

WWtt vs. WWII

Data comparison of the match
and for the variables
 ΔR , pdgId, η and pT

Explanation of the variables

- bGenPart = best-GenPart-child for the final state quark
 - bGenJet = closest GenJet for the bGenPart
 - bJet = closest Jet for the bGenJet
-
- Weak match = ($\Delta R < 0.4$ match) for $b\text{GenPart} \rightarrow b\text{GenJet}$
 - Strong match = ($\Delta R < 0.4$ match) for $b\text{GenJet} \rightarrow b\text{Jet}$

WWtt stats for the weak and strong match

- Weak match success rate: 0.993
- Strong match success rate: 0.986

```
-----  
Statistics of 49769 events with deltaRmax = 0.4:  
-----  
# particles/event:  
  
= 2: 1.0  
1: 0.0  
0: 0.0  
  
# all particles  
= 99538  
-----  
in weak match  
= 2: 0.985  
1: 0.015  
0: 0.0  
  
# weak matched particles / # all particles  
= 98810/99538 = 0.993  
-----  
and strong match  
= 2: 0.973  
1: 0.027  
0: 0.0  
  
# strong matched particles / # weak matched particles  
= 98193/98810 = 0.994  
# strong matched particles / # all particles  
= 98193/99538 = 0.986  
-----
```

WWtt stats with data filters

- The matching success rates improve these filters

statistics of 49769 events with deltaRmax = 0.4:

```
# particles/event with filter: detectable eta  
(|bGenPart_eta| < 5.1 && |bGenJet_eta| < 5.1)  
= 2: 0.998  
1: 0.002  
0: 0.0
```

```
# all filtered particles / # all particles  
= 99422/99538 = 0.999
```

```
in weak match  
= 2: 0.984  
1: 0.016  
0: 0.0
```

```
# weak matched particles / # all (filtered) particles  
= 98758/99422 = 0.993
```

```
and strong match  
= 2: 0.973  
1: 0.027  
0: 0.0
```

```
# strong matched particles / # weak matched particles  
= 98174/98758 = 0.994  
# strong matched particles / # all (filtered) particles  
= 98174/99422 = 0.987
```

statistics of 49769 events with deltaRmax = 0.4:

```
# particles/event with filter: detectable GenJets  
(bGenPart_pT > 10)  
= 2: 0.966  
1: 0.034  
0: 0.0
```

```
# all filtered particles / # all particles  
= 97825/99538 = 0.983
```

```
in weak match  
= 2: 0.965  
1: 0.035  
0: 0.0
```

```
# weak matched particles / # all (filtered) particles  
= 97794/97825 = 1.0
```

```
and strong match  
= 2: 0.958  
1: 0.042  
0: 0.0
```

```
# strong matched particles / # weak matched particles  
= 97444/97794 = 0.996  
# strong matched particles / # all (filtered) particles  
= 97444/97825 = 0.996
```

statistics of 49769 events with deltaRmax = 0.4:

```
# particles/event with filter: detectable GenJets and Jets  
(|bGenPart_eta| < 5.1 && |bGenJet_eta| < 5.1  
&& bGenPart_pT > 10 && bGenJet_pT > 15)  
= 2: 0.959  
1: 0.041  
0: 0.0
```

```
# all filtered particles / # all particles  
= 97489/99538 = 0.979
```

```
in weak match  
= 2: 0.959  
1: 0.041  
0: 0.0
```

```
# weak matched particles / # all (filtered) particles  
= 97463/97489 = 1.0
```

```
and strong match  
= 2: 0.955  
1: 0.045  
0: 0.0
```

```
# strong matched particles / # weak matched particles  
= 97291/97463 = 0.998  
# strong matched particles / # all (filtered) particles  
= 97291/97489 = 0.998
```

WWII stats for the weak and strong match

- Weak match success rate: 0.954
 - (WWtt: 0.993)
- Strong match success rate: 0.904
 - (WWtt : 0.986)

```
-----  
Statistics of 51512 events with deltaRmax = 0.4:  
-----  
# particles/event:  
  
= 2: 1.0  
1: 0.0  
0: 0.0  
  
# all particles  
= 103024  
-----  
in weak match  
= 2: 0.91  
1: 0.088  
0: 0.002  
  
# weak matched particles / # all particles  
= 98266/103024 = 0.954  
-----  
and strong match  
= 2: 0.819  
1: 0.17  
0: 0.011  
  
# strong matched particles / # weak matched particles  
= 93119/98266 = 0.948  
# strong matched particles / # all particles  
= 93119/103024 = 0.904  
-----
```

WWII stats with data filters

Statistics of 51512 events with deltaRmax = 0.4:

```
# particles/event with filter: detectable eta  
(|bGenPart_eta| < 5.1 && |bGenJet_eta| < 5.1)  
= 2: 0.931  
1: 0.067  
0: 0.002
```

```
# all filtered particles / # all particles  
= 99389/103024 = 0.965
```

```
in weak match  
= 2: 0.871  
1: 0.123  
0: 0.006
```

```
# weak matched particles / # all (filtered) particles  
= 96076/99389 = 0.967
```

```
and strong match  
= 2: 0.81  
1: 0.177  
0: 0.013
```

```
# strong matched particles / # weak matched particles  
= 92554/96076 = 0.963  
# strong matched particles / # all (filtered) particles  
= 92554/99389 = 0.931
```

Statistics of 51512 events with deltaRmax = 0.4:

```
# particles/event with filter: detectable GenJets  
(bGenPart_pT > 10)  
= 2: 0.817  
1: 0.173  
0: 0.01
```

```
# all filtered particles / # all particles  
= 93082/103024 = 0.903
```

```
in weak match  
= 2: 0.813  
1: 0.176  
0: 0.011
```

```
# weak matched particles / # all (filtered) particles  
= 92836/93082 = 0.997
```

```
and strong match  
= 2: 0.762  
1: 0.218  
0: 0.02
```

```
# strong matched particles / # weak matched particles  
= 89774/92836 = 0.967  
# strong matched particles / # all (filtered) particles  
= 89774/93082 = 0.964
```

Statistics of 51512 events with deltaRmax = 0.4:

```
# particles/event with filter: detectable GenJets and Jets  
(|bGenPart_eta| < 5.1 && |bGenJet_eta| < 5.1  
&& bGenPart_pT > 10 && bGenJet_pT > 15)  
= 2: 0.766  
1: 0.214  
0: 0.02
```

```
# all filtered particles / # all particles  
= 89949/103024 = 0.873
```

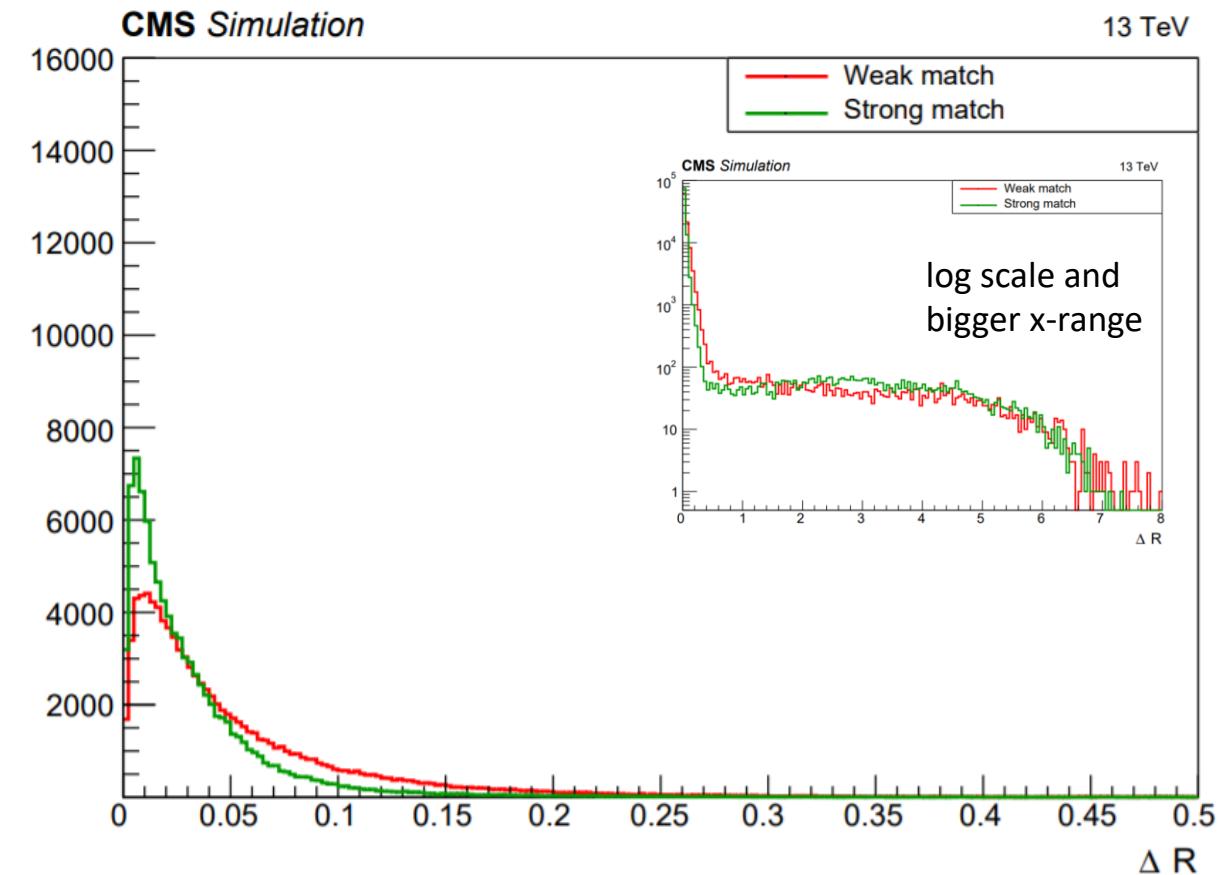
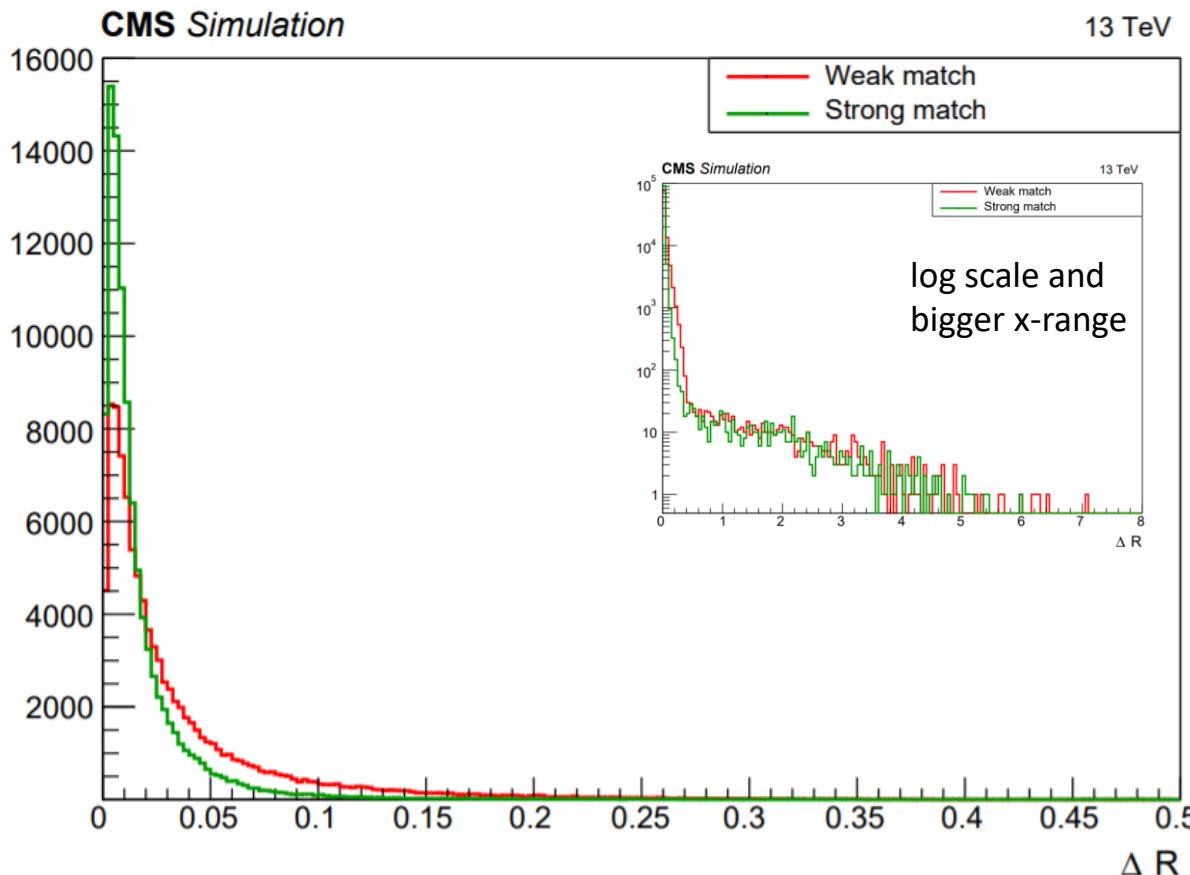
```
in weak match  
= 2: 0.764  
1: 0.216  
0: 0.02
```

```
# weak matched particles / # all (filtered) particles  
= 89819/89949 = 0.999
```

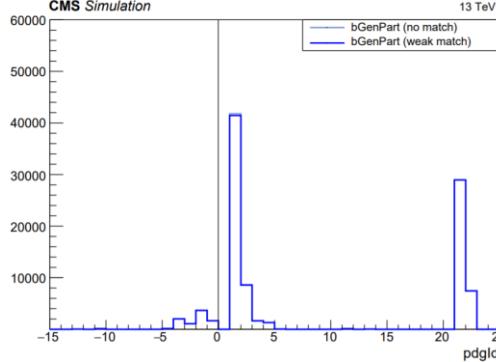
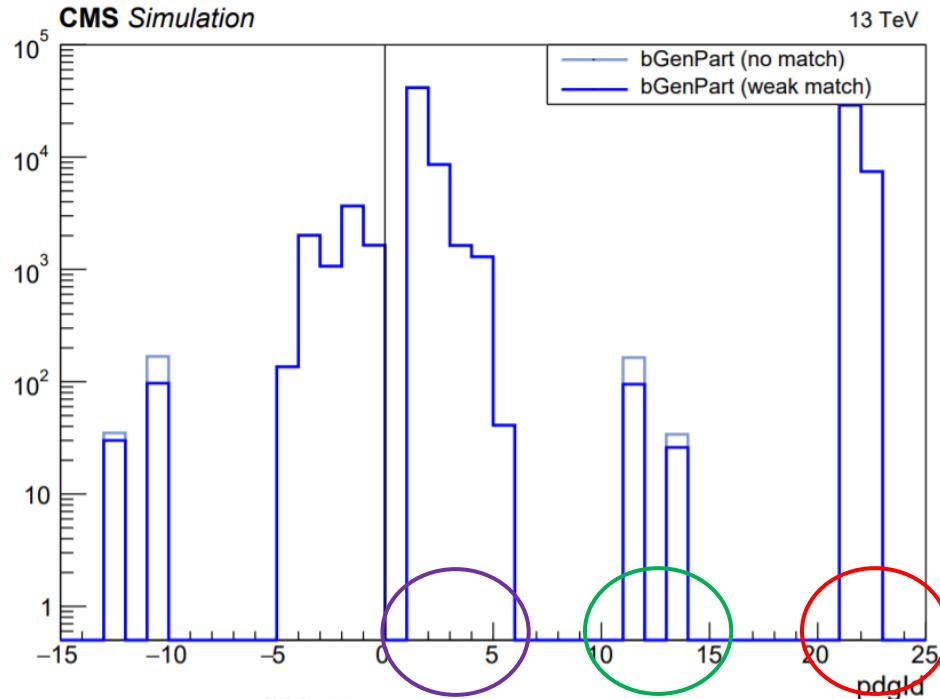
```
and strong match  
= 2: 0.746  
1: 0.231  
0: 0.023
```

```
# strong matched particles / # weak matched particles  
= 88737/89819 = 0.988  
# strong matched particles / # all (filtered) particles  
= 88737/89949 = 0.987
```

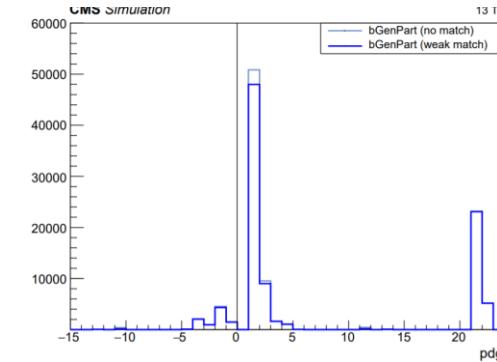
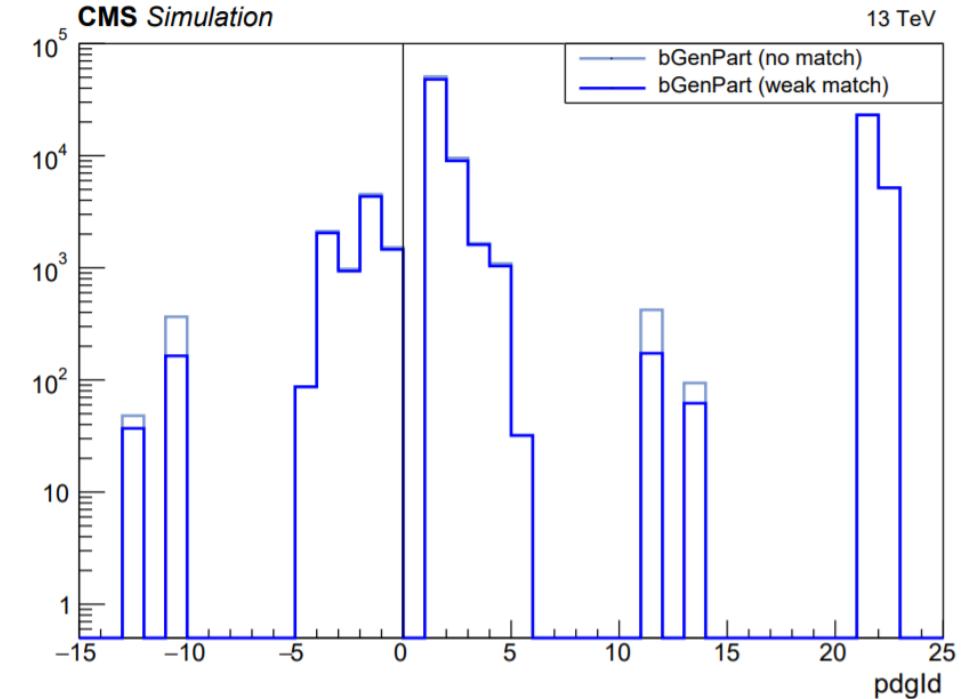
ΔR comparison (WW $t\bar{t}$ vs. WW $l\bar{l}$)



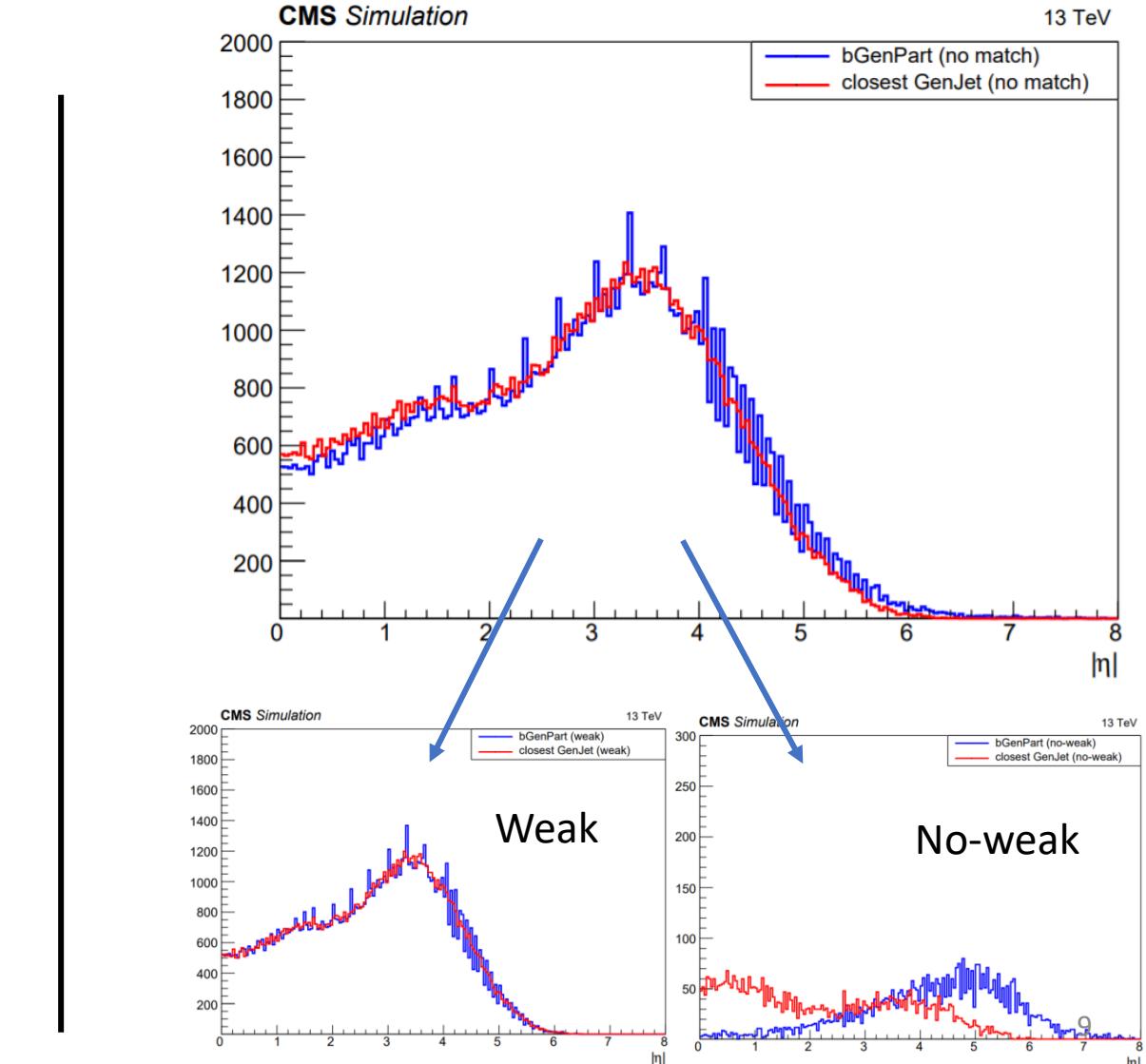
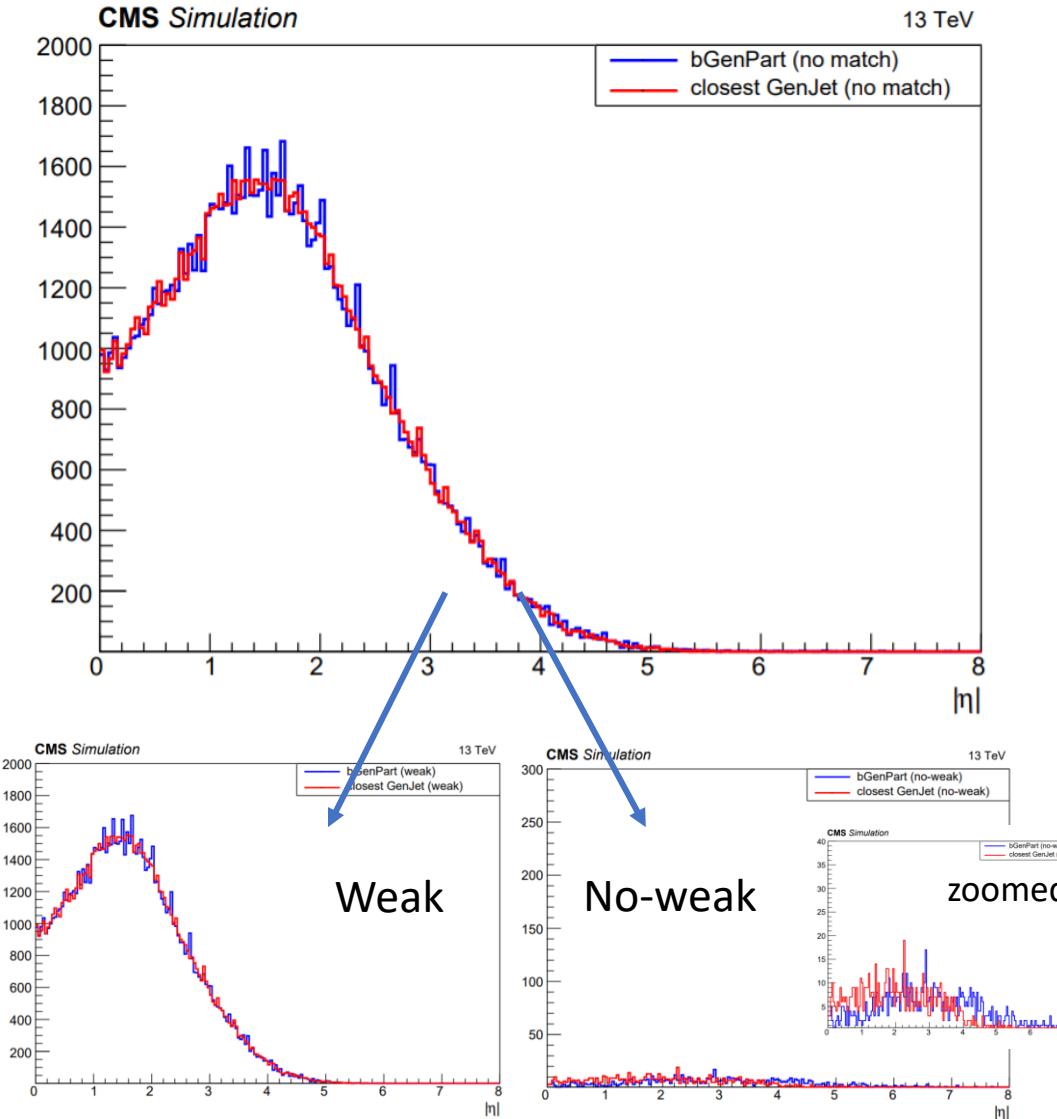
PdgId comparison (WWtt vs. WWll)



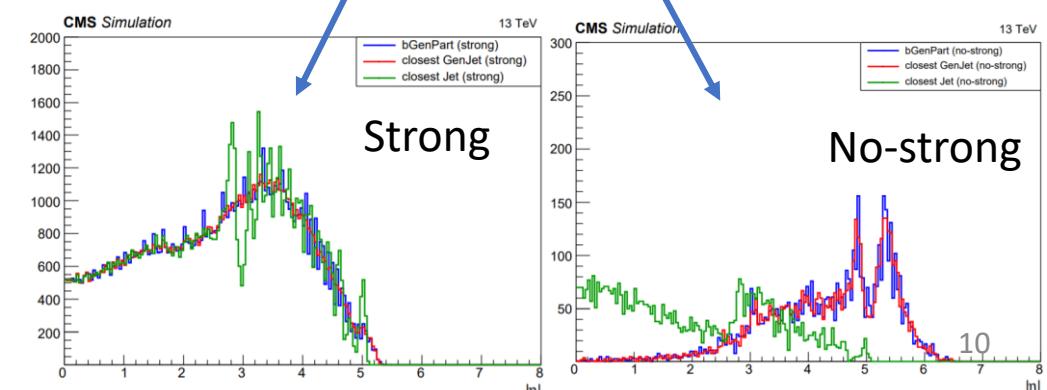
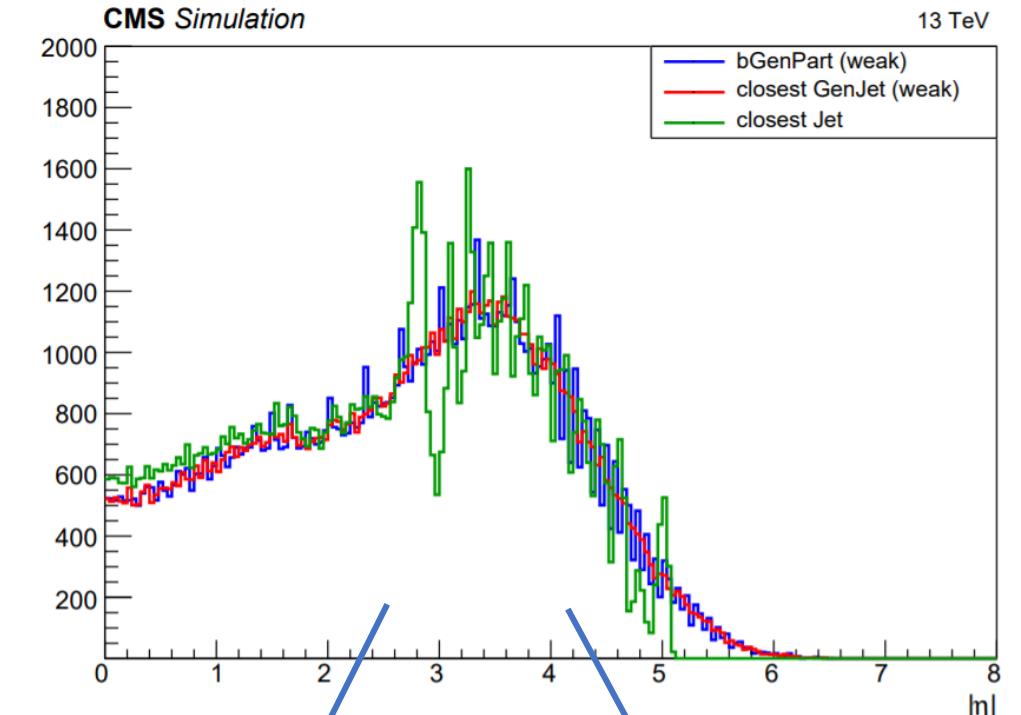
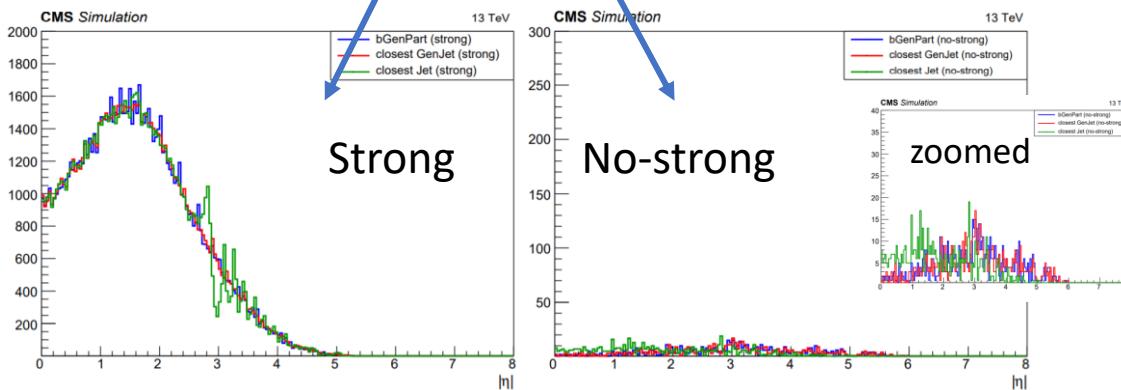
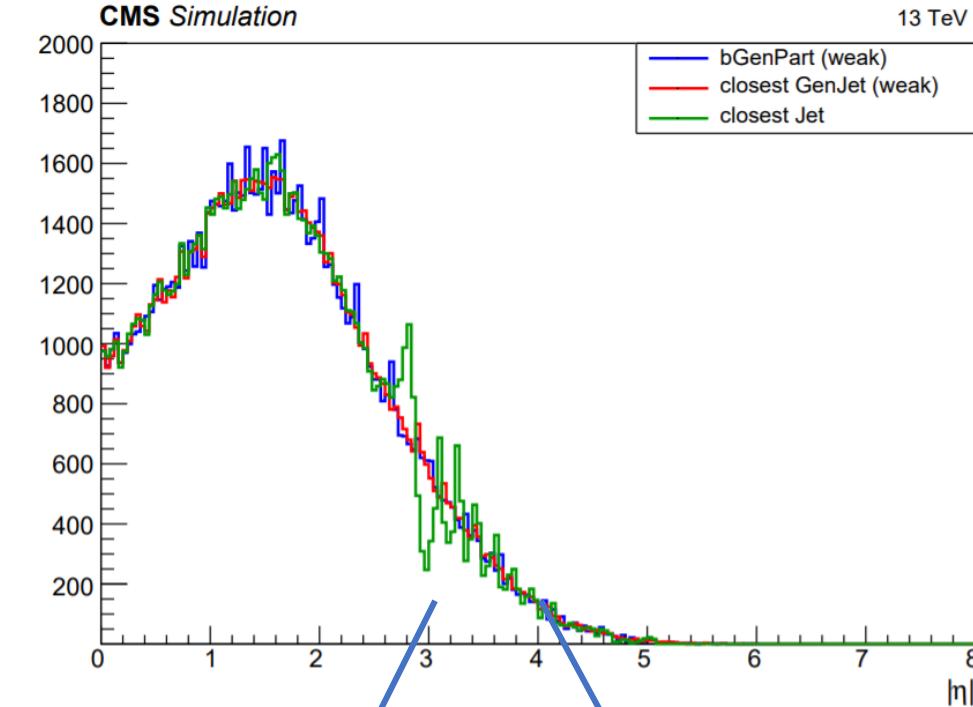
d, u, s, c, b quarks,
electrons, muons
gluons and photons



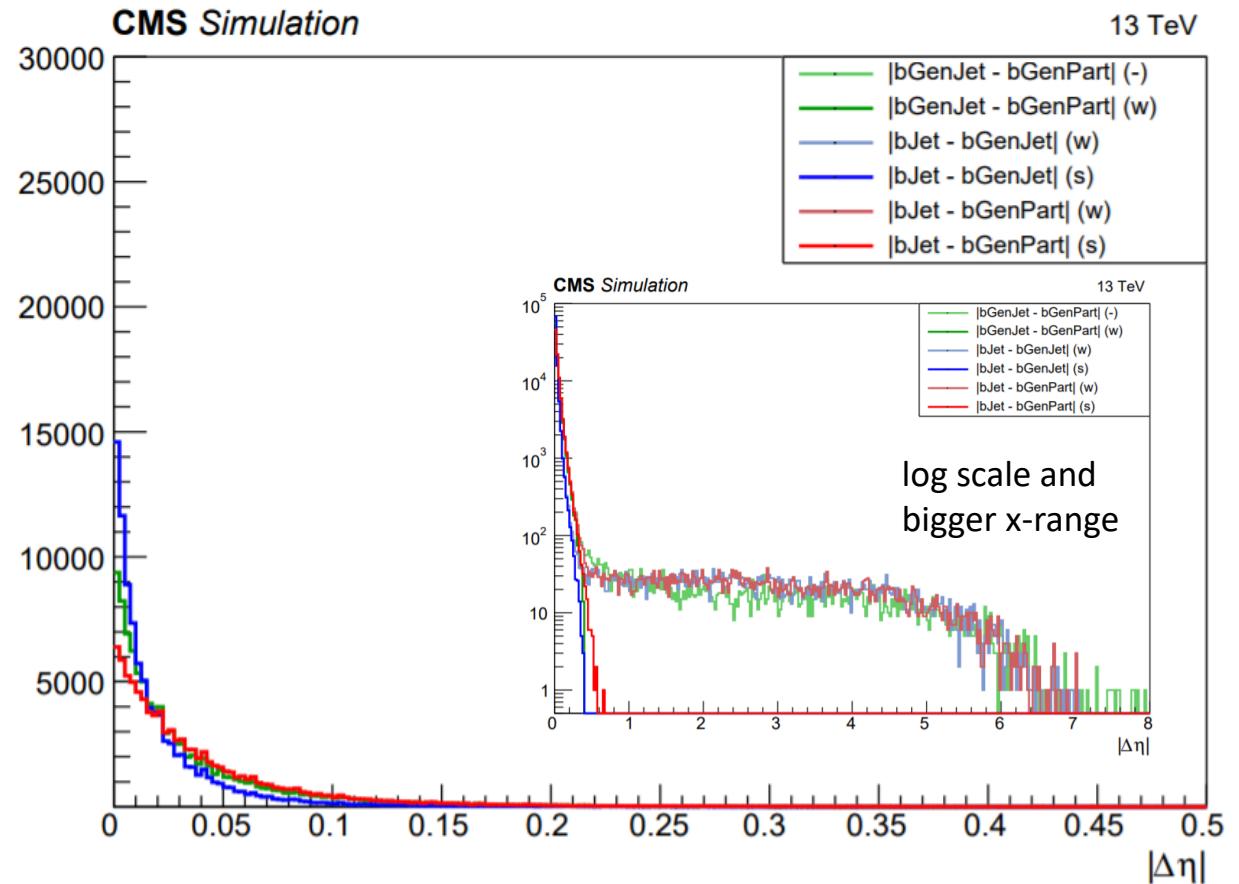
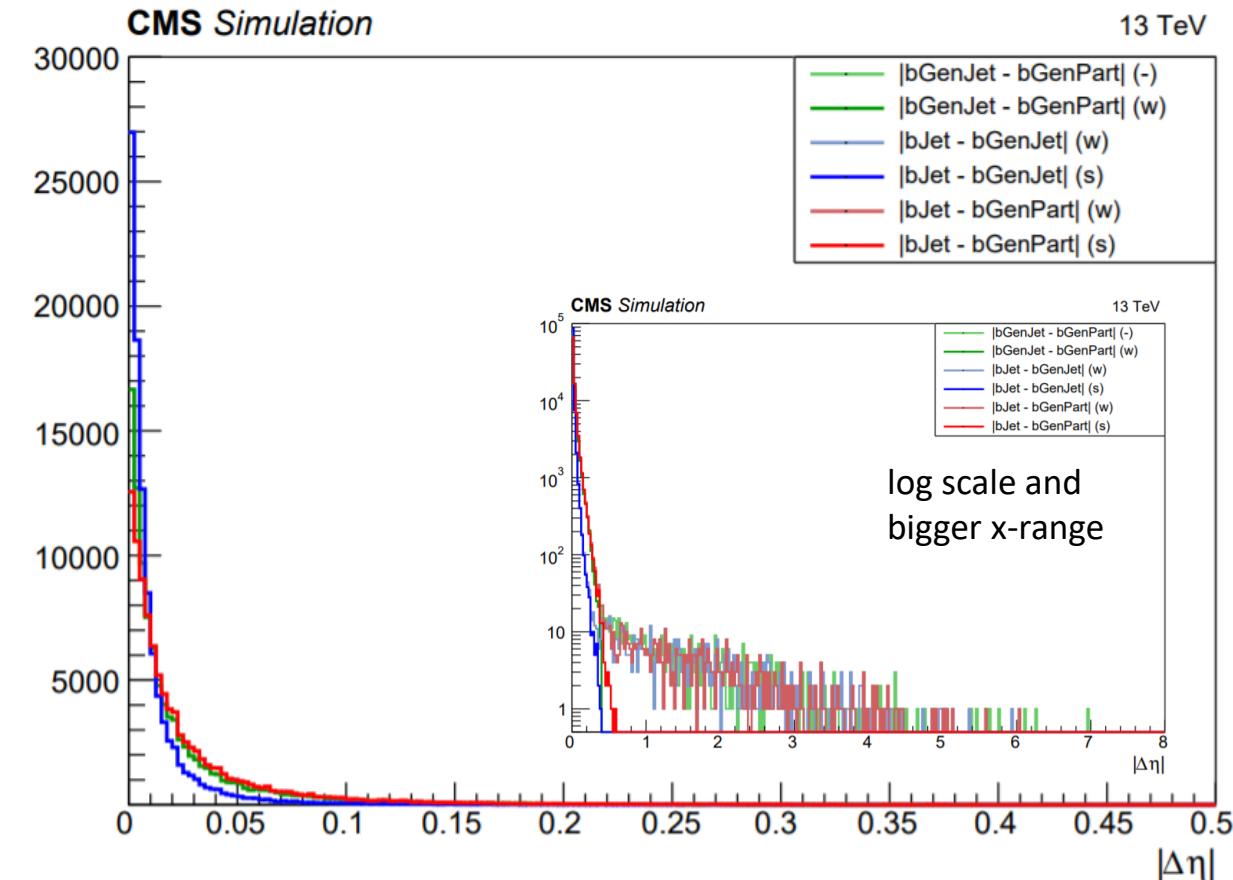
η comp. WEAK MATCH (WW $t\bar{t}$ vs. WW ll)



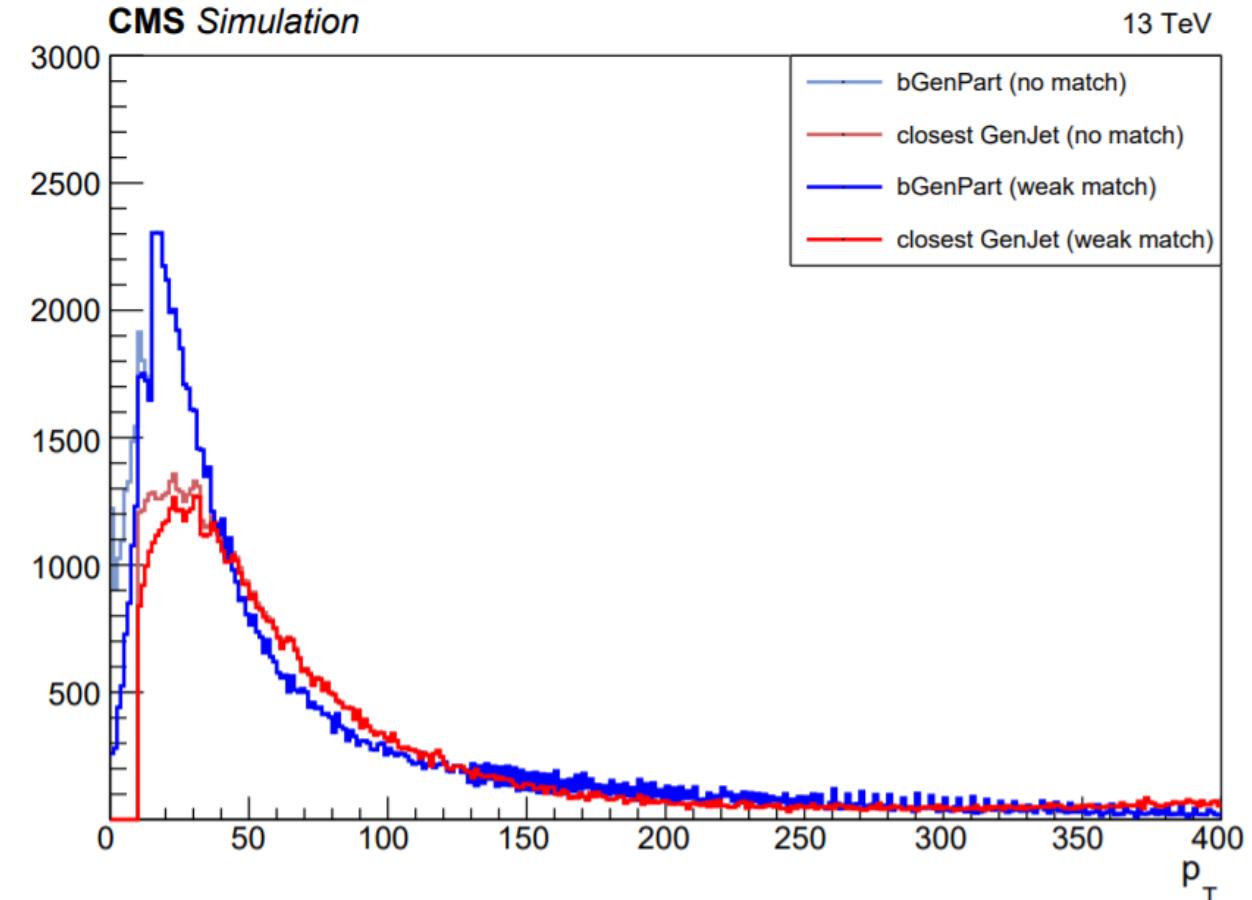
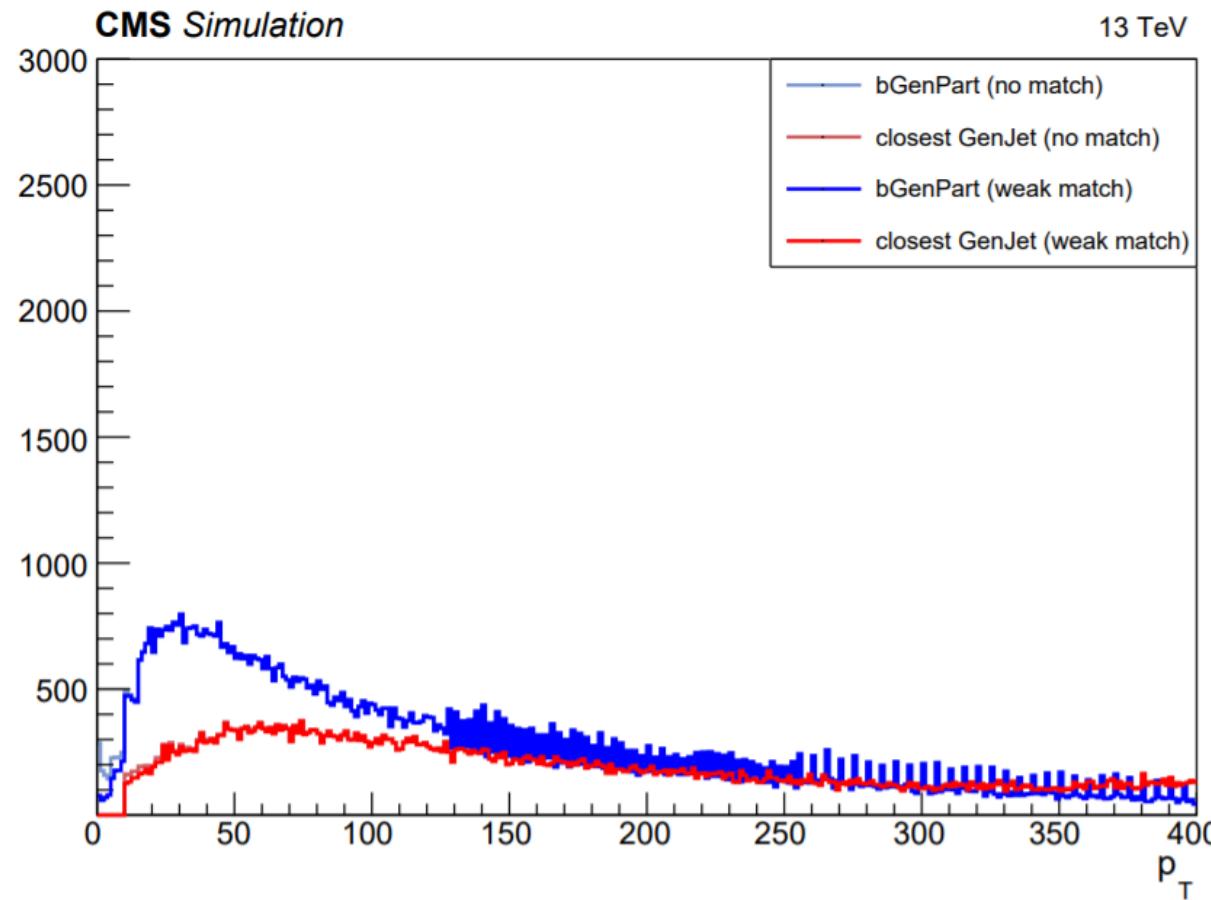
η comp. STRONG MATCH (WW $t\bar{t}$ vs. WWII)



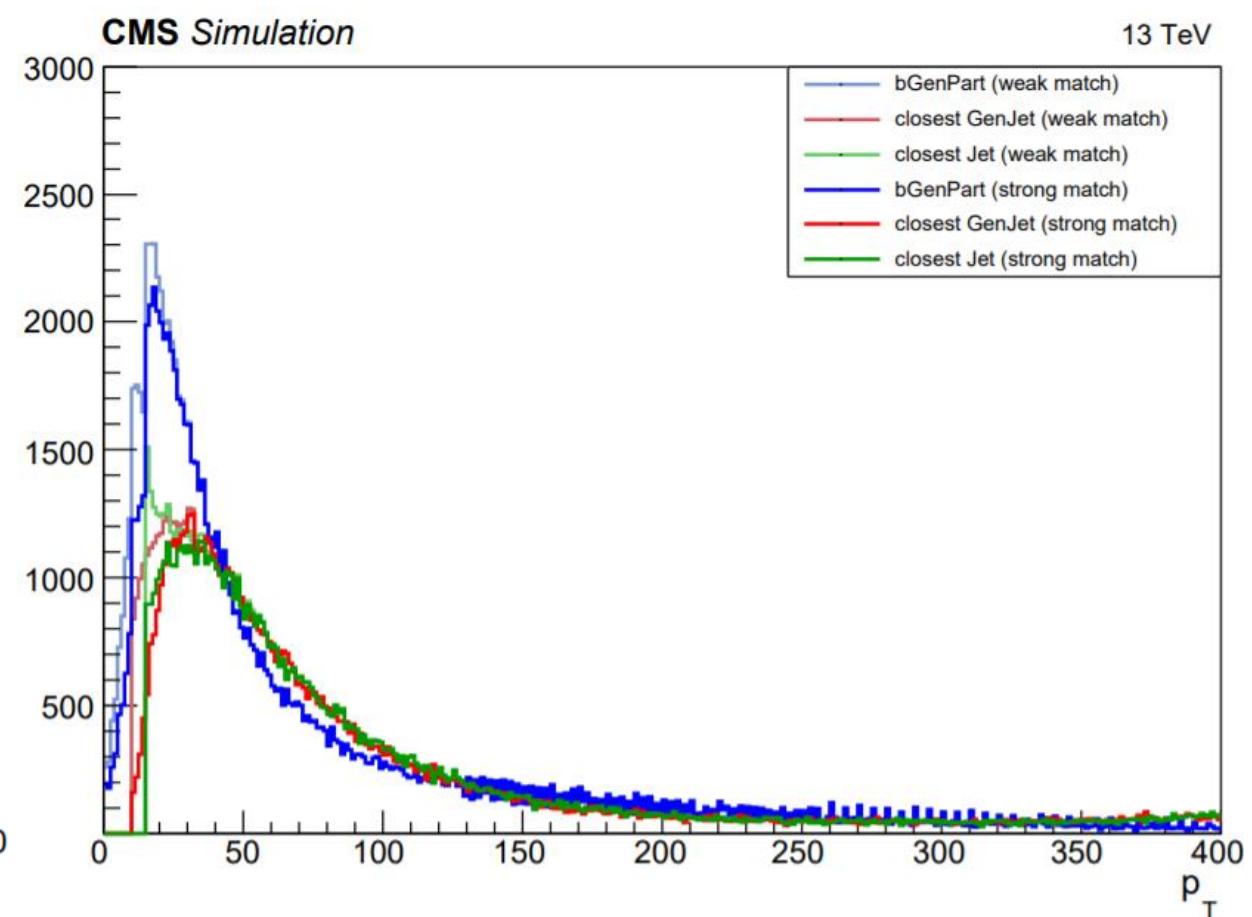
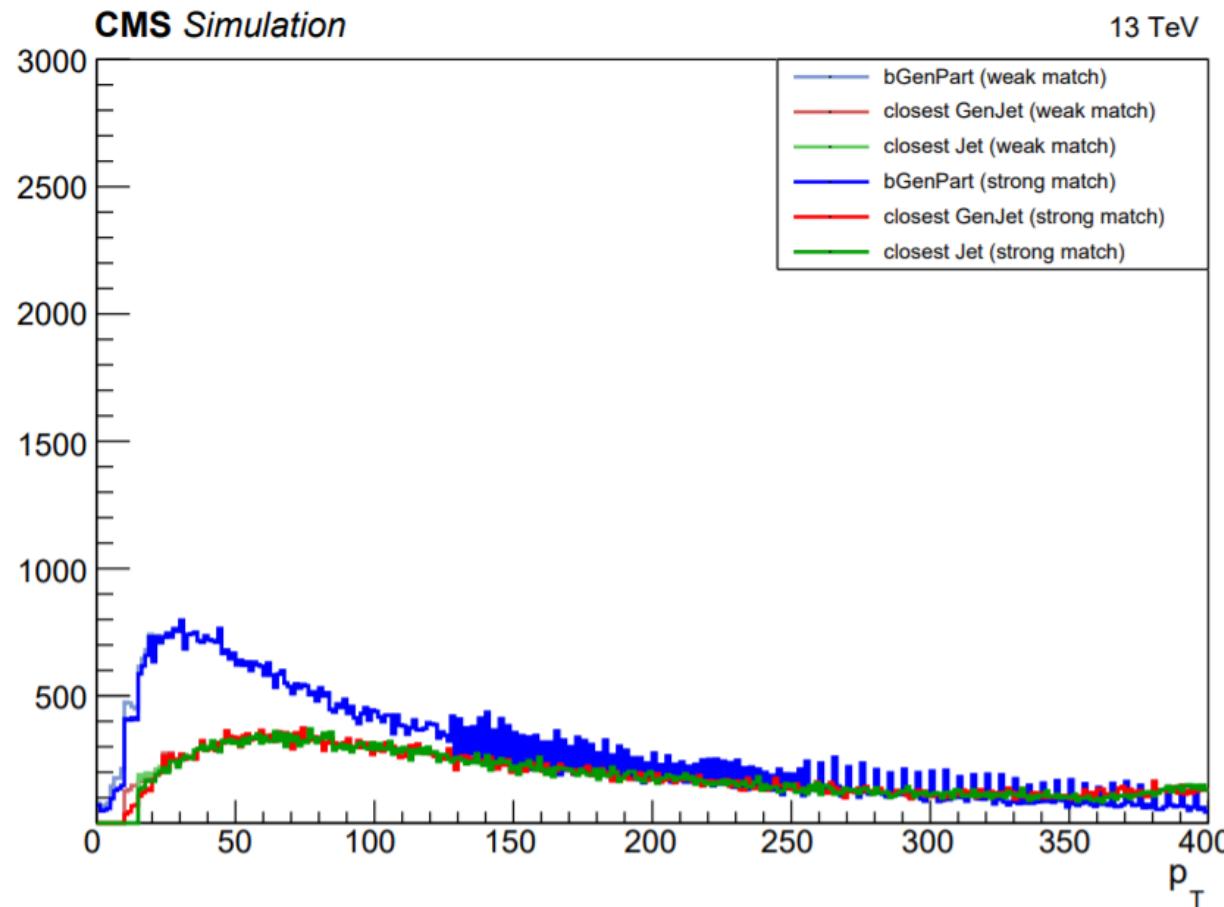
$|\Delta\eta|$ comparison (WW $t\bar{t}$ vs. WW ll)



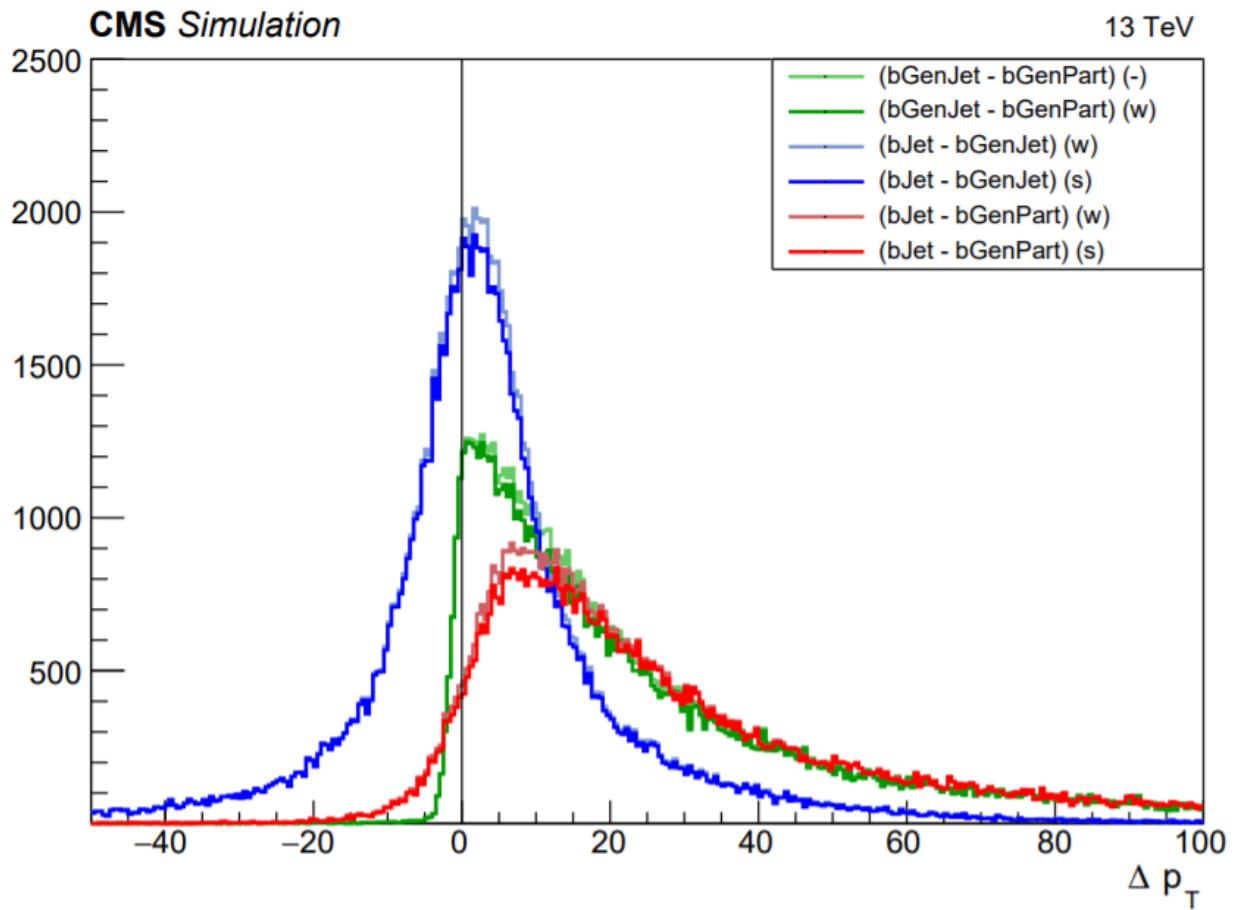
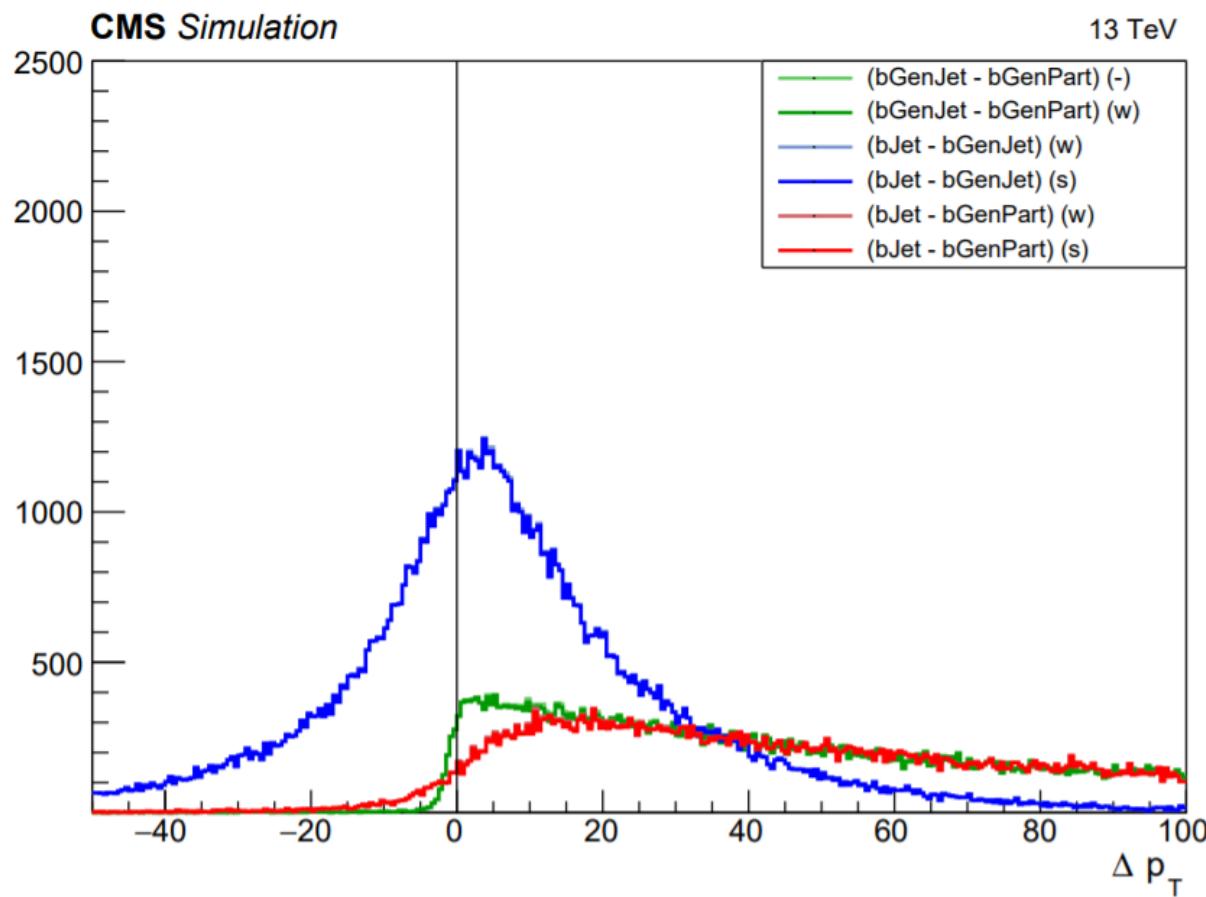
Small p_T comp. WEAK MATCH (WWtt vs. WWII)



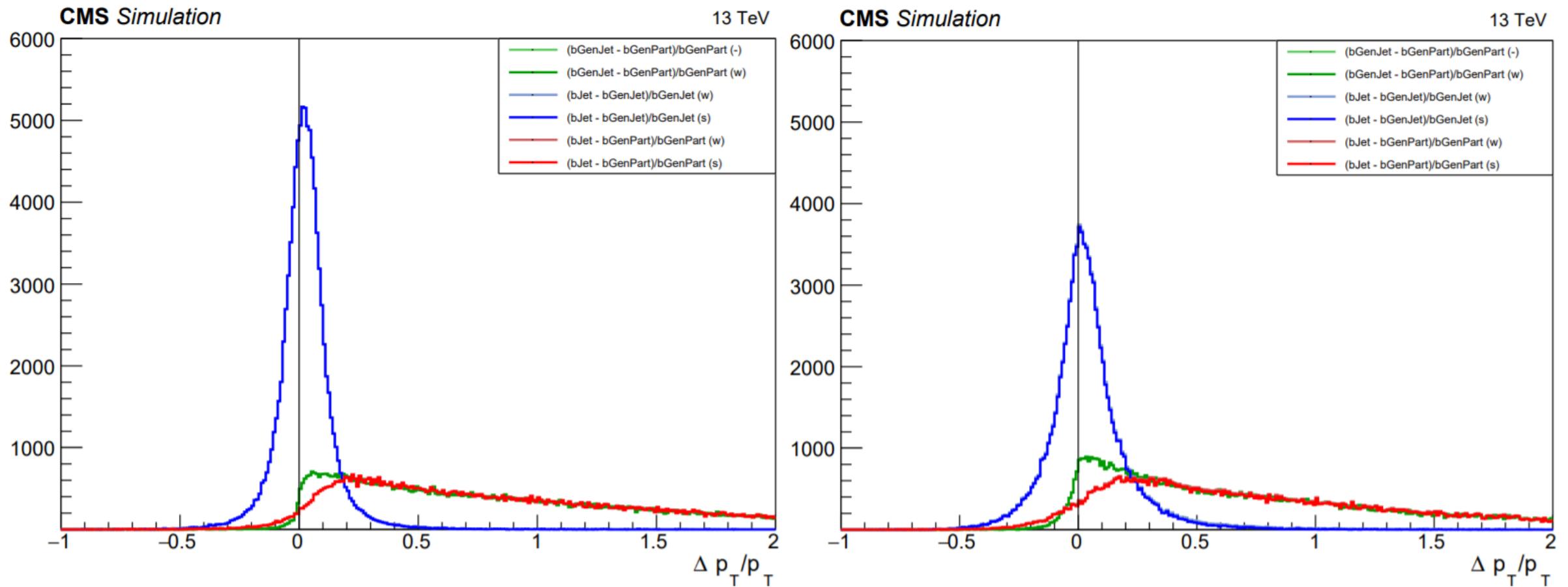
Small p_T comp. STRONG MATCH (WW_{tt} vs. WW_{ll})



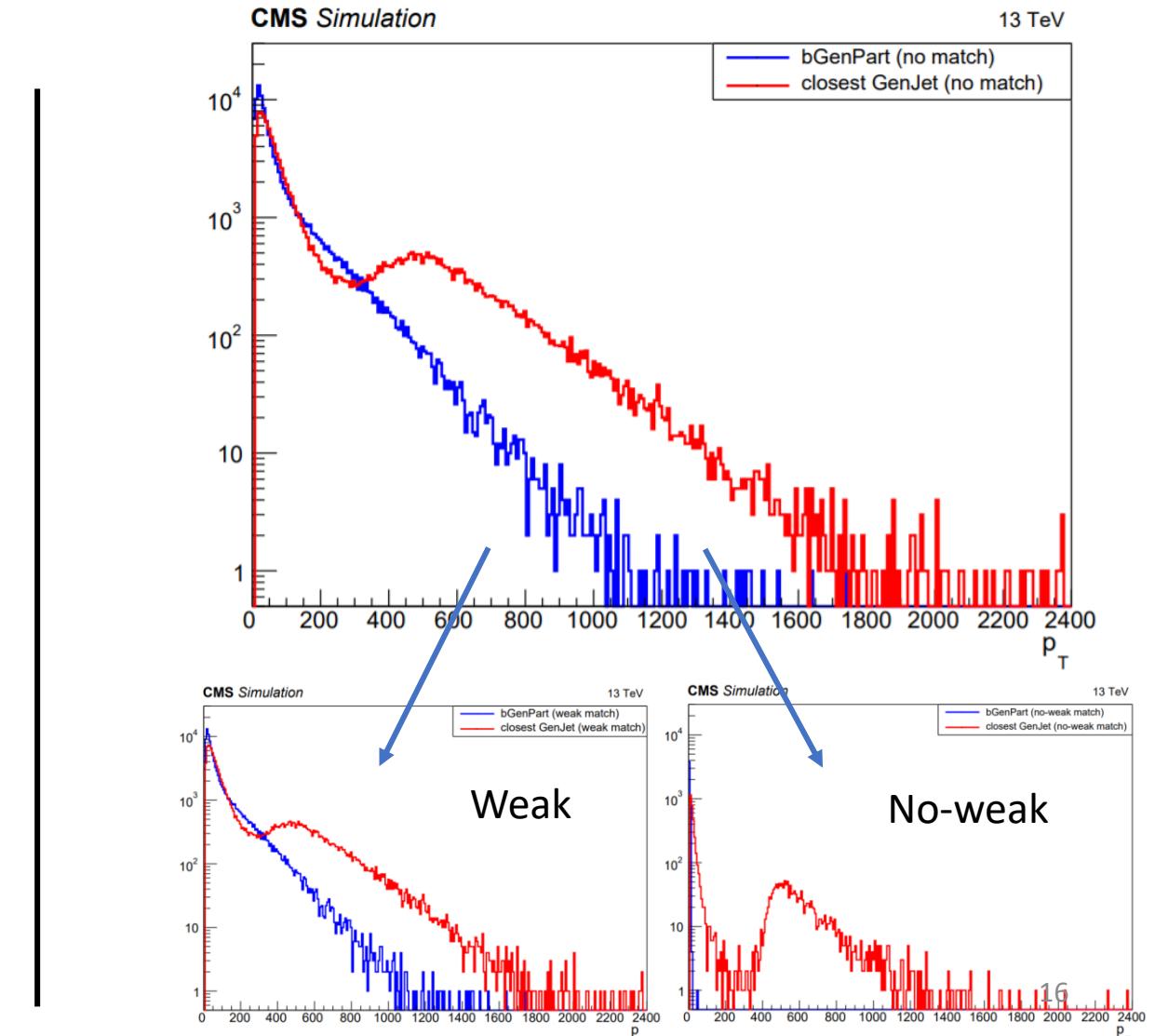
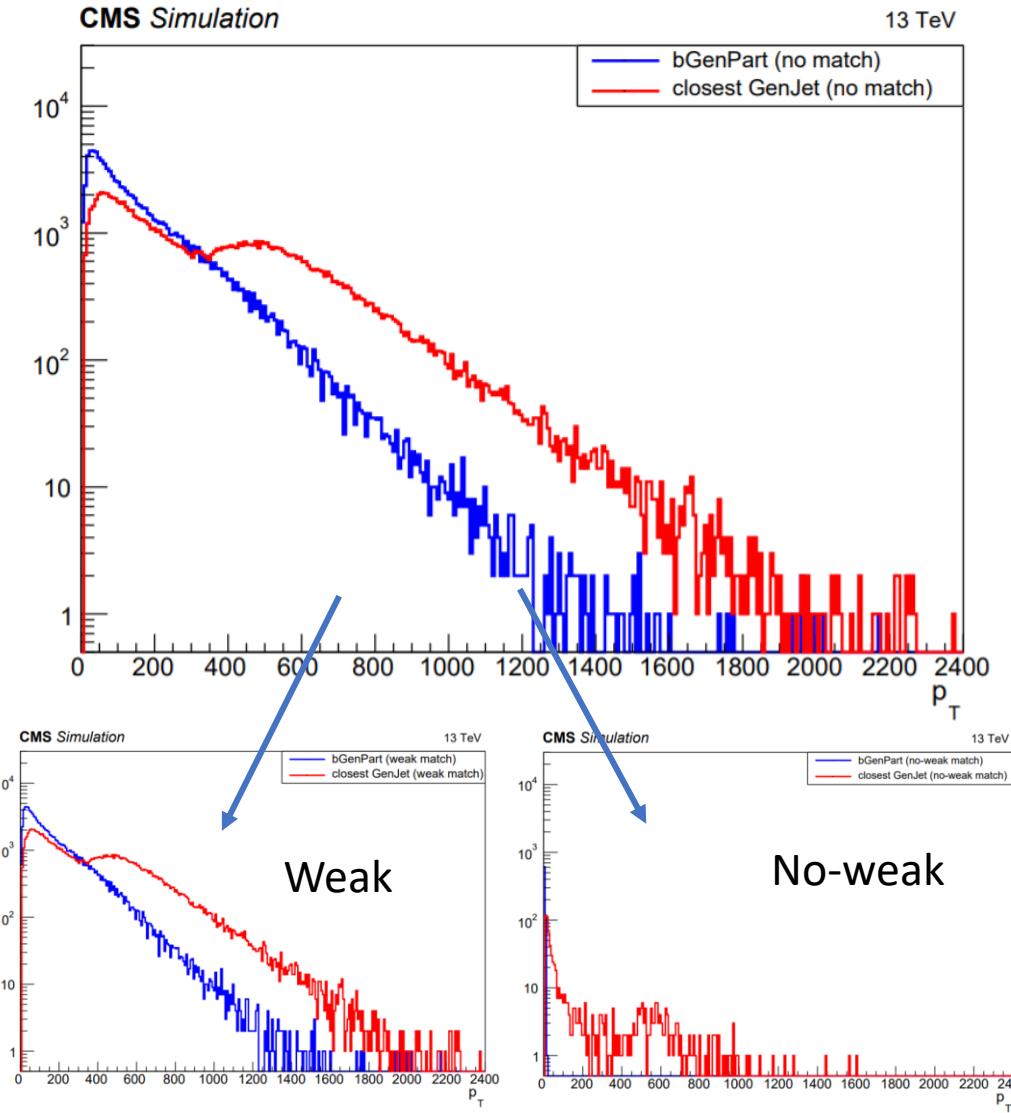
Small Δp_T comparison (WW $t\bar{t}$ vs. WW $l\bar{l}$)



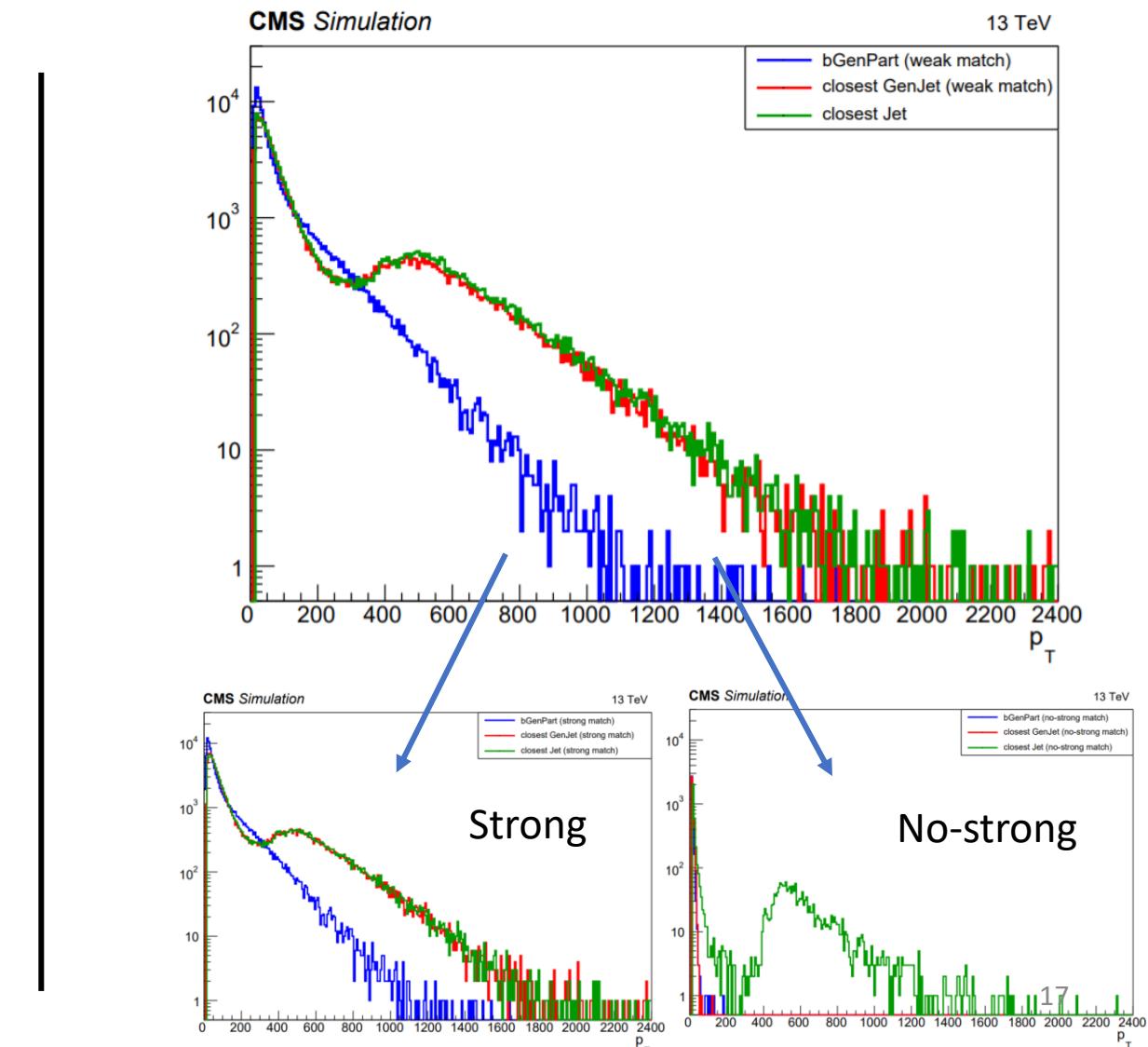
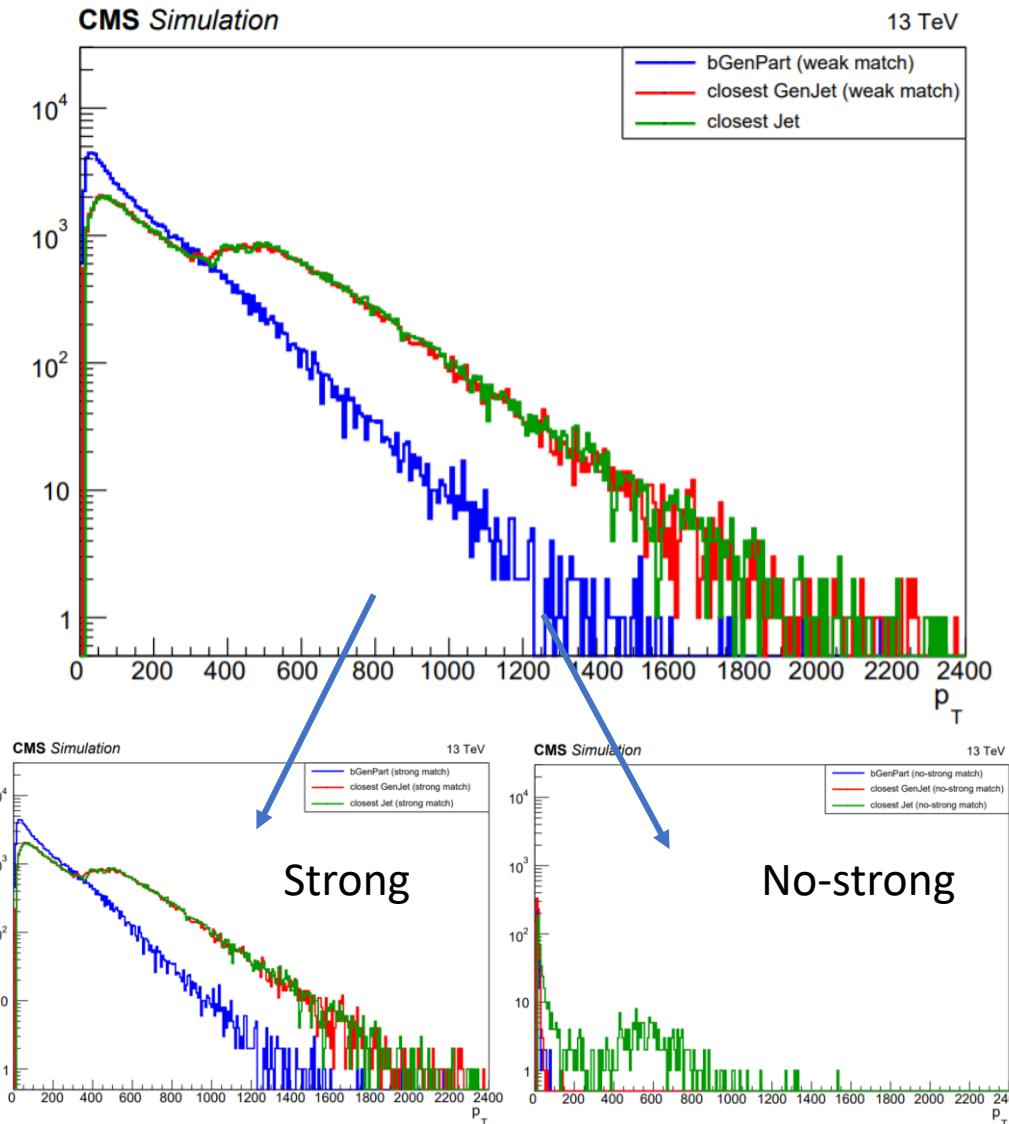
Small $\Delta p_T/p_T$ comp. (WW $t\bar{t}$ vs. WW $l\bar{l}$)



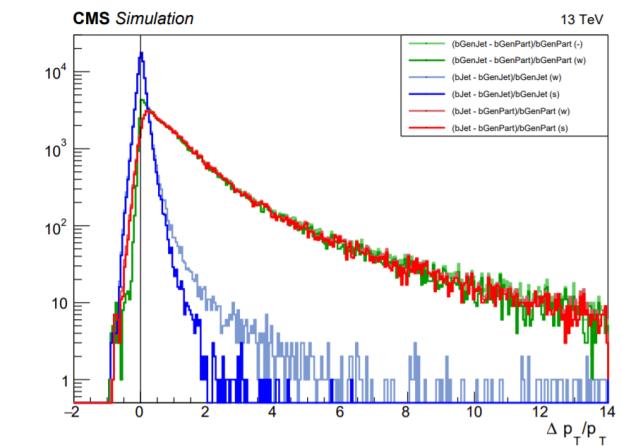
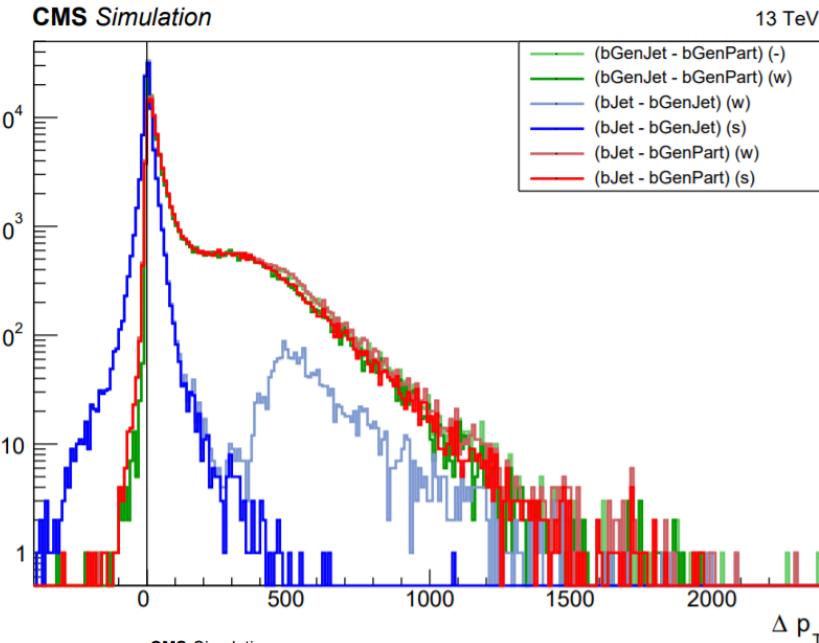
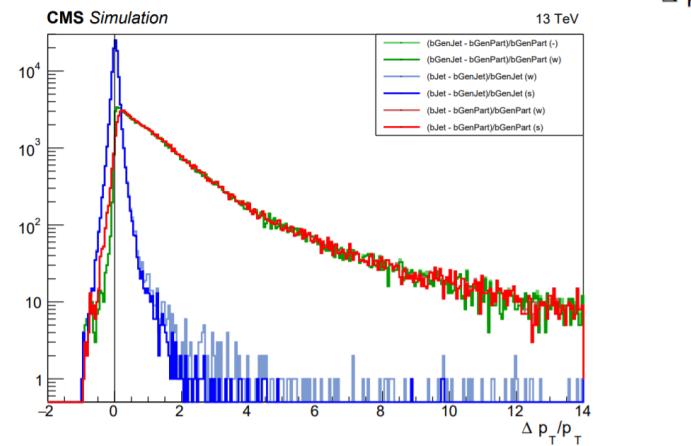
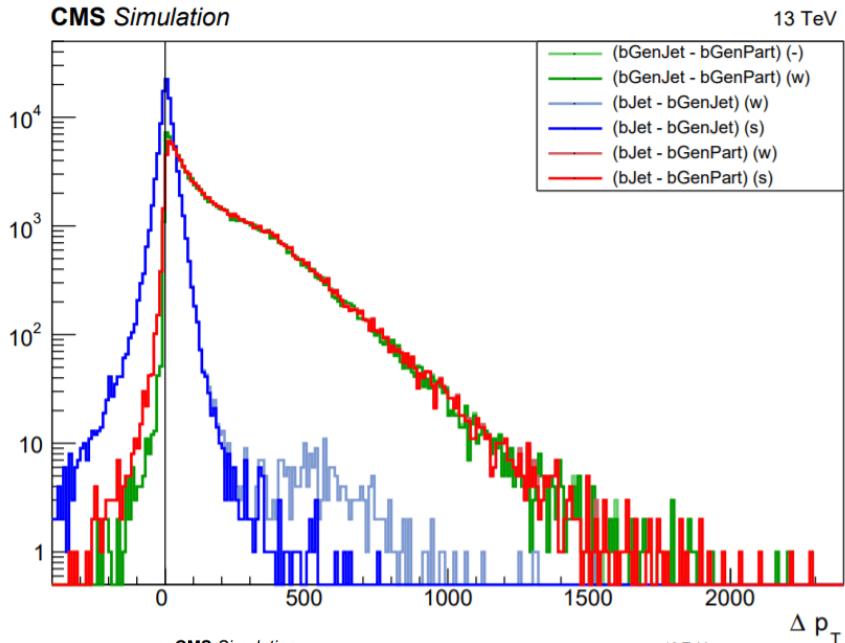
Big pT comp. WEAK MATCH (WW $t\bar{t}$ vs. WW ll)



Big pT comp. STRONG MATCH (WW $t\bar{t}$ vs. WWII)



Big Δp_T and $\Delta p_T/p_T$ comp. (WW $t\bar{t}$ vs. WW $l\bar{l}$)



Q1 vs.Q2 comp. variables (WWtt vs. WWII)

