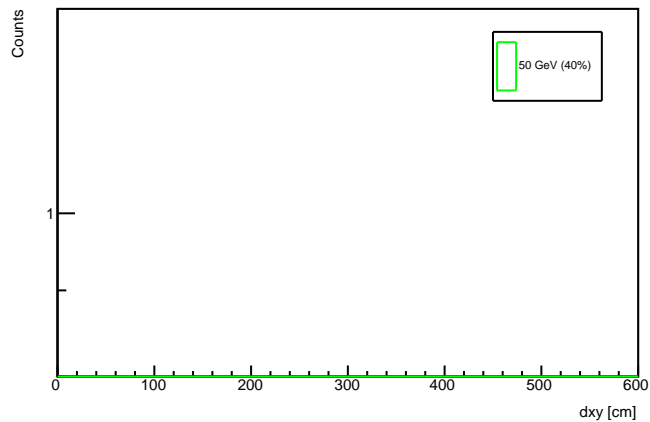
reco all Mu vxy: n\_jet &gt;=1, j1pt &gt; 30 GeV



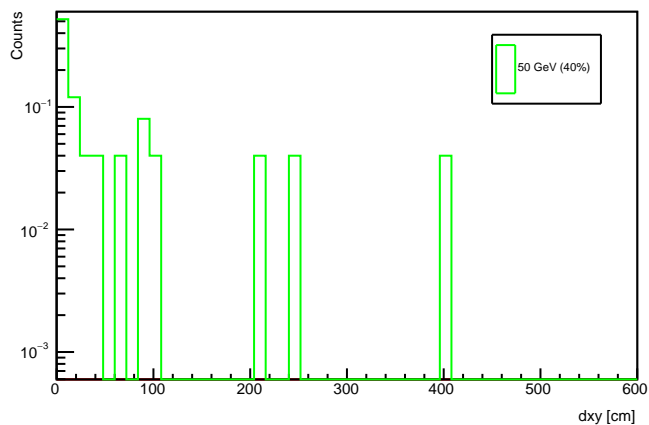
reco all Mu vxy: MET &gt; 120 GeV



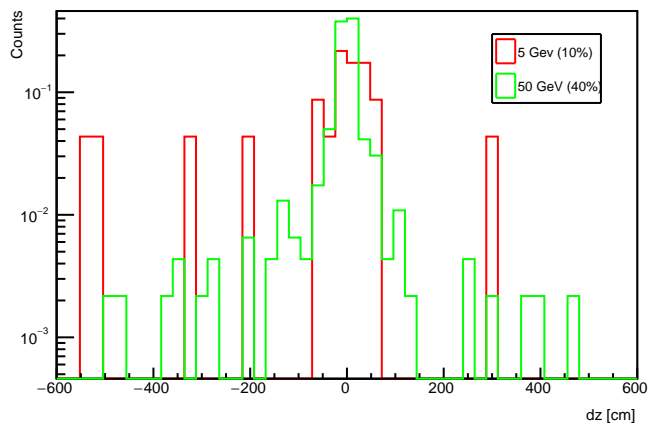
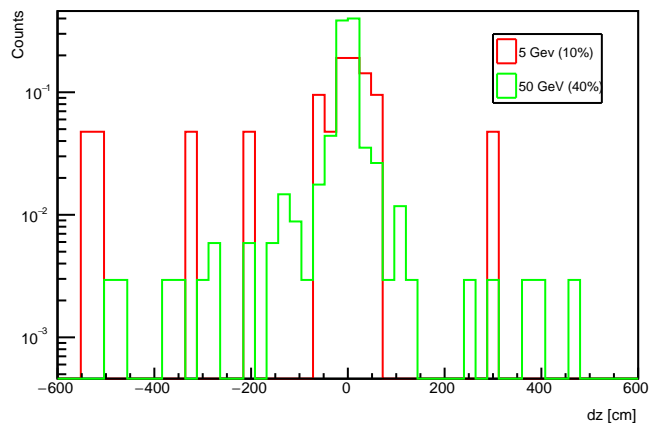
reco all Mu vxy: j1pt &gt;120, at most 2 jets w/ pt &gt;30 GeV



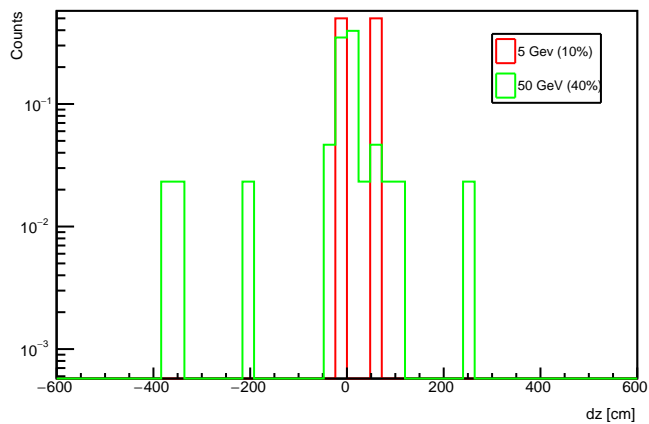
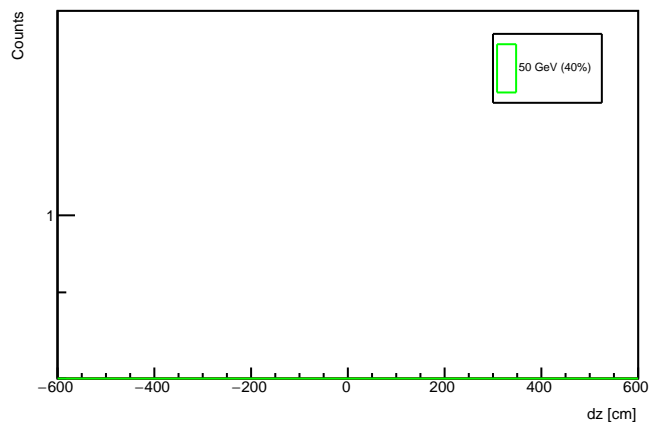
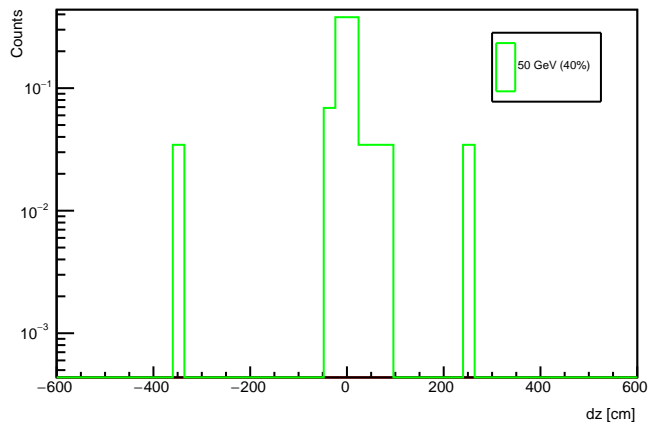
reco all Mu vxy: at least 2 mu w/ vxy &lt; 740 cm, |vz| &lt; 960 cm &amp; |eta| &lt; 2.4



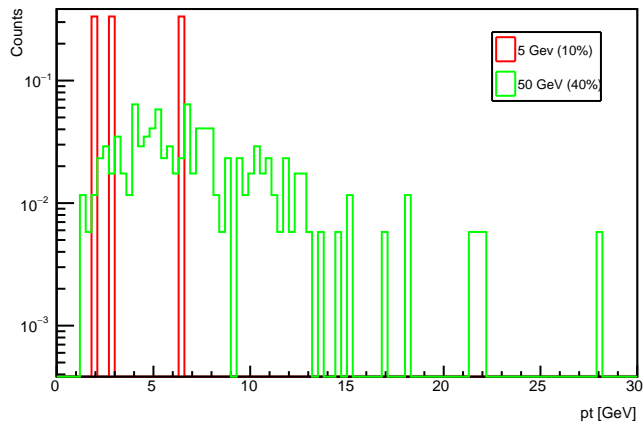
reco all Mu vz: no cuts

reco all Mu vz:  $n_{\text{jet}} \geq 1$ ,  $j1pt > 30$  GeV

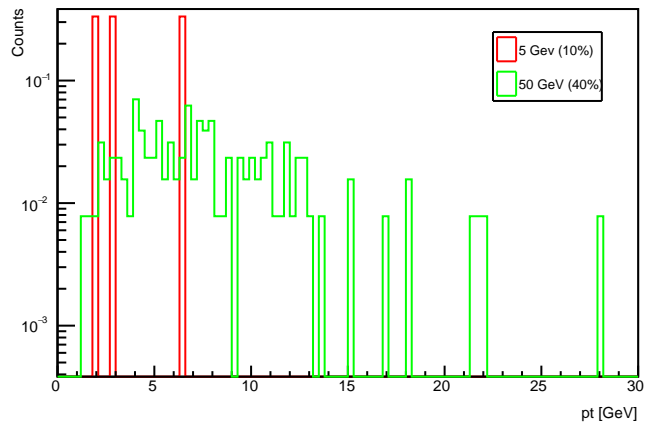
reco all Mu vz: MET &gt; 120 GeV

reco all Mu vz:  $j1pt > 120$ , at most 2 jets w/  $pt > 30$  GeVreco all Mu vz: at least 2 mu w/  $vxy < 740$  cm,  $|vz| < 960$  cm &  $|\eta_{\text{jet}}| < 2.4$ 

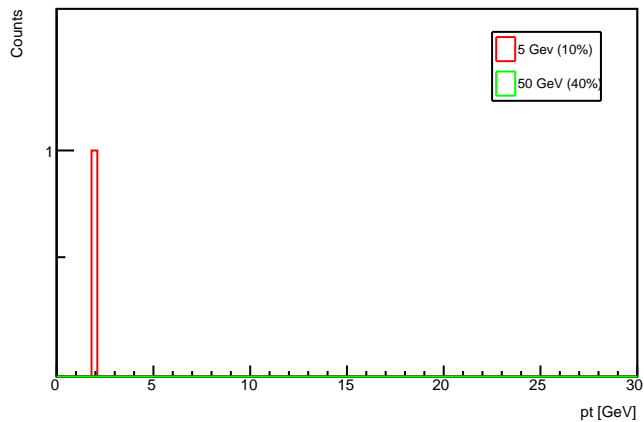
ctau 1mm leading vs subleading Mu pt: no cuts



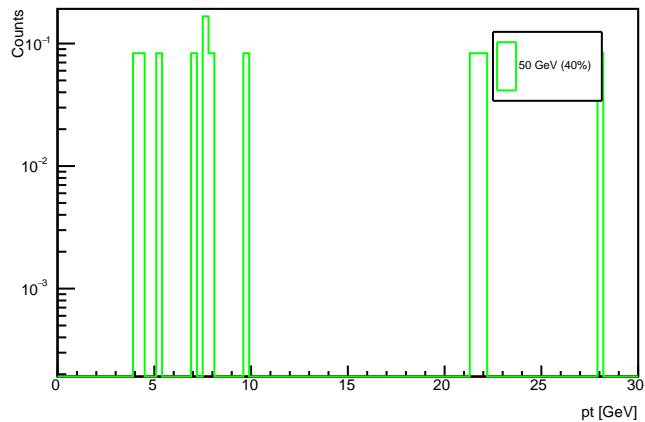
ctau 1mm leading vs subleading Mu pt:  $n_{\text{jet}} \geq 1$ ,  $j1_{\text{pt}} > 30$  GeV



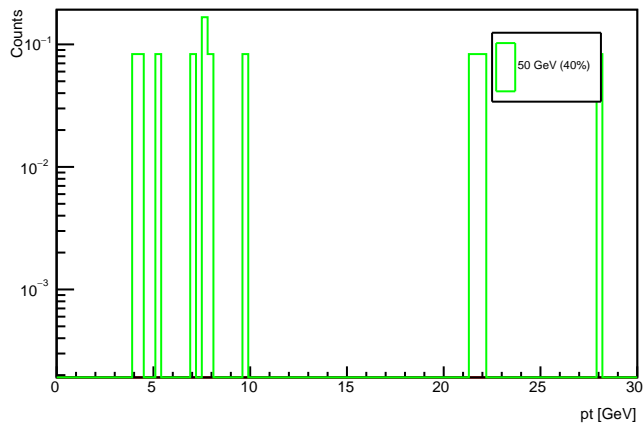
ctau 1mm leading vs subleading Mu pt: MET > 120 GeV



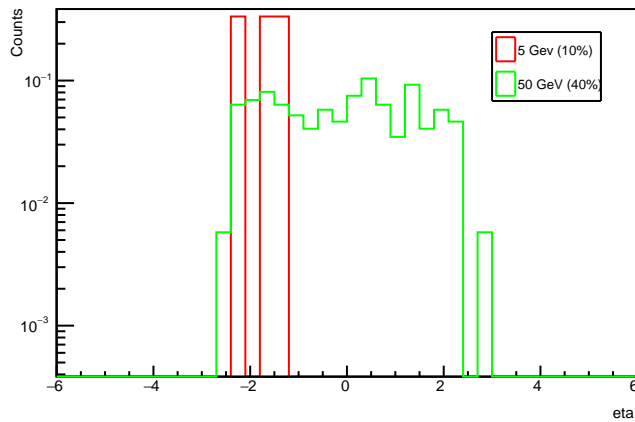
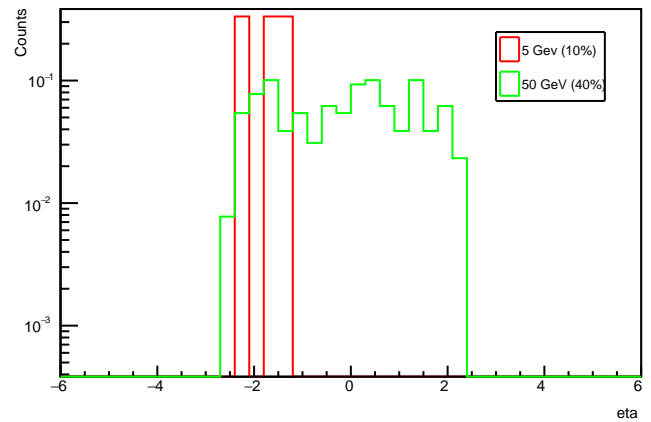
ctau 1mm leading vs subleading Mu pt:  $j1_{\text{pt}} > 120$ , at most 2 jets w/  $p_{\text{T}} > 30$  GeV



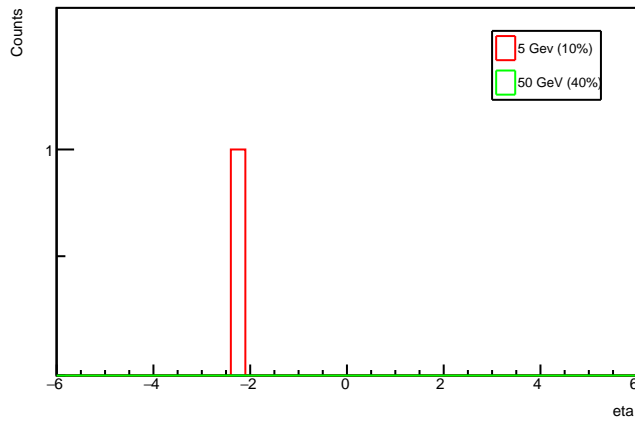
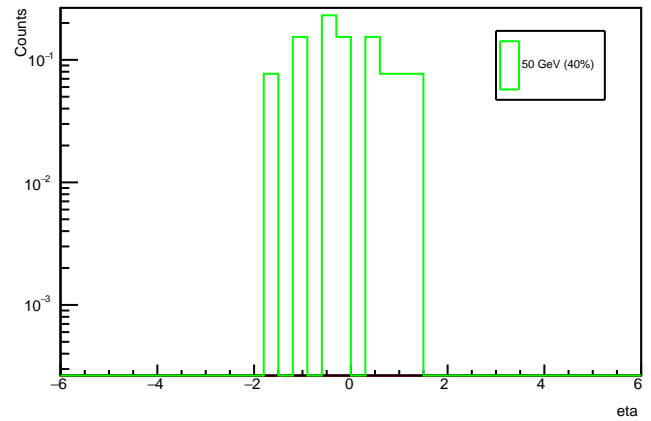
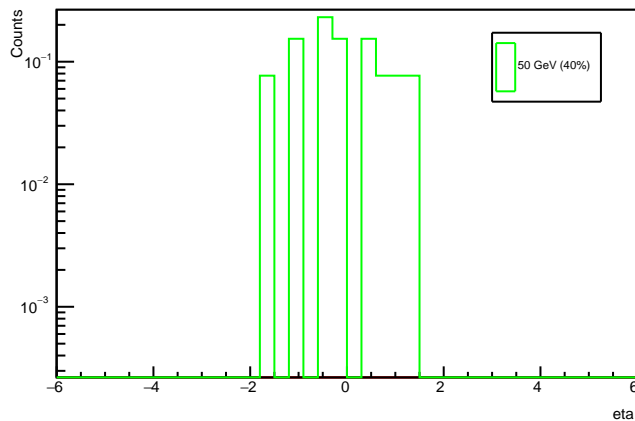
ctau 1mm leading vs subleading Mu pt: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta| < 2.4$



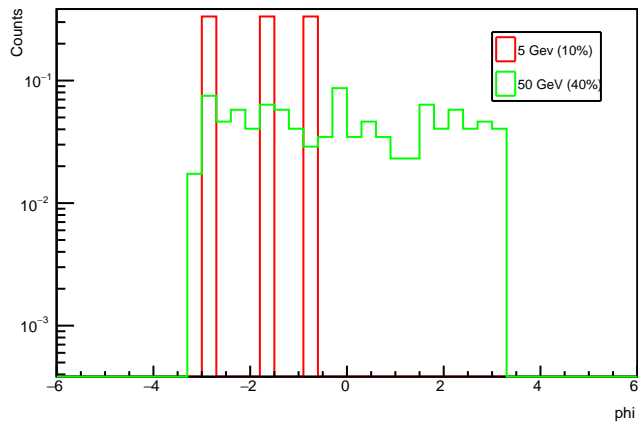
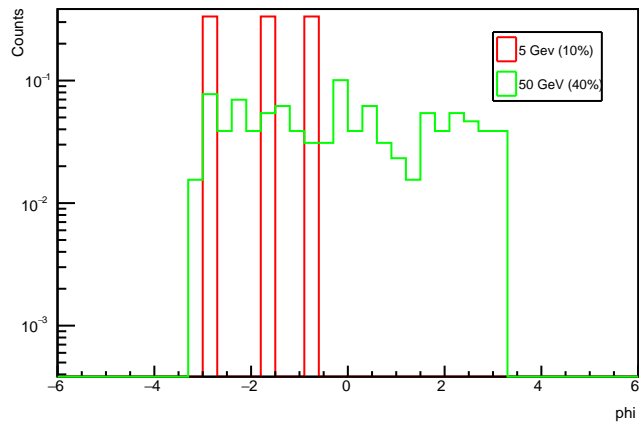
reco subleading Mu eta: no cuts

reco subleading Mu eta:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

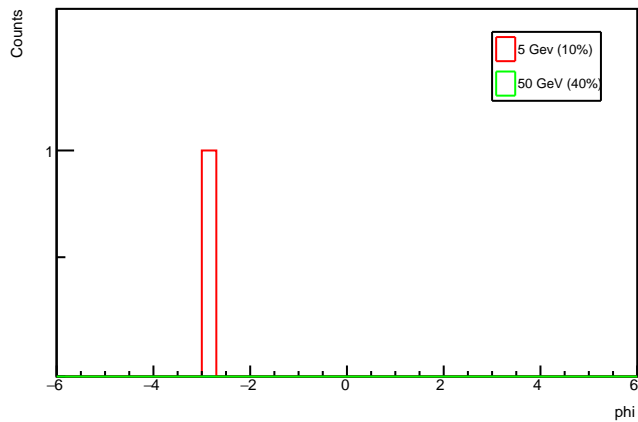
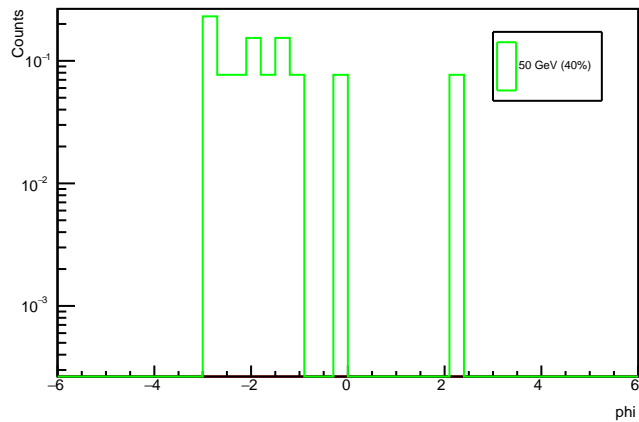
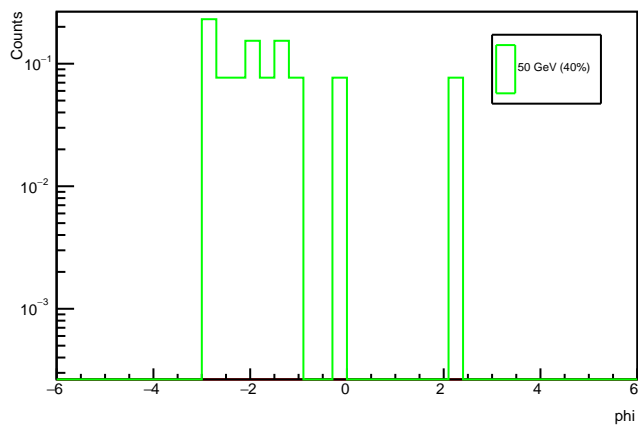
reco subleading Mu eta: MET &gt; 120 GeV

reco subleading Mu eta:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_{\text{T}} > 30$  GeVreco subleading Mu eta: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta| < 2.4$ 

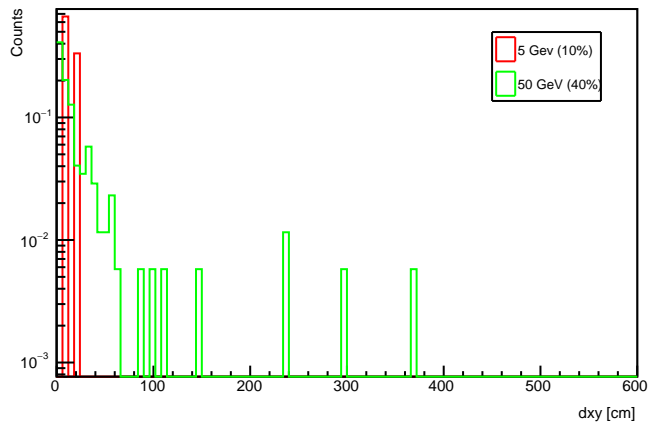
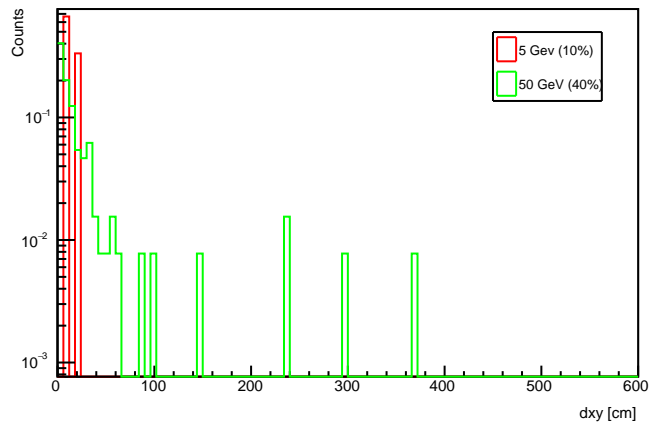
reco subleading Mu phi: no cuts

reco subleading Mu phi:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

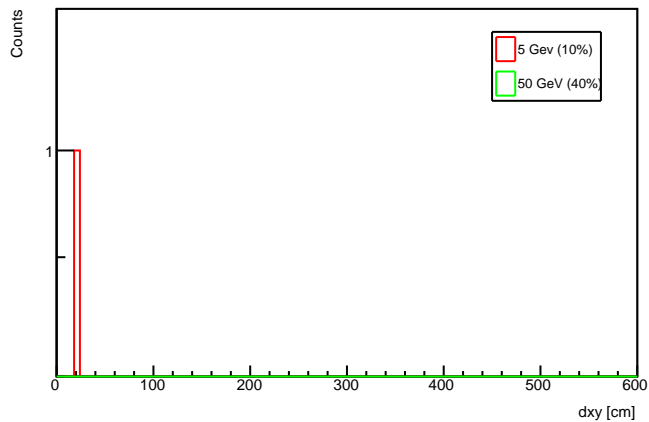
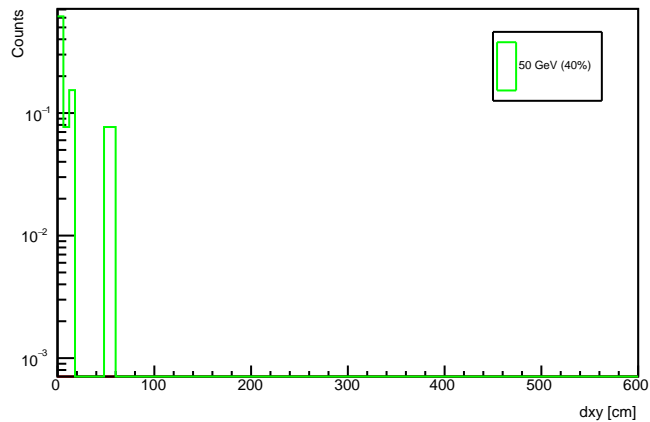
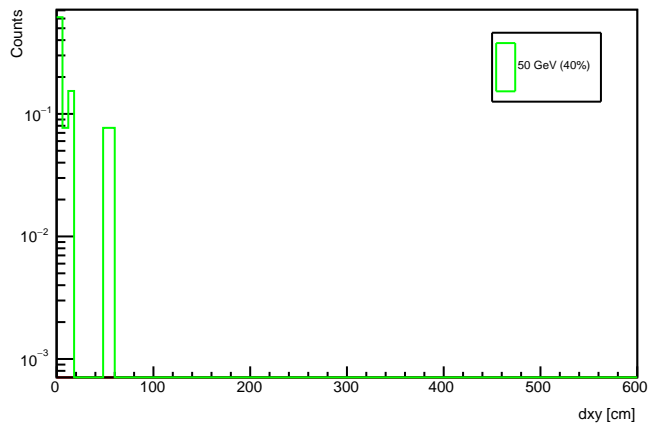
reco subleading Mu phi: MET &gt; 120 GeV

reco subleading Mu phi:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVreco subleading Mu phi: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta_{\text{jet}}| < 2.4$ 

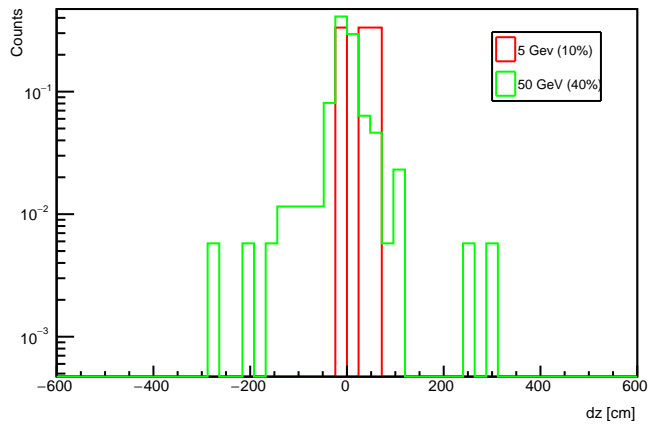
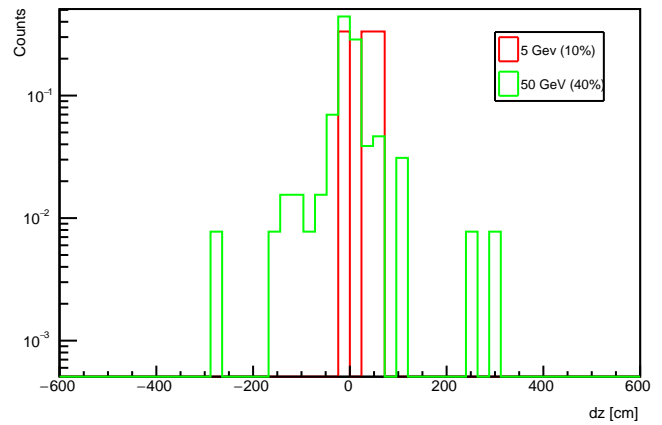
reco subleading Mu vxy: no cuts

reco subleading Mu vxy:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

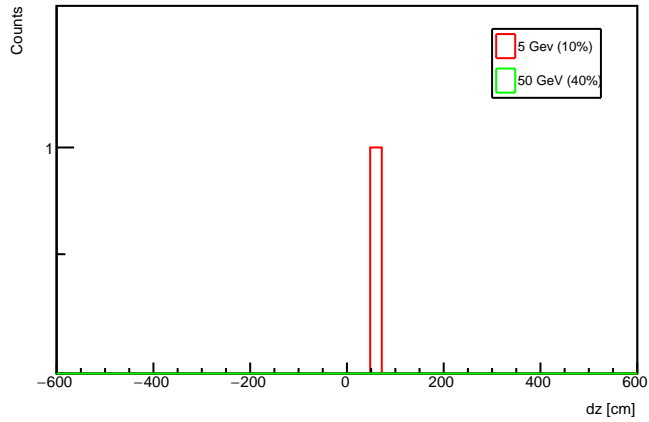
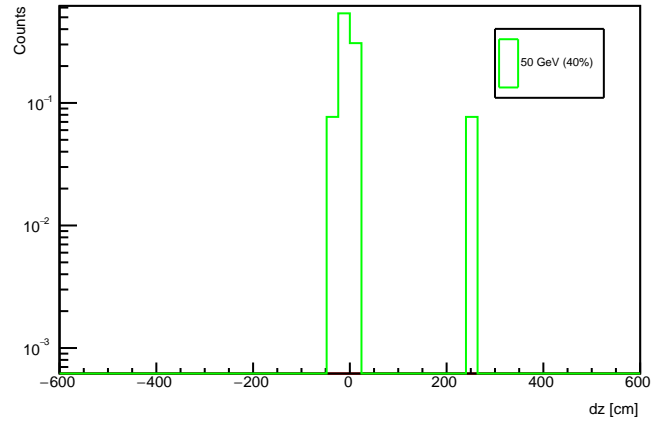
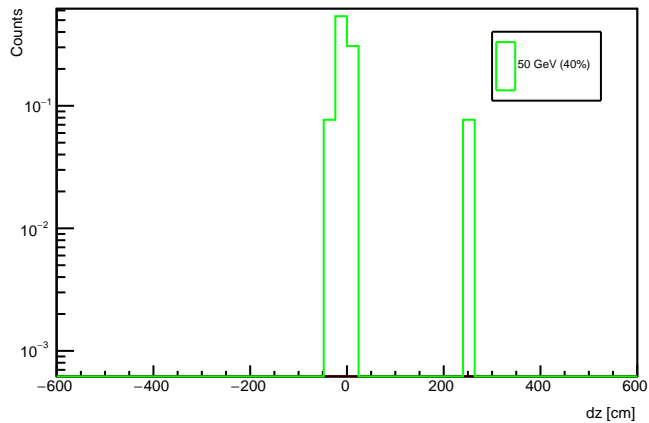
reco subleading Mu vxy: MET &gt; 120 GeV

reco subleading Mu vxy:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVreco subleading Mu vxy: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta| < 2.4$ 

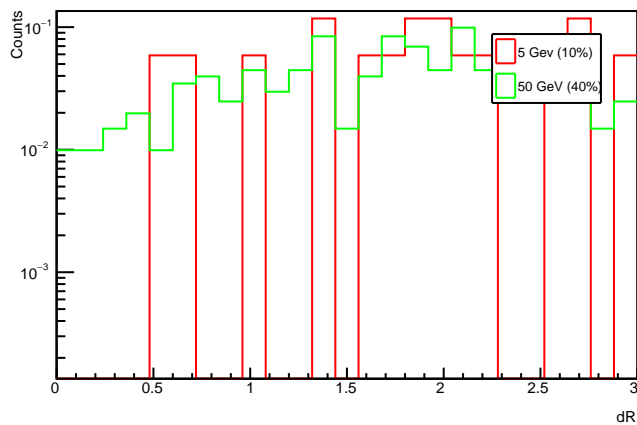
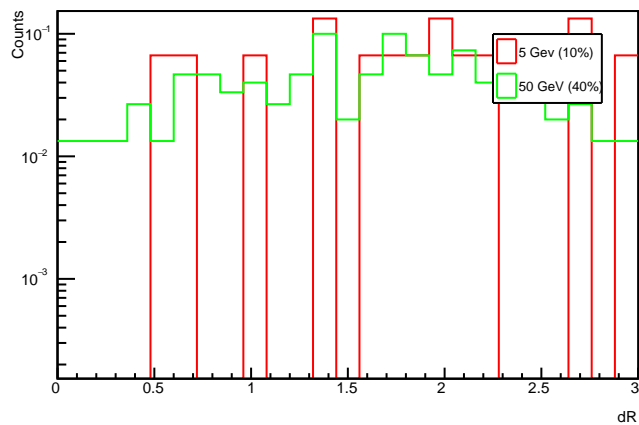
reco subleading Mu vz: no cuts

reco subleading Mu vz:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

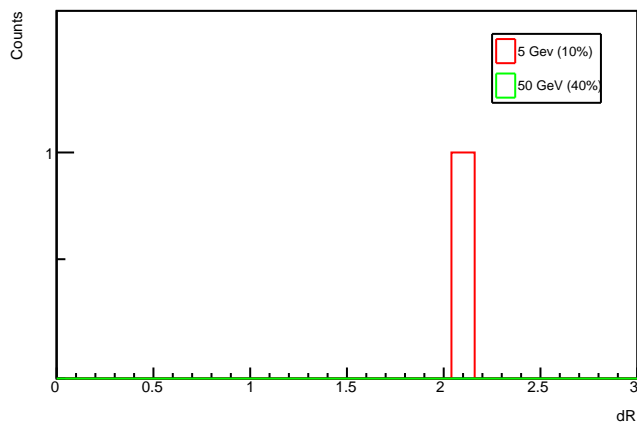
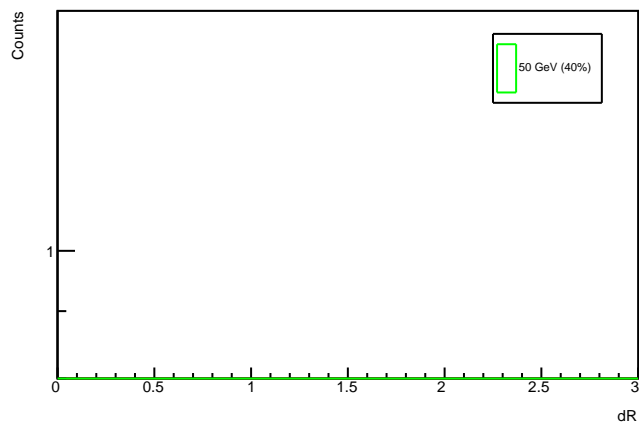
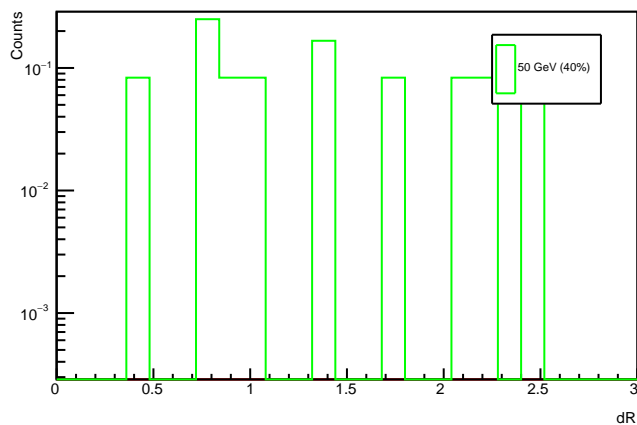
reco subleading Mu vz: MET &gt; 120 GeV

reco subleading Mu vz:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVreco subleading Mu vz: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta| < 2.4$ 

dR: reco leading mu and subleading mu: no cuts

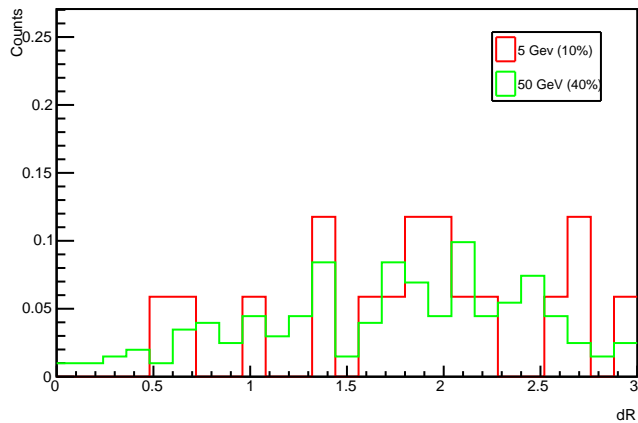
dR: reco leading mu and subleading mu:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

dR: reco leading mu and subleading mu: MET &gt; 120 GeV

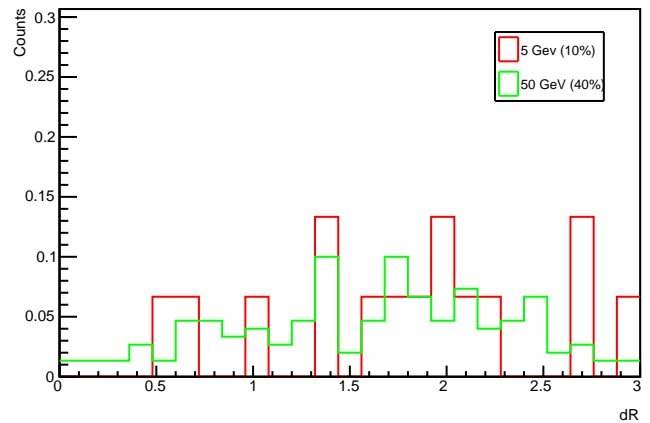
dR: reco leading mu and subleading mu:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVdR: reco leading mu and subleading mu: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta| < 2.4$ 



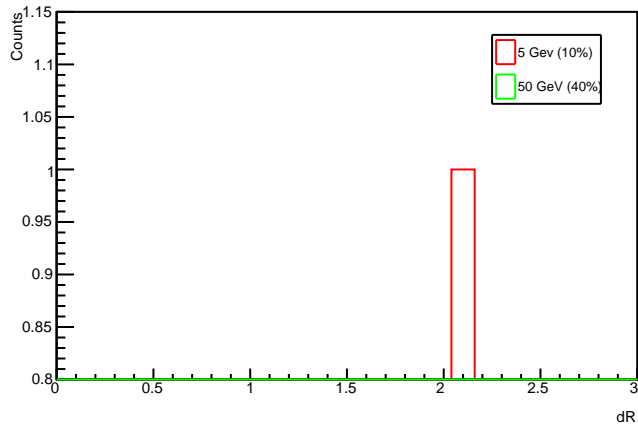
dR: reco leading mu and subleading mu: no cuts



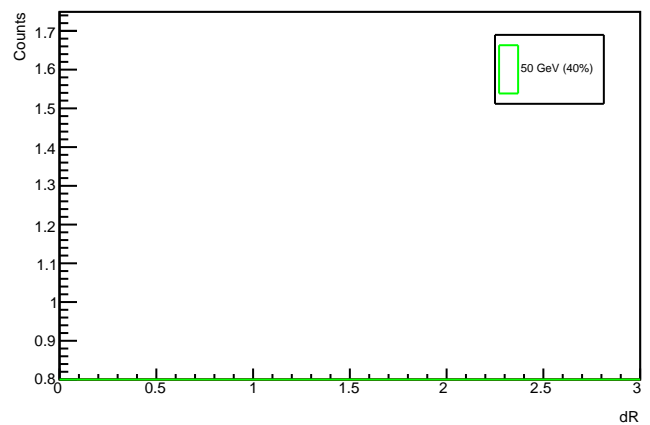
dR: reco leading mu and subleading mu:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV



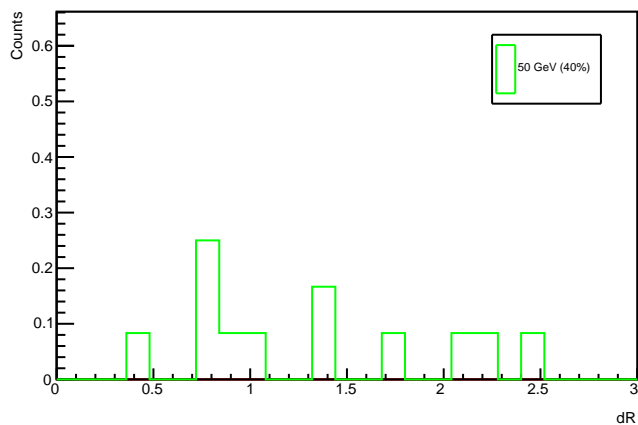
dR: reco leading mu and subleading mu: MET > 120 GeV



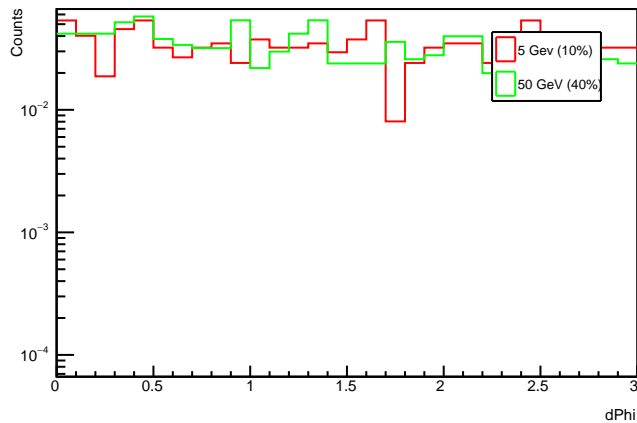
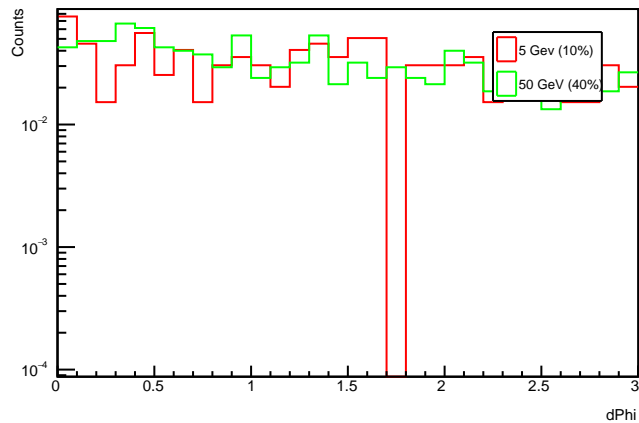
dR: reco leading mu and subleading mu:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_{\text{T}} > 30$  GeV



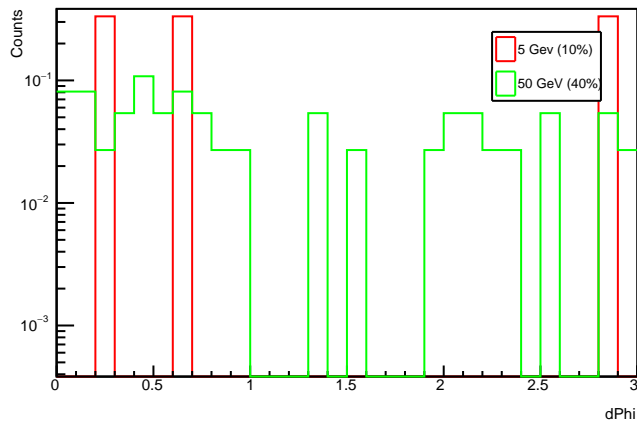
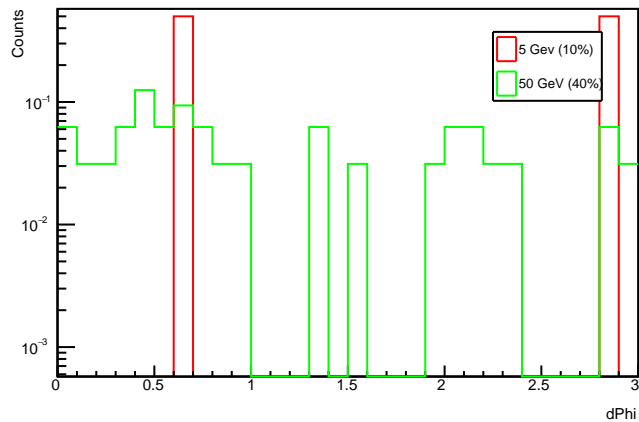
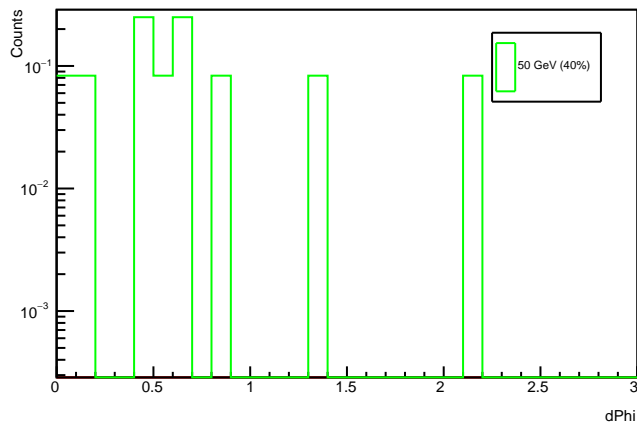
dR: reco leading mu and subleading mu: at least 2 mu w/  $v_{xy} < 740$  cm,  $|\nu_z| < 960$  cm &  $|\eta| < 2.4$



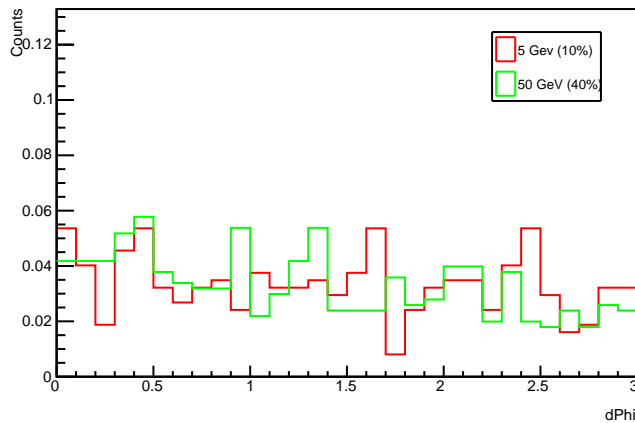
dPhi: reco MET and leading mu: no cuts

dPhi: reco MET and leading mu:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

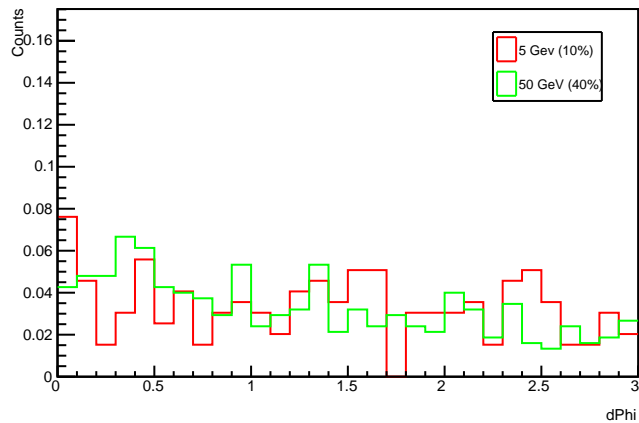
dPhi: reco MET and leading mu: MET &gt; 120 GeV

dPhi: reco MET and leading mu:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVdPhi: reco MET and leading mu: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta_{\text{jet}}| < 2.4$ 

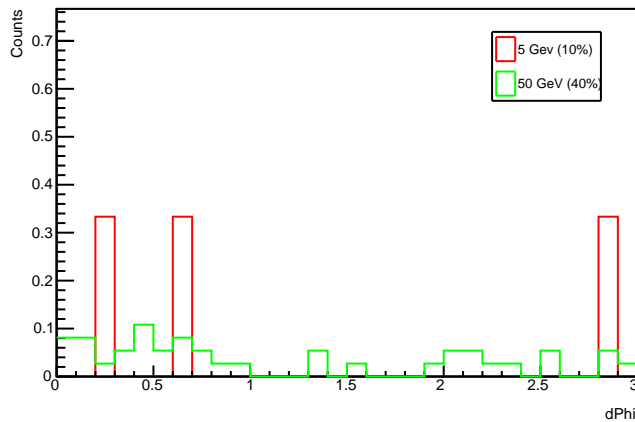
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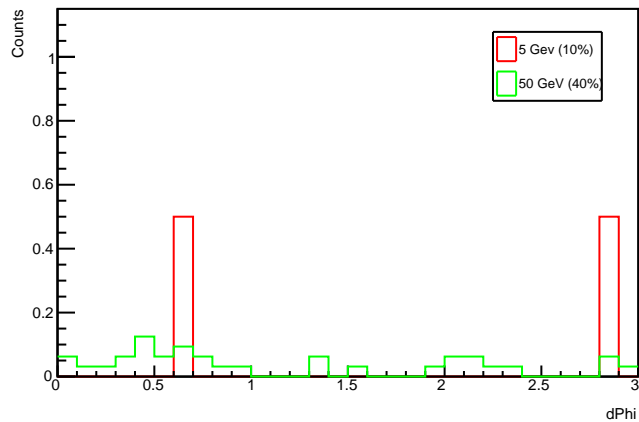
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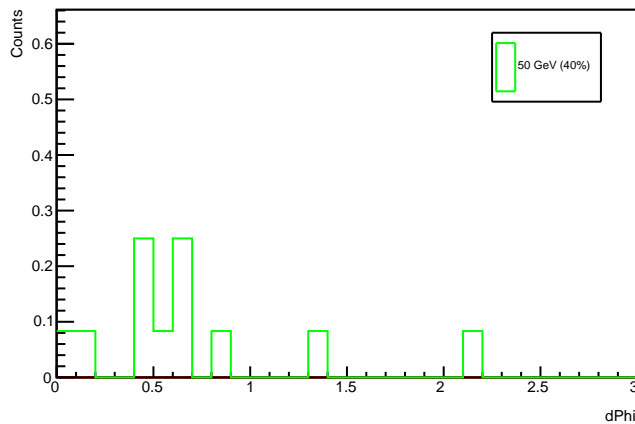
dPhi: reco MET and leading mu: MET > 120 GeV



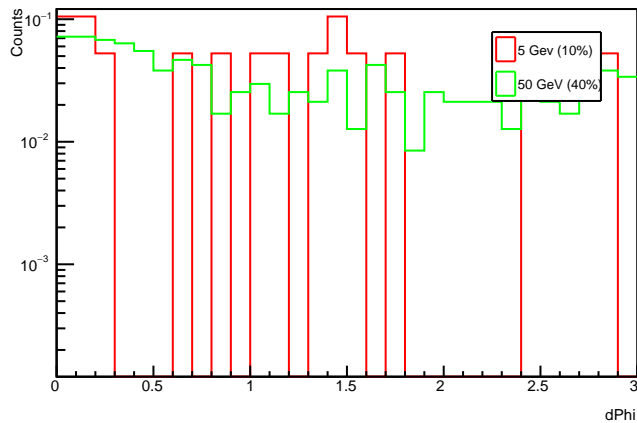
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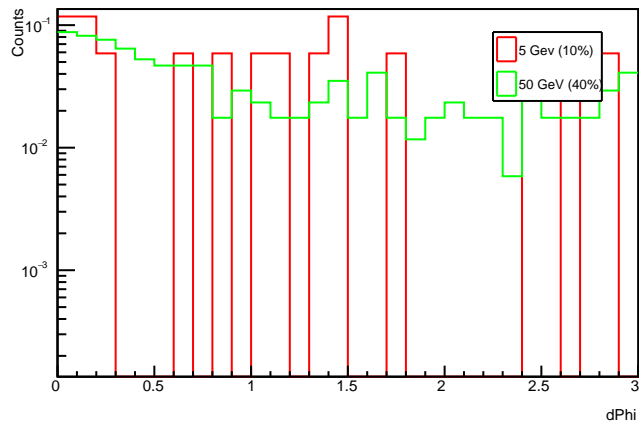
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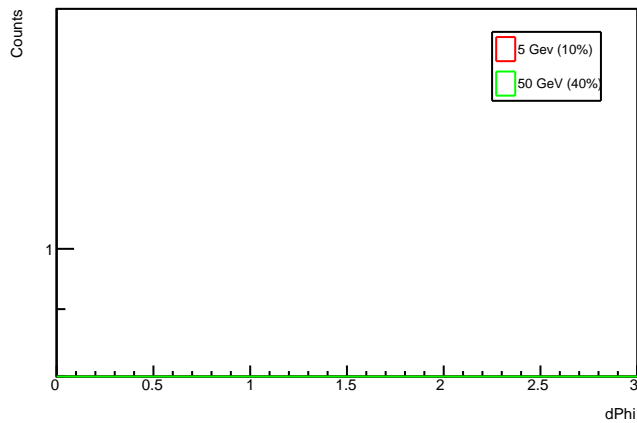
dPhi: reco leading mu and subleading mu: no cuts



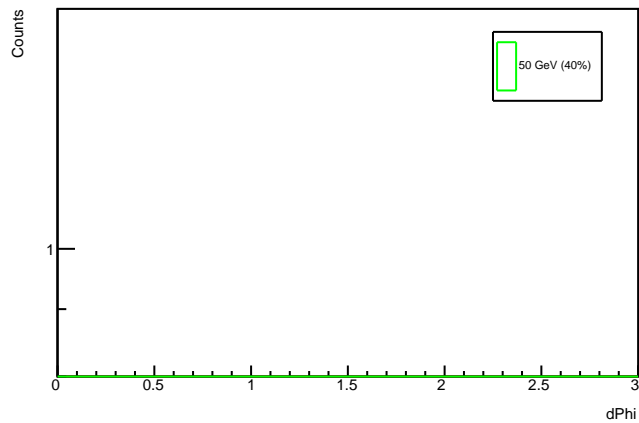
dPhi: reco leading mu and subleading mu:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV



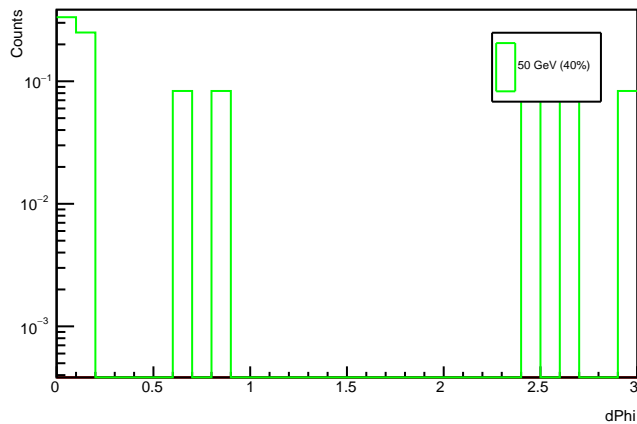
dPhi: reco leading mu and subleading mu: MET > 120 GeV



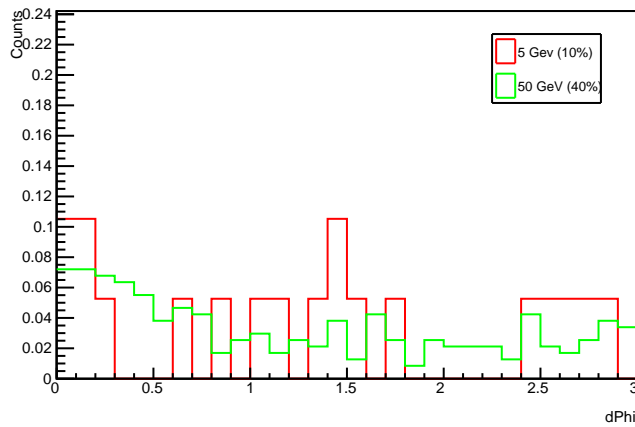
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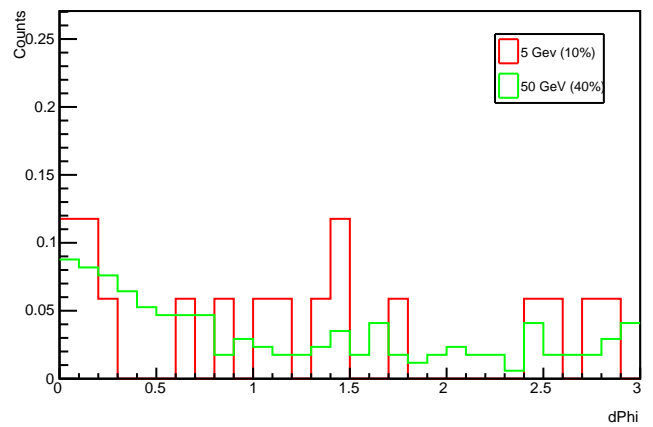
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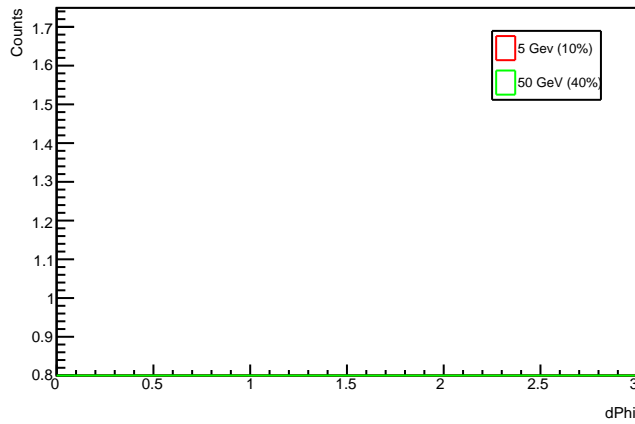
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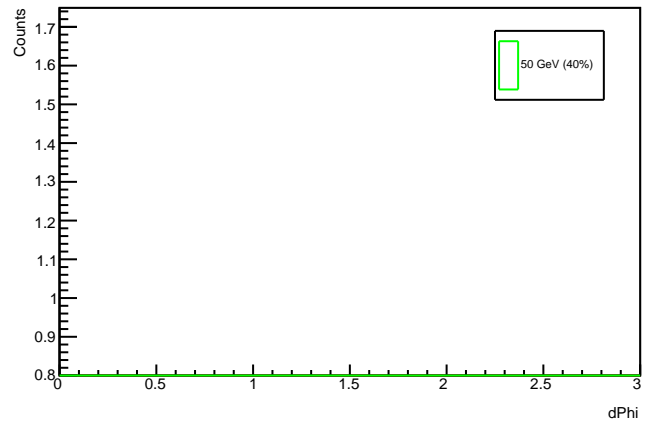
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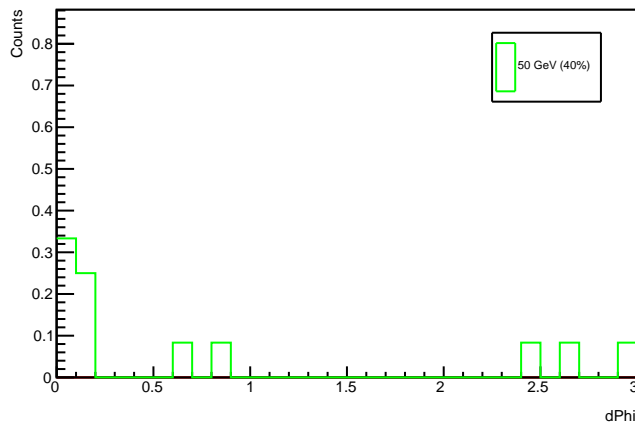
dPhi: reco leading mu and subleading mu: MET > 120 GeV



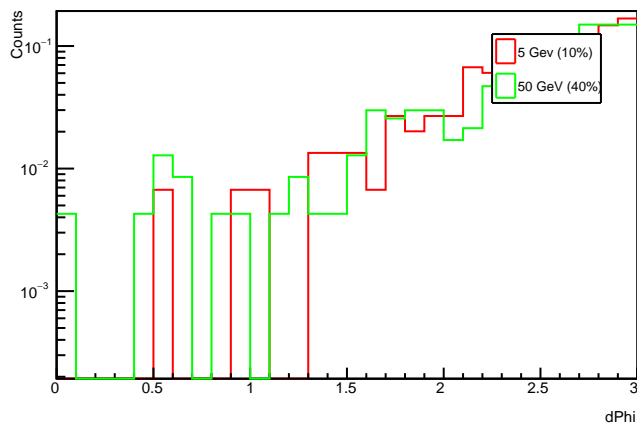
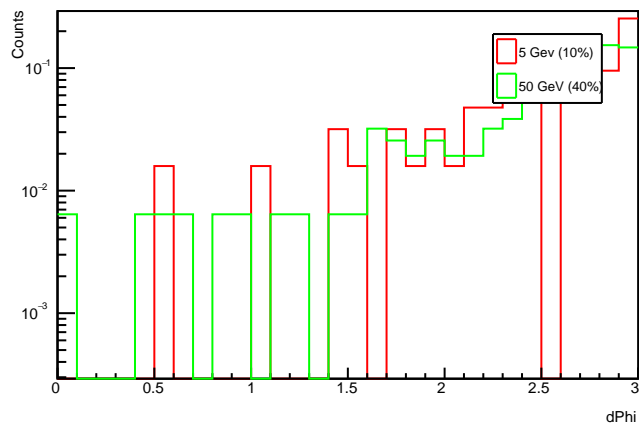
dPhi: reco leading mu and subleading mu:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeV



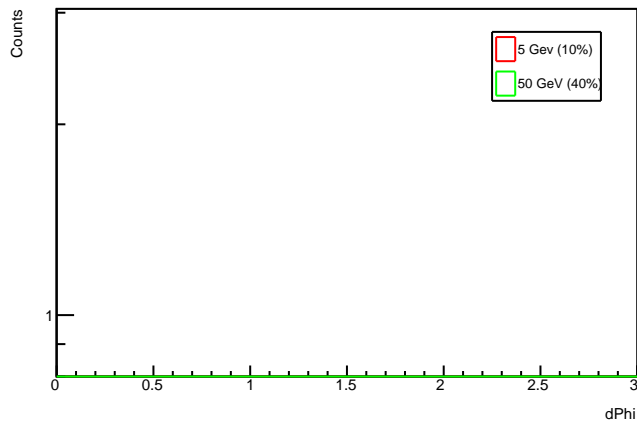
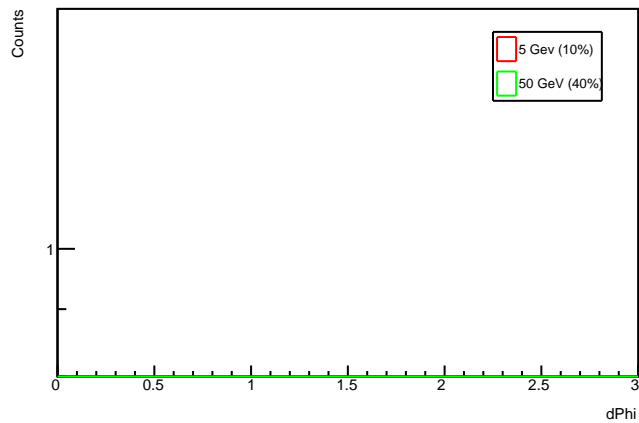
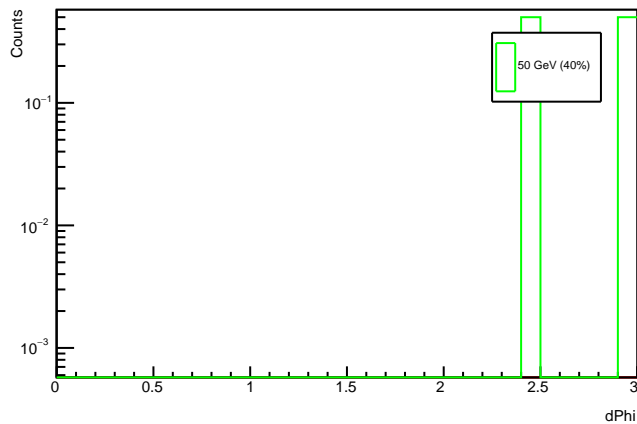
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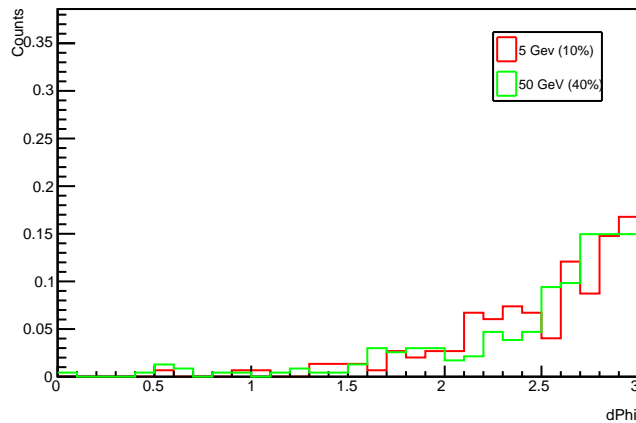
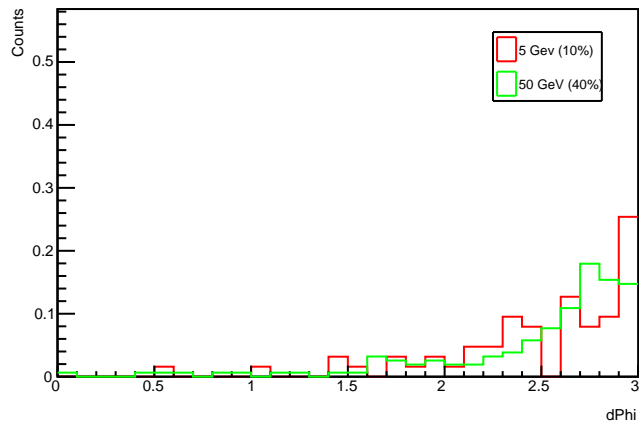
dPhi: reco MET and leading jet: no cuts

dPhi: reco MET and leading jet:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

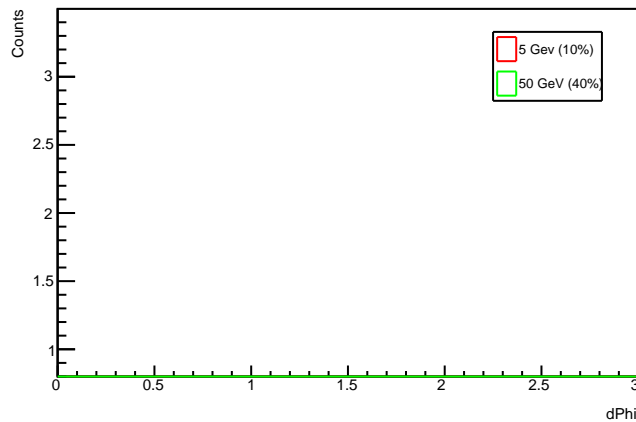
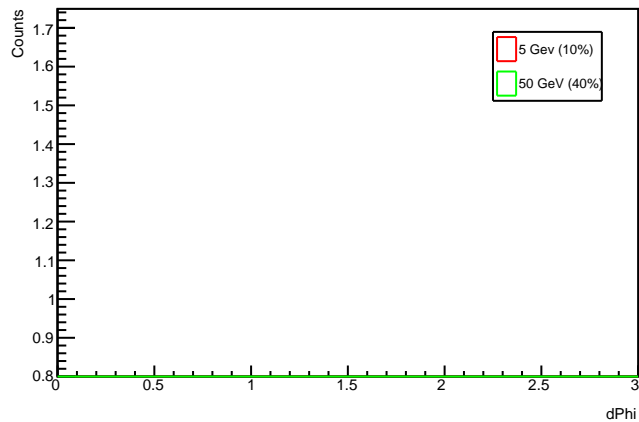
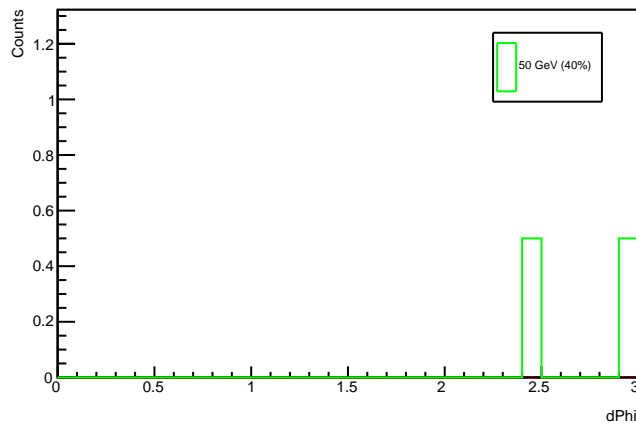
dPhi: reco MET and leading jet: MET &gt; 120 GeV

dPhi: reco MET and leading jet:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVdPhi: reco MET and leading jet: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta| < 2.4$ 

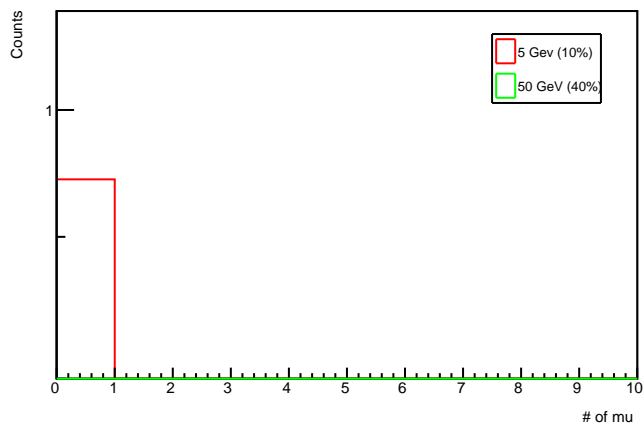
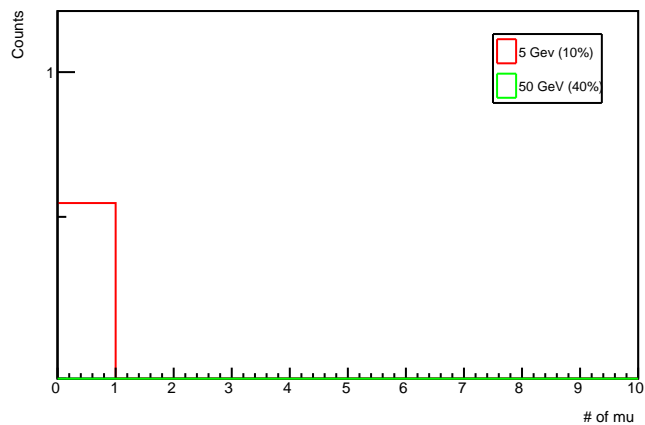
dPhi: reco MET and leading jet: no cuts

dPhi: reco MET and leading jet:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30 \text{ GeV}$ 

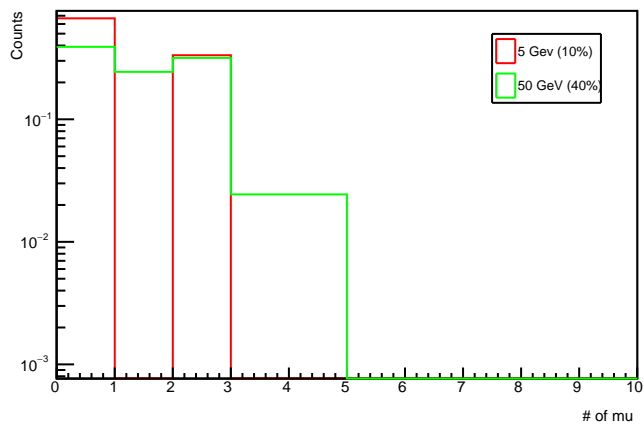
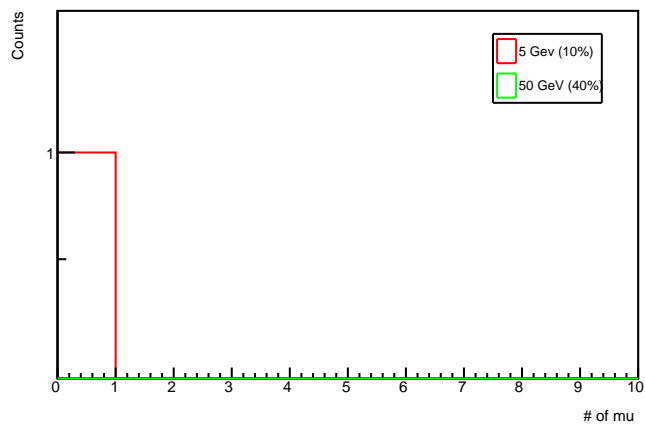
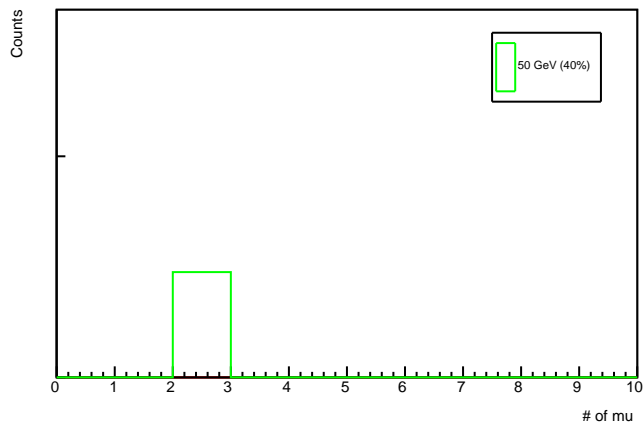
dPhi: reco MET and leading jet: MET &gt; 120 GeV

dPhi: reco MET and leading jet:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30 \text{ GeV}$ dPhi: reco MET and leading jet: at least 2 mu w/  $v_{xy} < 740 \text{ cm}$ ,  $|v_z| < 960 \text{ cm}$  &  $|\eta| < 2.4$ 

reco number of mu: no cuts

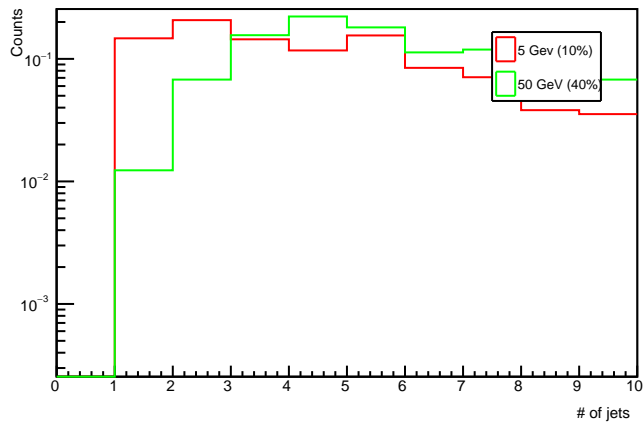
reco number of mu:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV

reco number of mu: MET &gt; 120 GeV

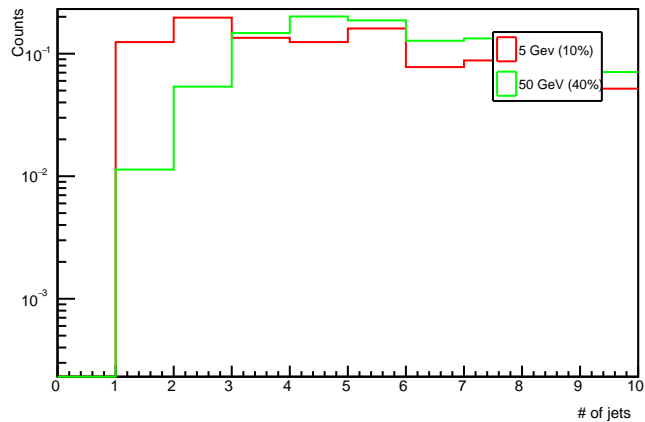
reco number of mu:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeVreco number of mu: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta| < 2.4$ 



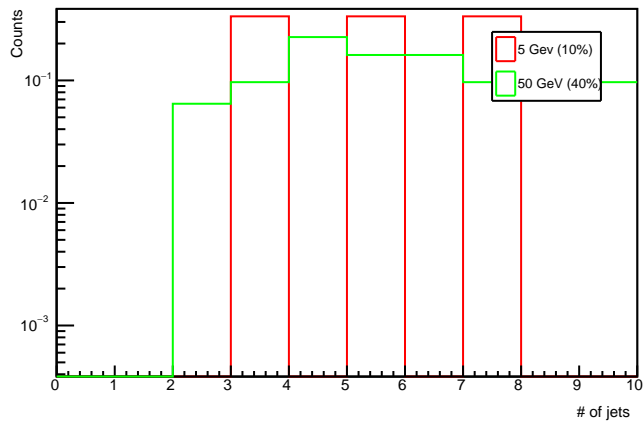
reco number of jets: no cuts



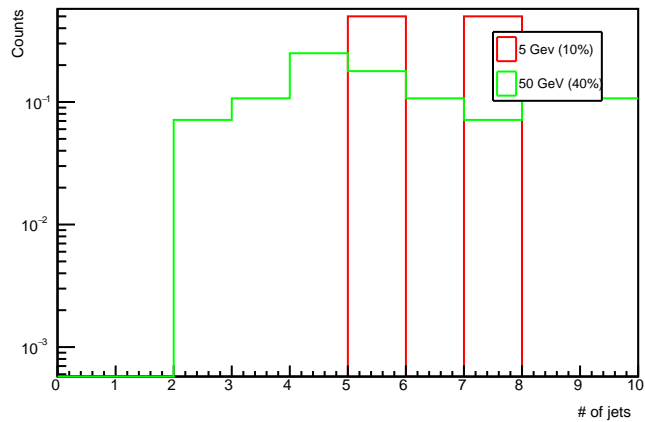
reco number of jets:  $n_{\text{jet}} \geq 1$ ,  $j_{1\text{pt}} > 30$  GeV



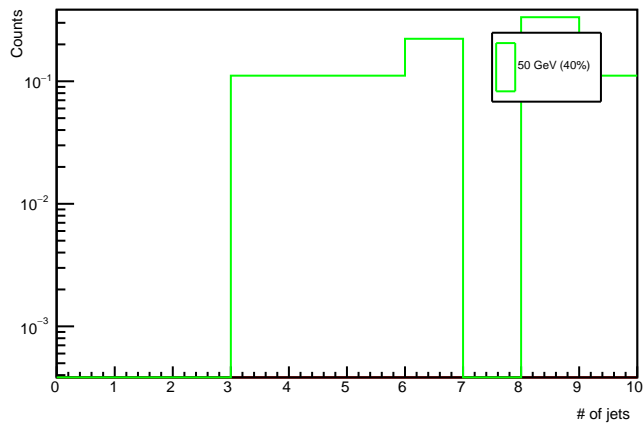
reco number of jets:  $\text{MET} > 120$  GeV



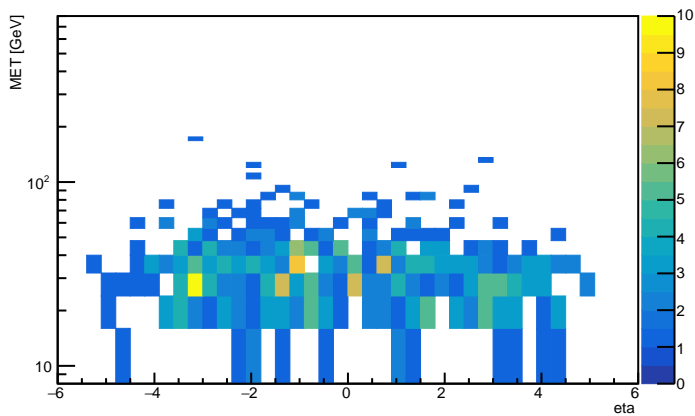
reco number of jets:  $j_{1\text{pt}} > 120$ , at most 2 jets w/  $p_t > 30$  GeV



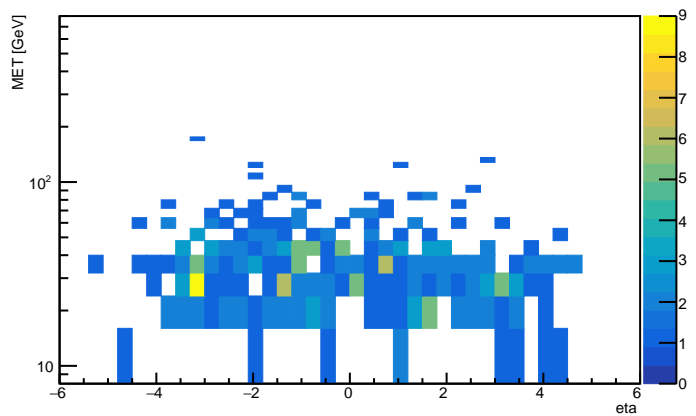
reco number of jets: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta_{\text{jet}}| < 2.4$



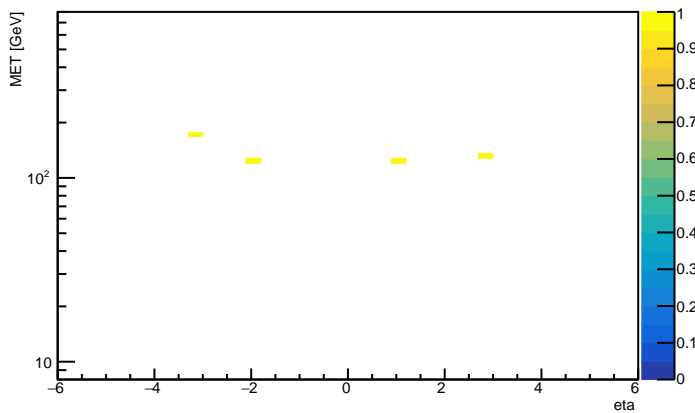
5 Gev (10%) cttau 1mm gen leading Met eta vs pt: no cuts



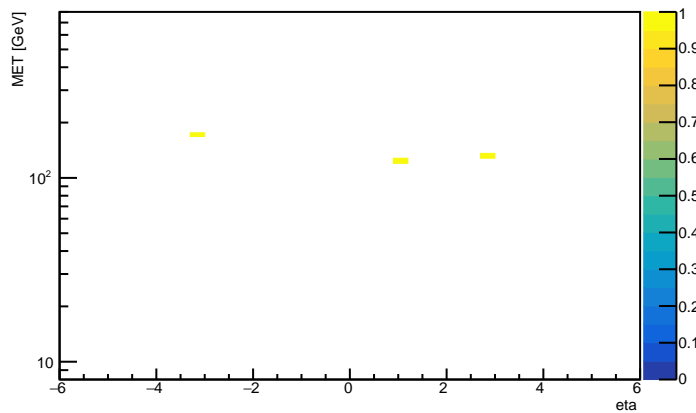
5 Gev (10%) cttau 1mm gen leading Met eta vs pt: n\_jet >=1, j1pt > 30 GeV



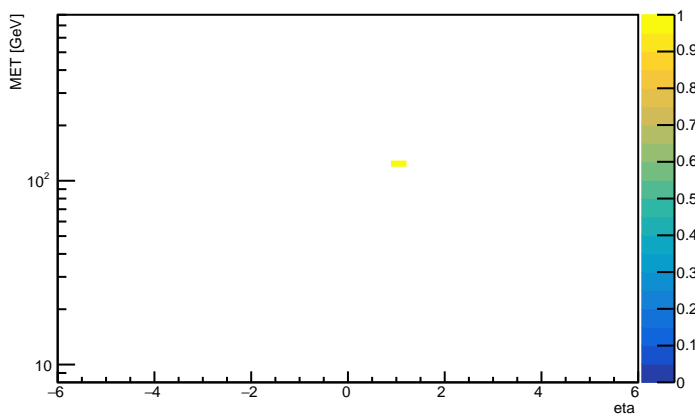
5 Gev (10%) cttau 1mm gen leading Met eta vs pt: MET > 120 GeV



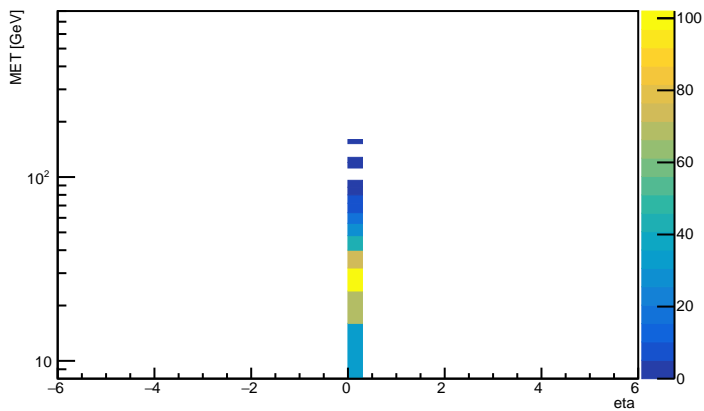
5 Gev (10%) cttau 1mm gen leading Met eta vs pt: j1pt >120, at most 2 jets w/ pt >30 GeV



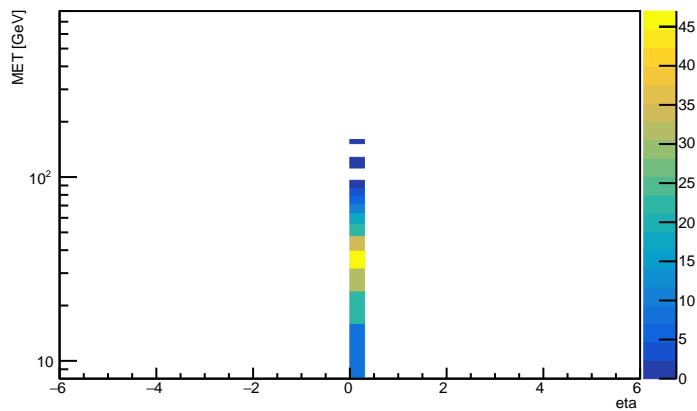
5 Gev (10%) cttau 1mm gen leading Met eta vs pt: at least 2 mu w/ vx>740 cm, |vz|<960cm & |eta|<2.4



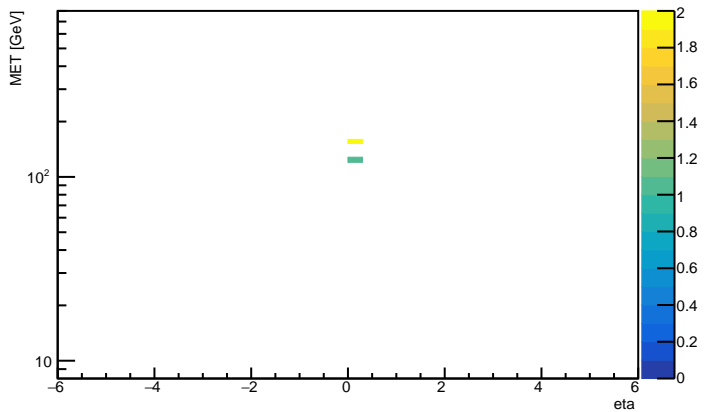
5 Gev (10%) ctau 1mm reco leading Met eta vs pt: no cuts



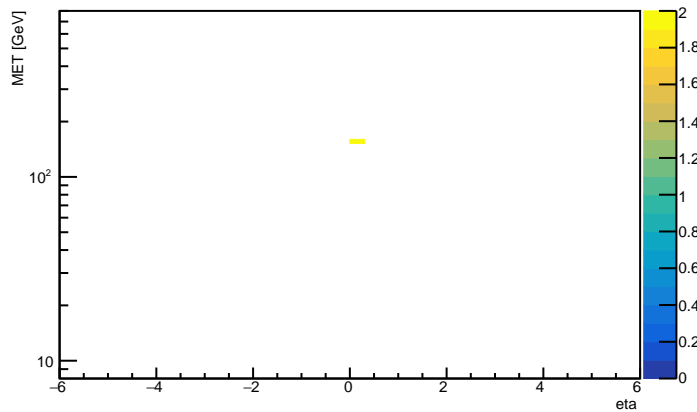
5 Gev (10%) ctau 1mm reco leading Met eta vs pt: n\_jet &gt;=1, j1 pt &gt; 30 GeV



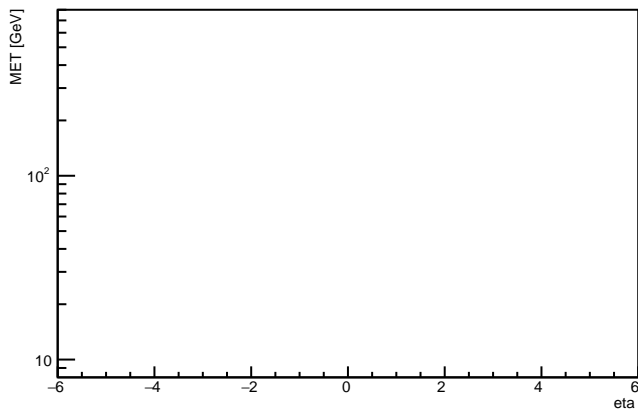
5 Gev (10%) ctau 1mm reco leading Met eta vs pt: MET &gt; 120 GeV



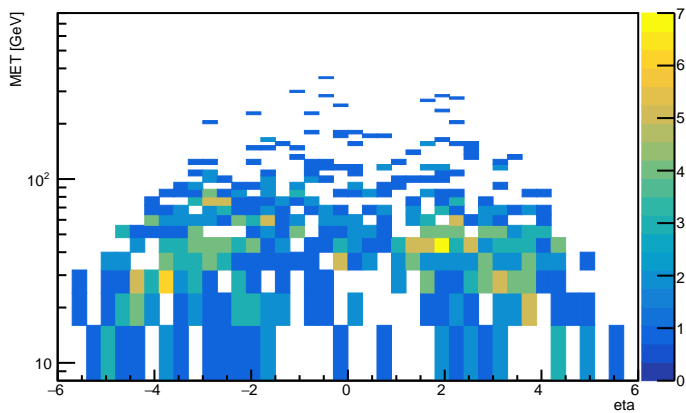
5 Gev (10%) ctau 1mm reco leading Met eta vs pt: j1 pt &gt;120, at most 2 jets w/ pt &gt;30 GeV



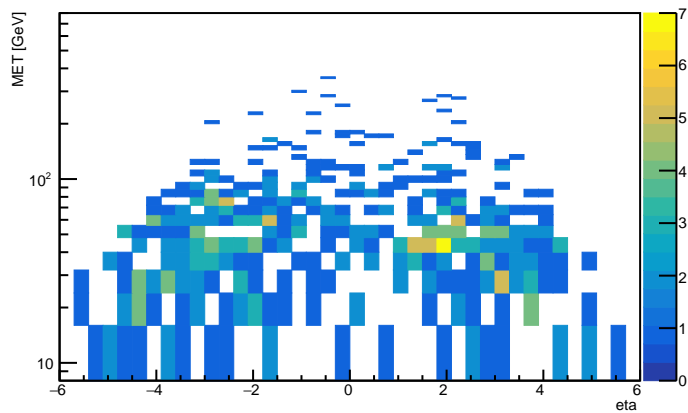
5 Gev (10%) ctau 1mm reco leading Met eta vs pt: at least 2 mu w/ vx &lt; 740 cm, |vz| &lt; 960 cm &amp; |eta| &lt; 2.4



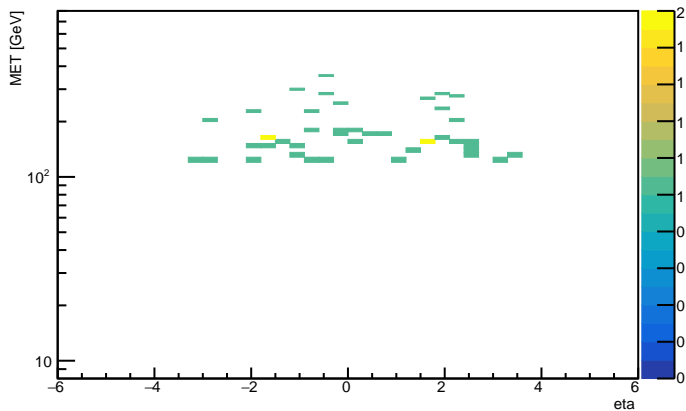
50 GeV (40%) ctau 1mm gen leading Met eta vs pt: no cuts



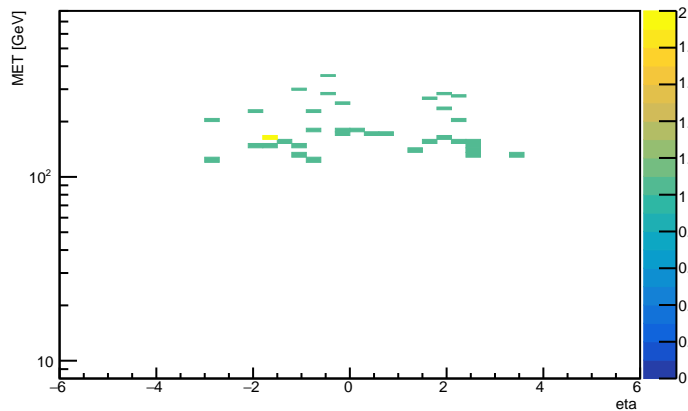
50 GeV (40%) ctau 1mm gen leading Met eta vs pt: n\_jet &gt;= 1, j1pt &gt; 30 GeV



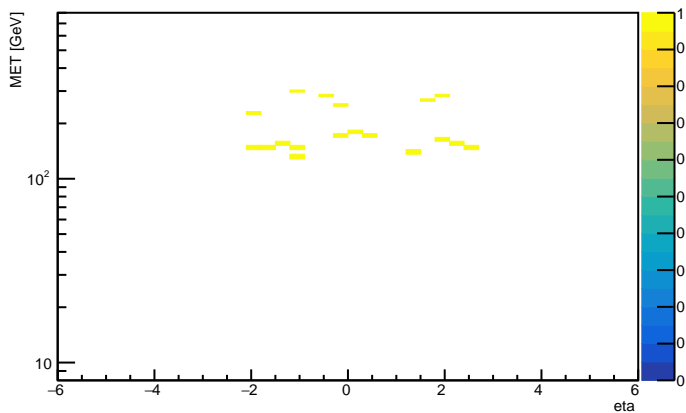
50 GeV (40%) ctau 1mm gen leading Met eta vs pt: MET &gt; 120 GeV



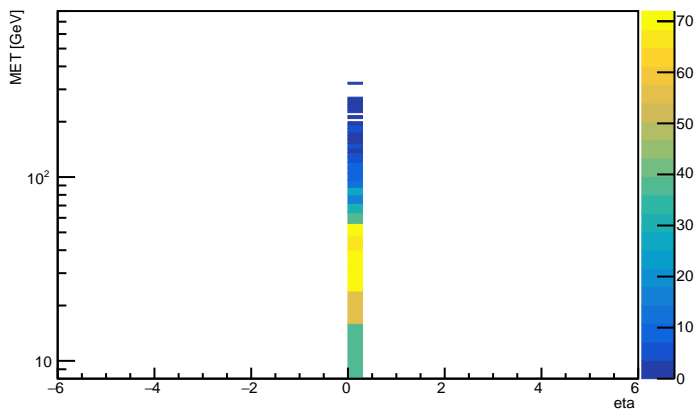
50 GeV (40%) ctau 1mm gen leading Met eta vs pt: j1pt &gt; 120, at most 2 jets w/ pt &gt; 30 GeV



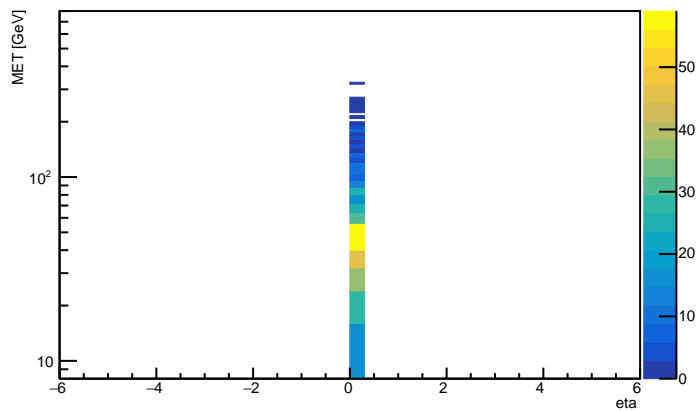
50 GeV (40%) ctau 1mm gen leading Met eta vs pt: at least 2 mu w/ vxy &lt; 740 cm, |vz| &lt; 960 cm &amp; |eta| &lt; 2.4



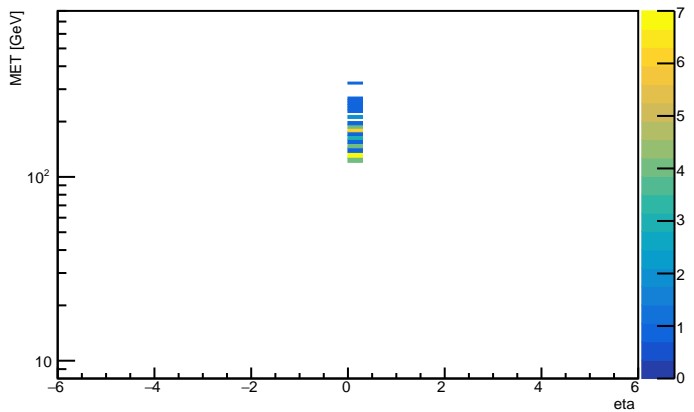
50 GeV (40%) ctau 1mm reco leading Met eta vs pt: no cuts



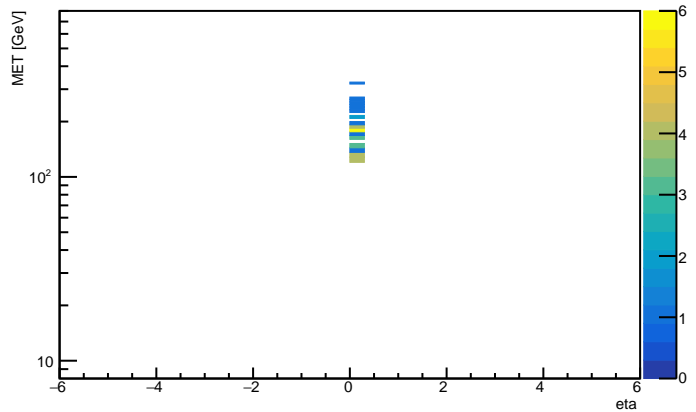
50 GeV (40%) ctau 1mm reco leading Met eta vs pt:  $n_{\text{jet}} \geq 1$ ,  $j1pt > 30$  GeV



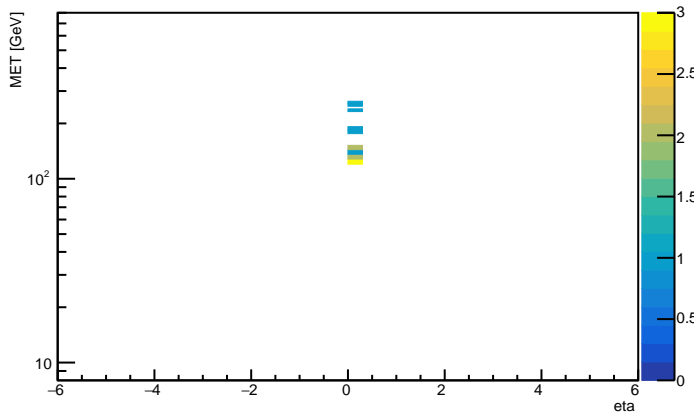
50 GeV (40%) ctau 1mm reco leading Met eta vs pt:  $MET > 120$  GeV



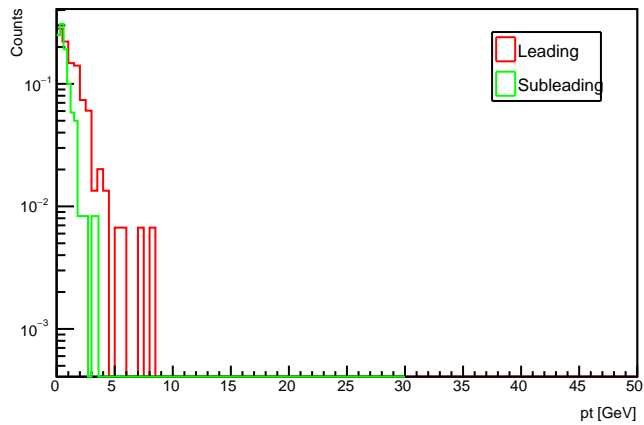
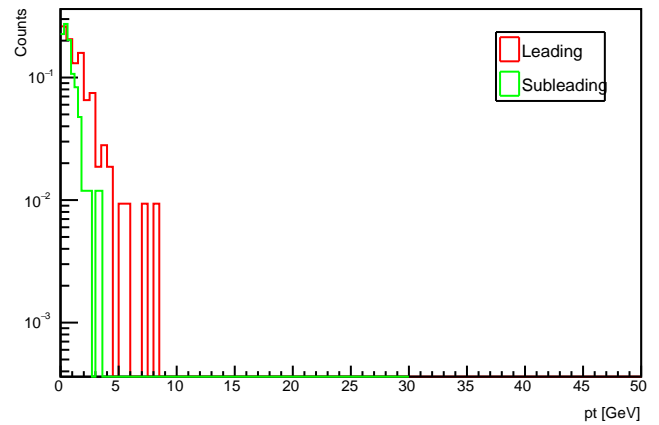
50 GeV (40%) ctau 1mm reco leading Met eta vs pt:  $j1pt > 120$ , at most 2 jets w/  $pt > 30$  GeV



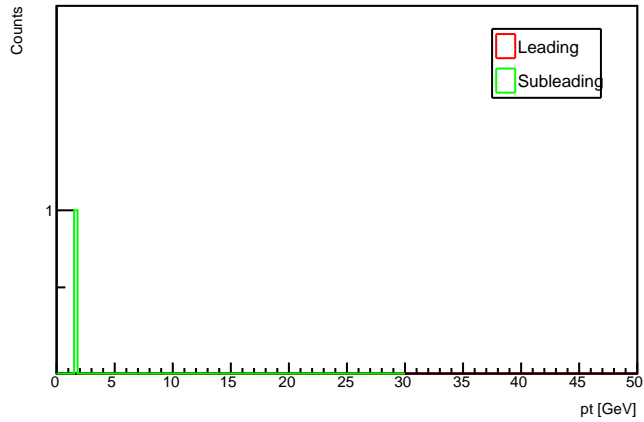
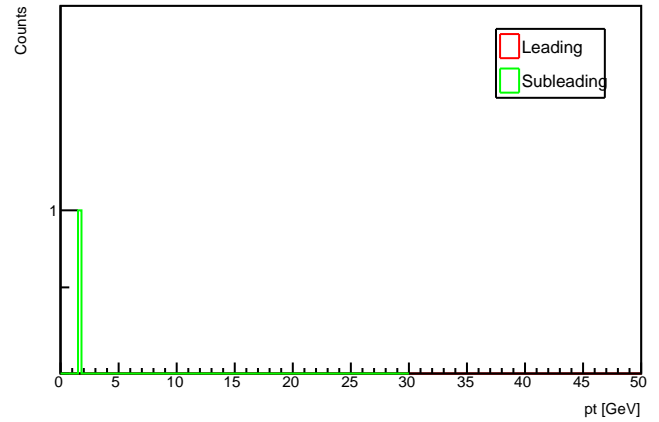
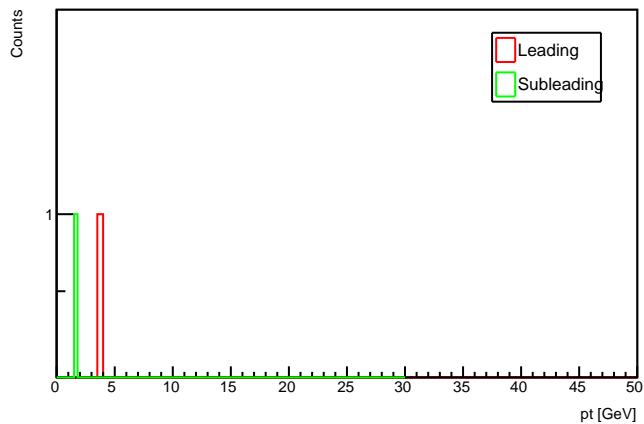
50 GeV (40%) ctau 1mm reco leading Met eta vs pt: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_{z1}| < 960$  cm &  $|eta| < 2.4$



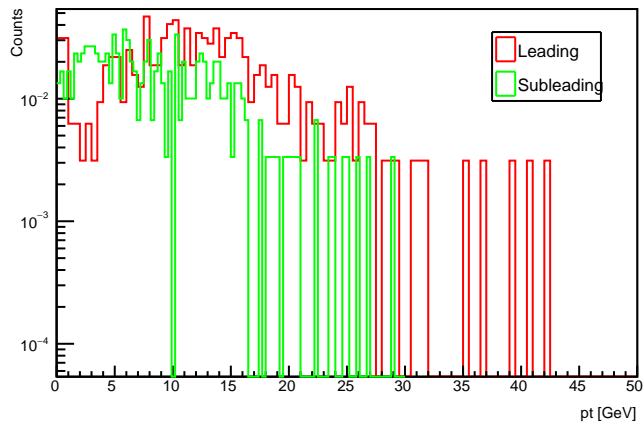
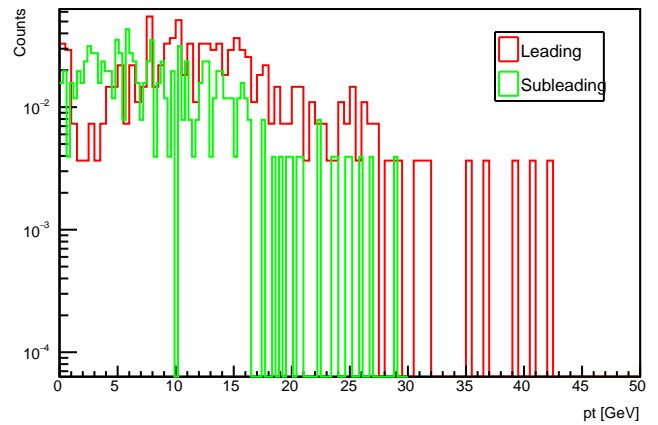
5 Gev (10%) leading vs subleading Mu pt: no cuts

5 Gev (10%) leading vs subleading Mu pt:  $n_{\text{jet}} \geq 1$ ,  $j1pt > 30$  GeV

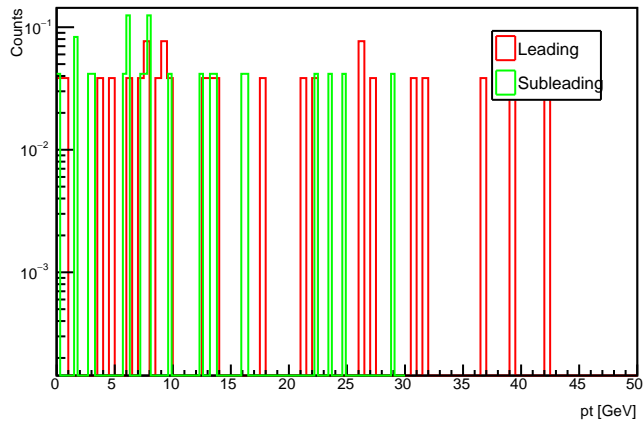
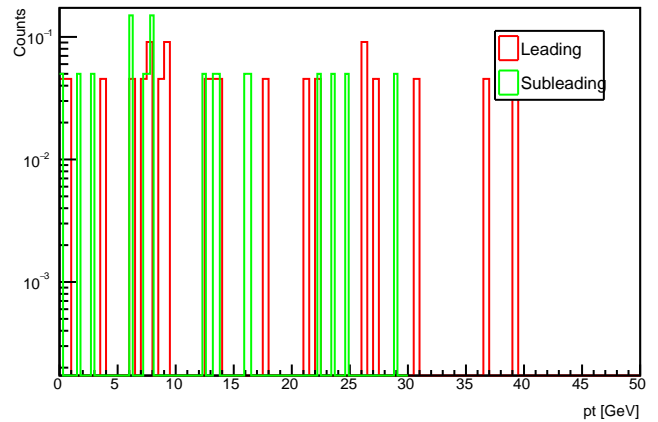
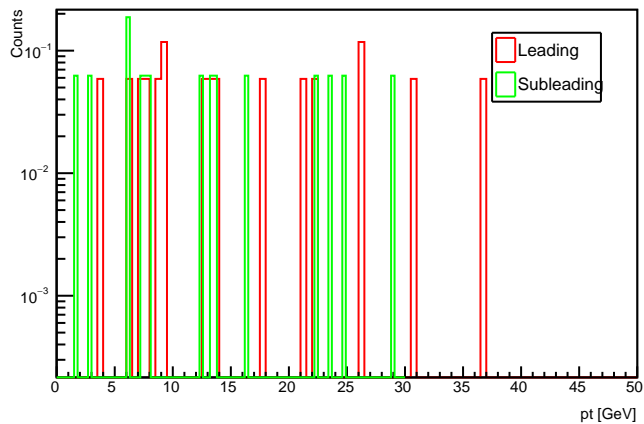
5 Gev (10%) leading vs subleading Mu pt: MET &gt; 120 GeV

5 Gev (10%) leading vs subleading Mu pt:  $j1pt > 120$ , at most 2 jets w/  $pt > 30$  GeV5 Gev (10%) leading vs subleading Mu pt: at least 2 mu w/  $v_{xy} < 740$  cm,  $|v_z| < 960$  cm &  $|\eta| < 2.4$ 

50 GeV (40%) leading vs subleading Mu pt: no cuts

50 GeV (40%) leading vs subleading Mu pt:  $n_{\text{jet}} \geq 1$ ,  $j_1 \text{pt} > 30 \text{ GeV}$ 

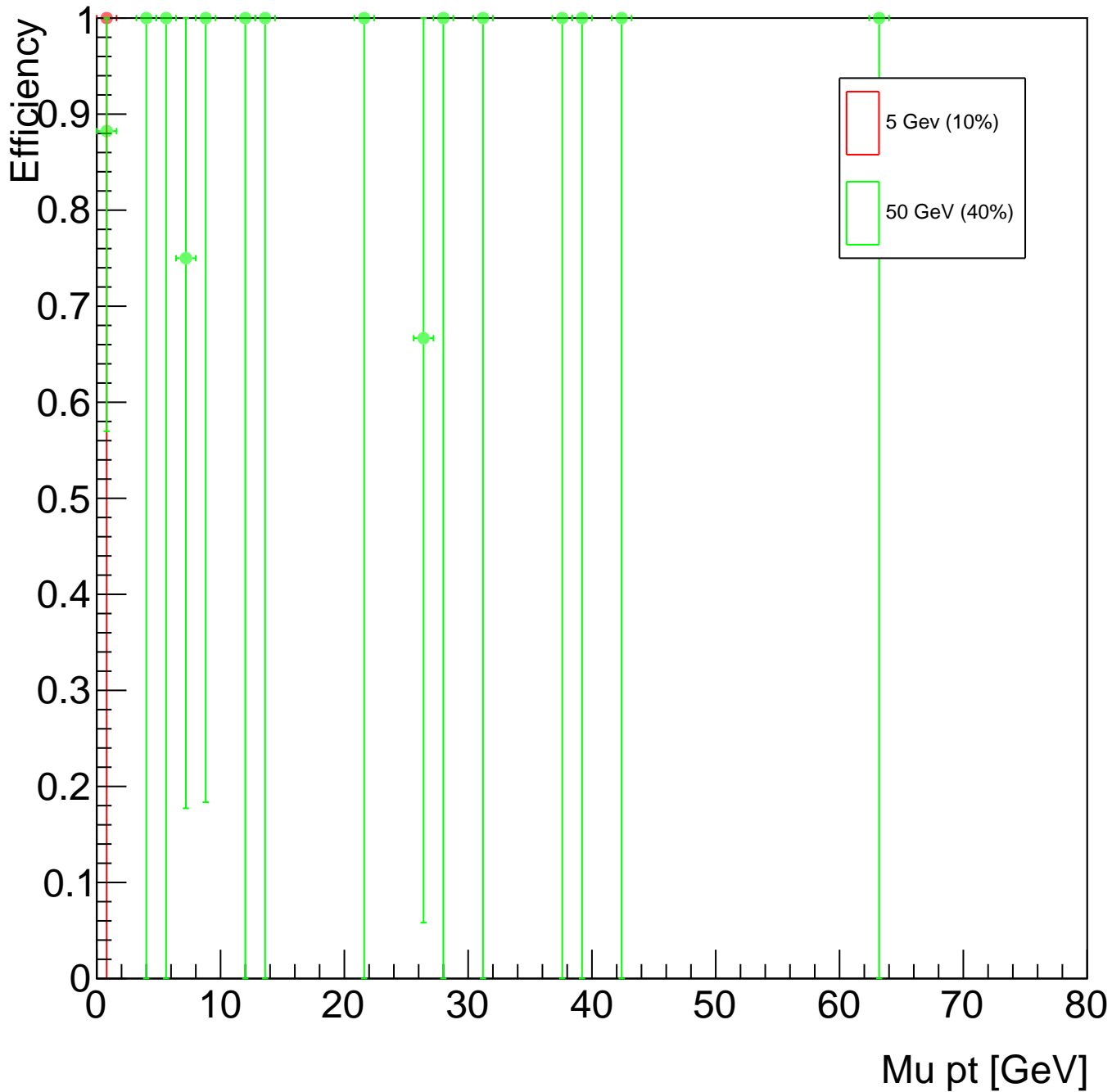
50 GeV (40%) leading vs subleading Mu pt: MET &gt; 120 GeV

50 GeV (40%) leading vs subleading Mu pt:  $j_1 \text{pt} > 120$ , at most 2 jets w/  $\text{pt} > 30 \text{ GeV}$ 50 GeV (40%) leading vs subleading Mu pt: at least 2 mu w/  $v_{xy} < 740 \text{ cm}$ ,  $|v_z| < 960 \text{ cm}$  &  $|\eta_a| < 2.4$ 

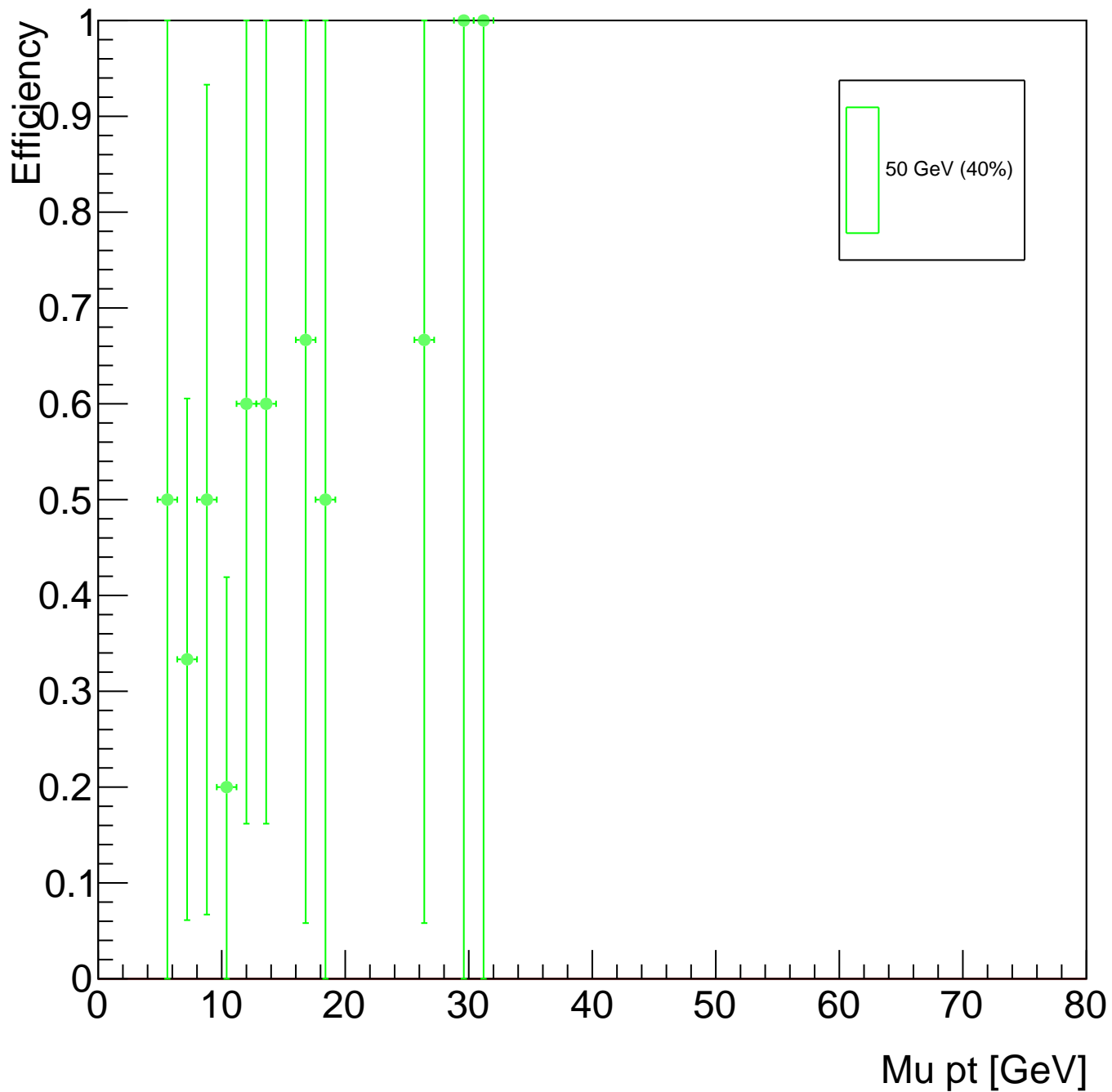
**efficiencies**



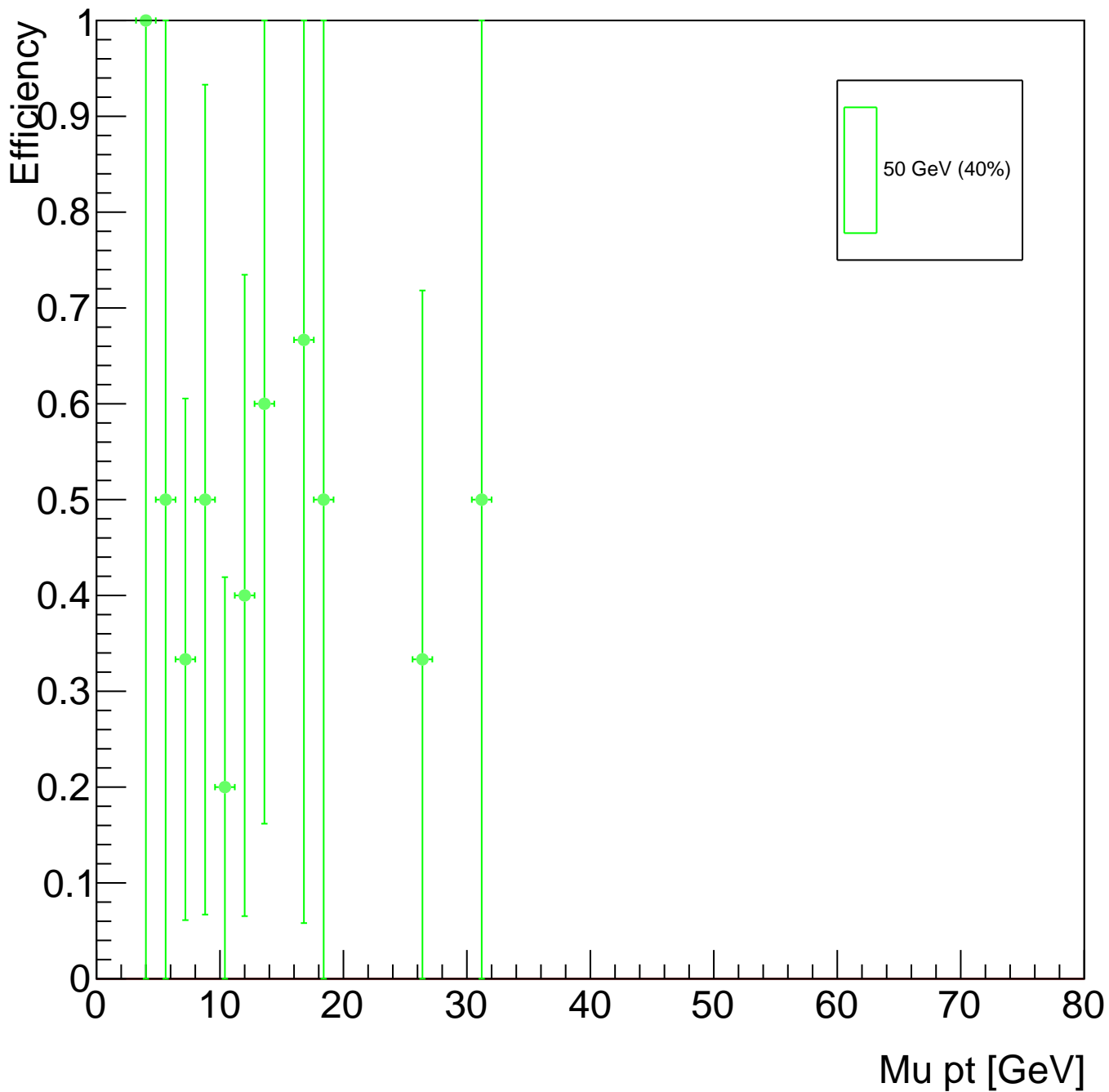
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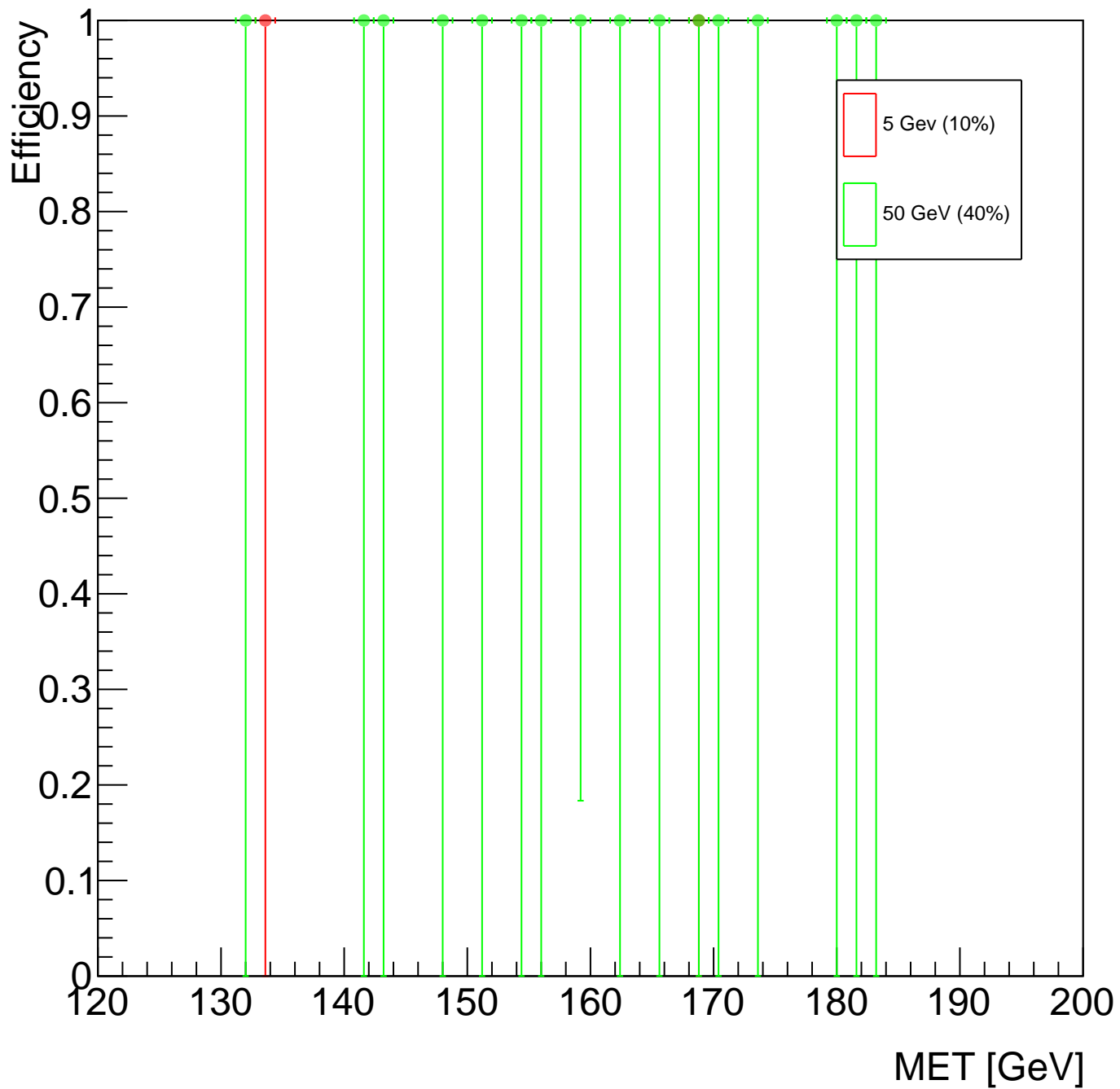
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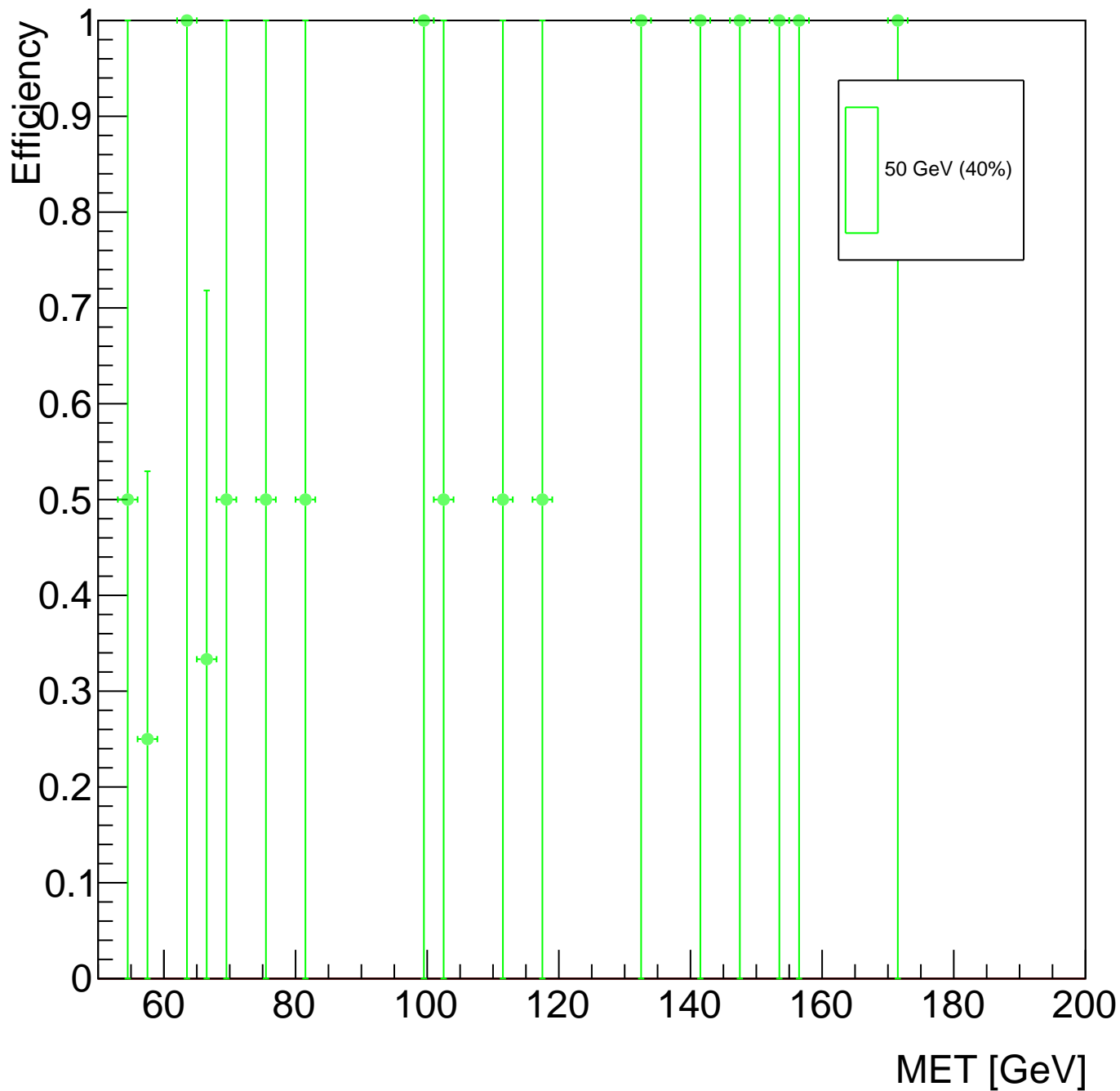
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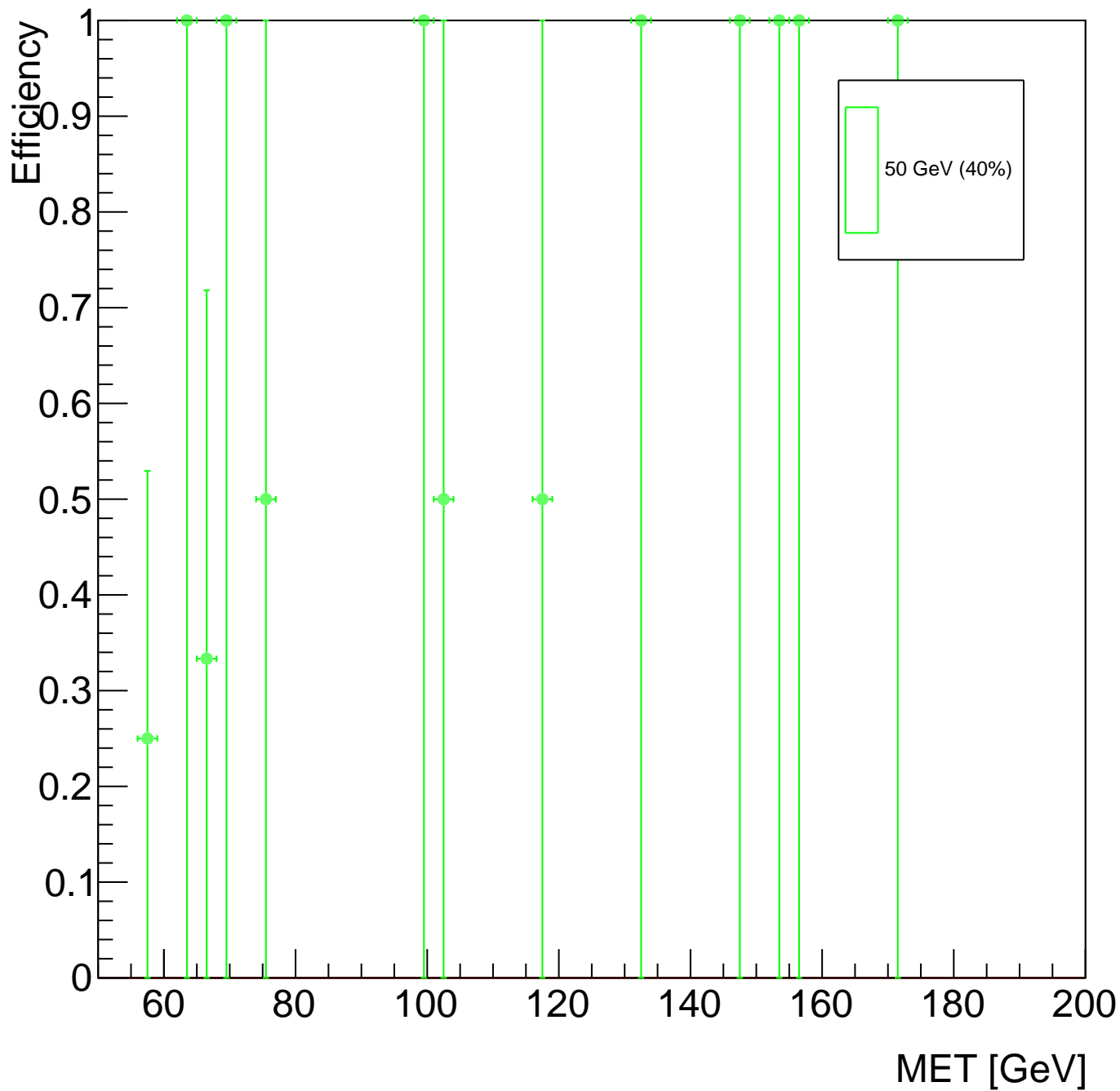
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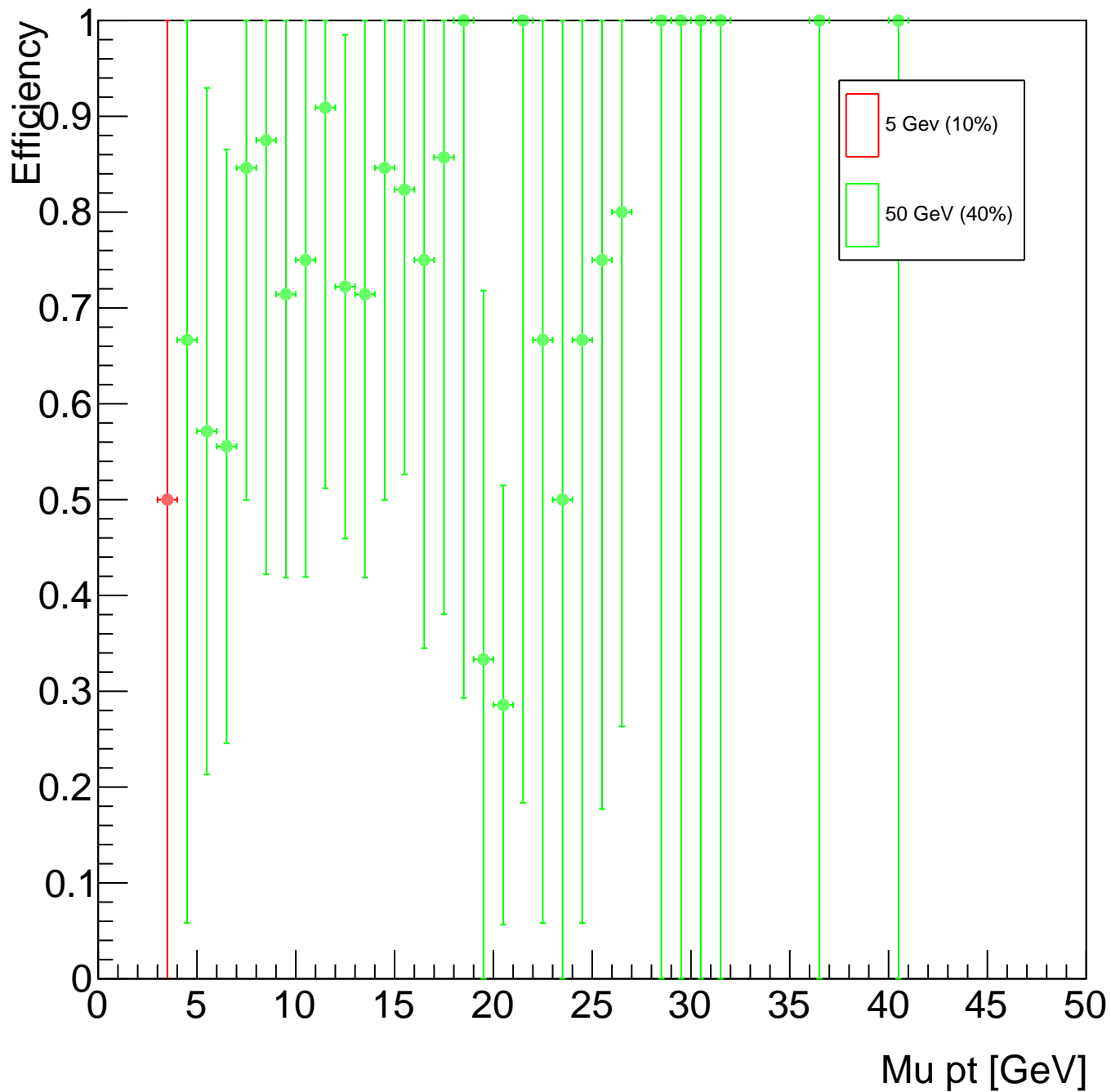
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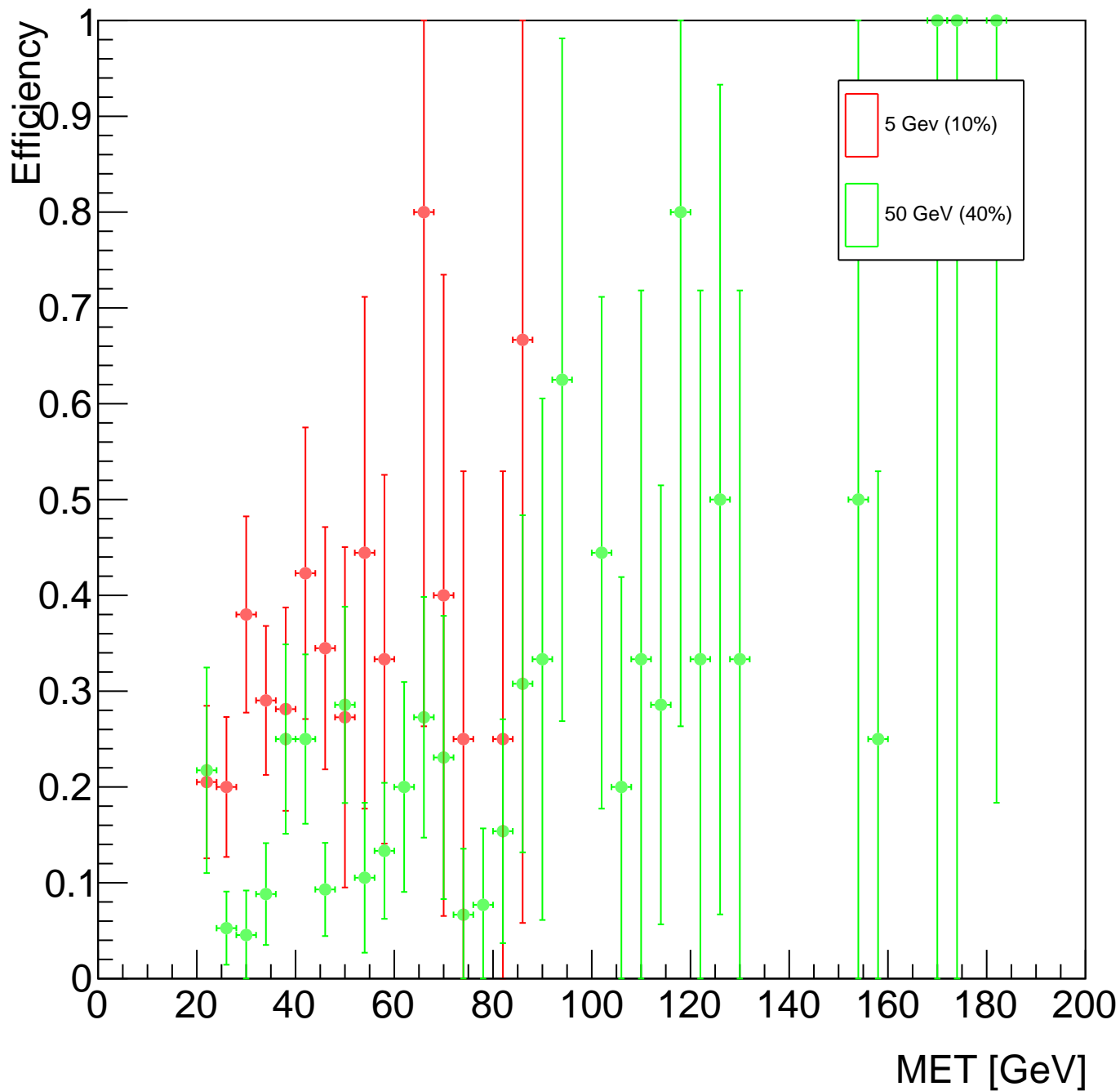
trigefficiency HLT\_DoubleMu3\_DZ\_PFMET50\_PFMHT60



# recoefficiency mu



# recoefficiency met





# recoefficiency met

