

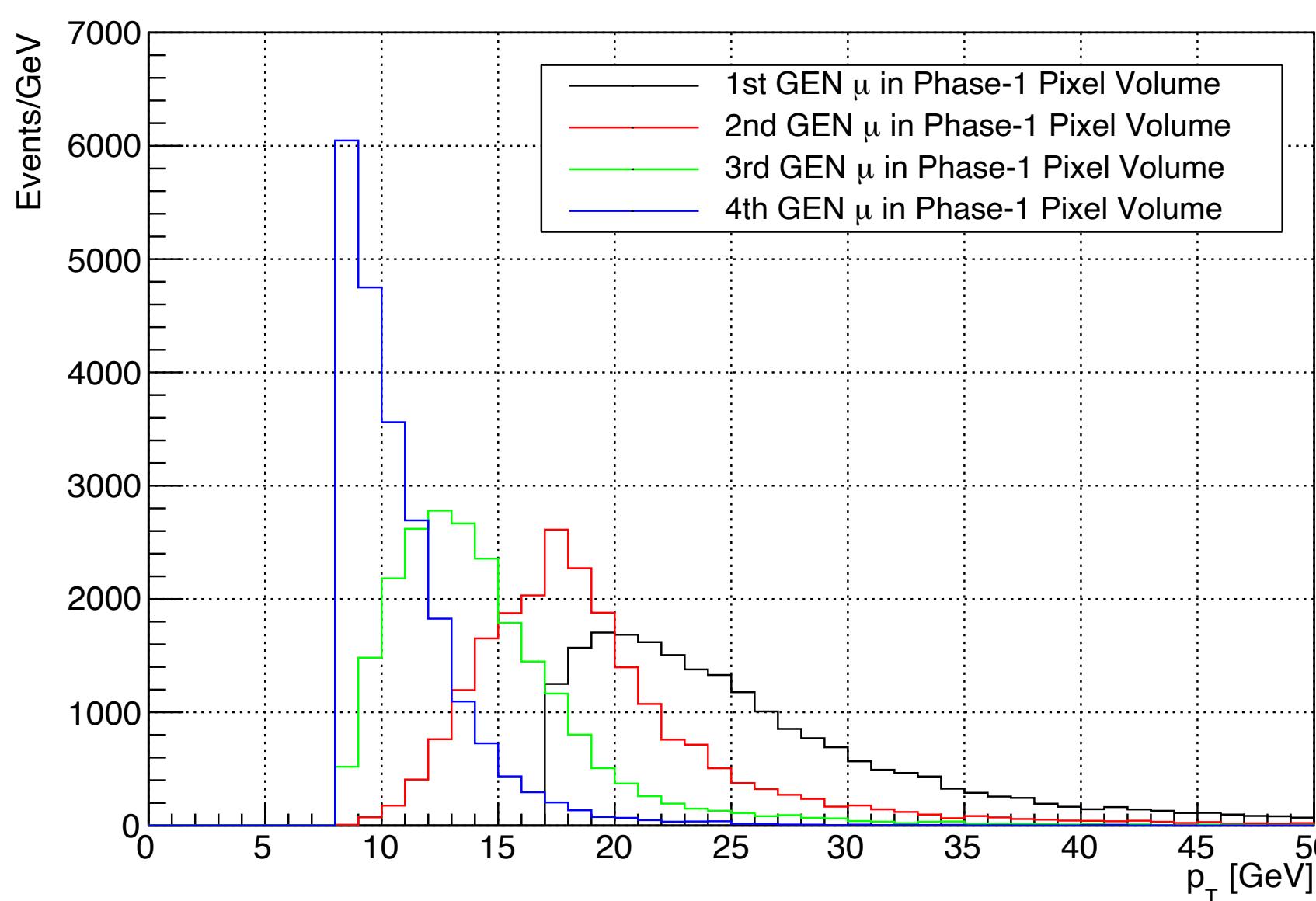
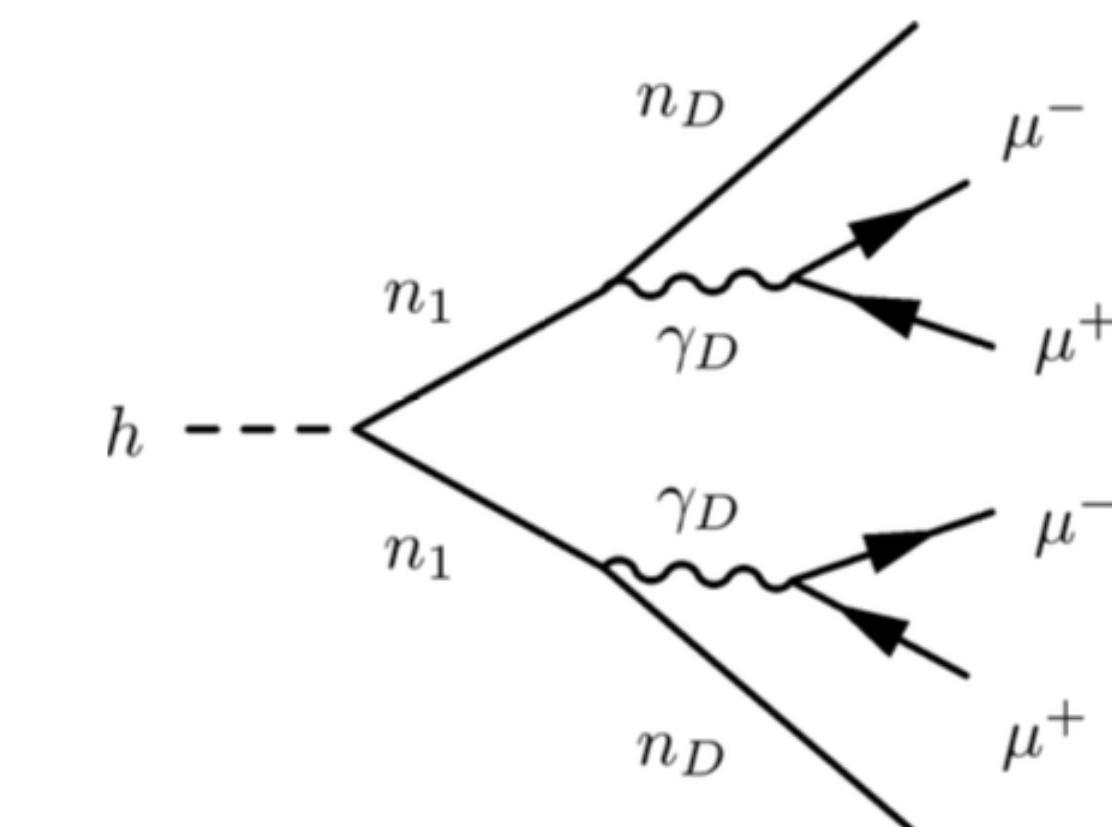
Reconstruction for Displaced Muons in MiniAODSIM

Wei Shi

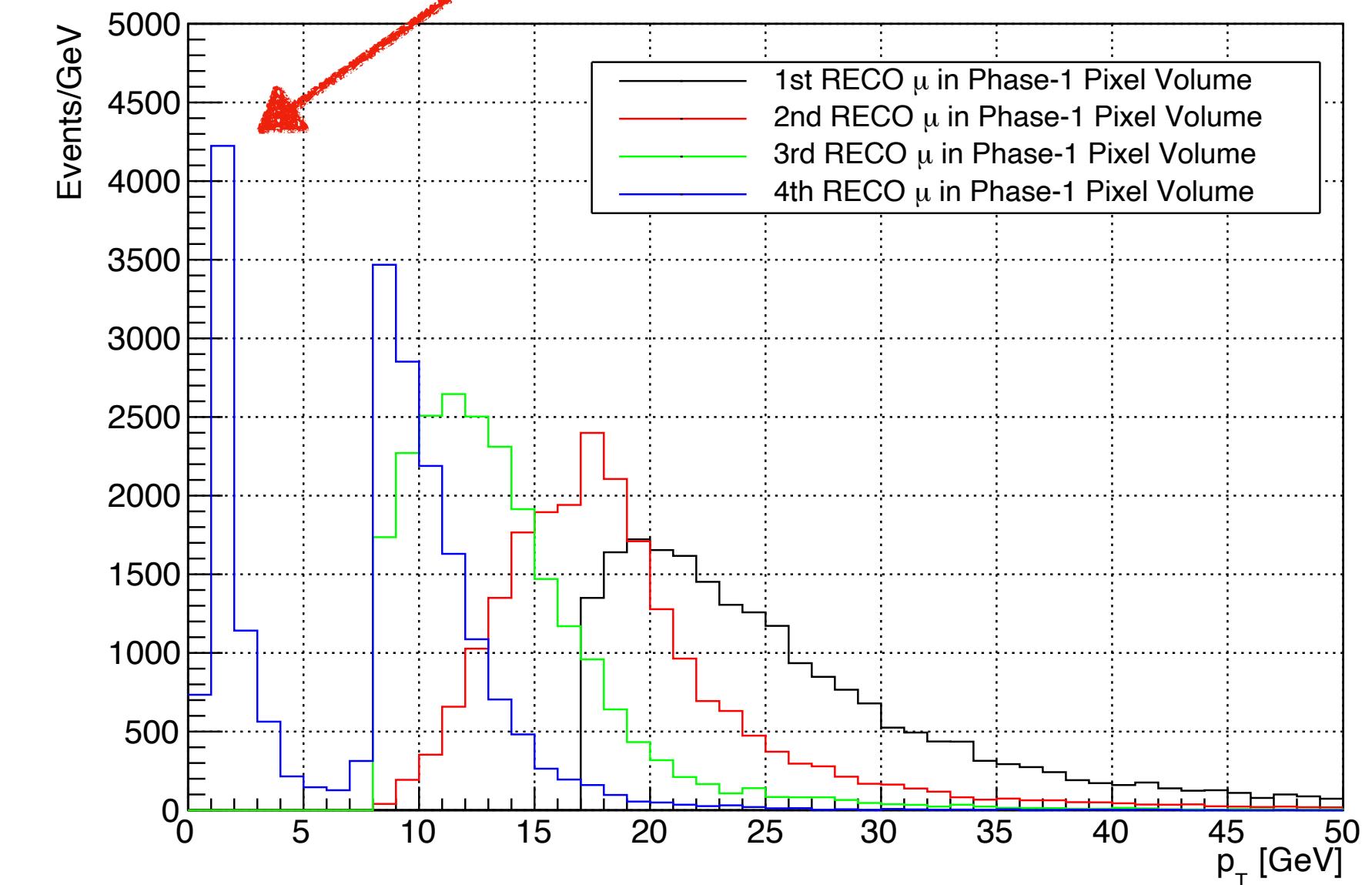
Rice U.

2017 MSSMD MC [$m(h)=125\text{GeV}$, $m(n_1)=60\text{GeV}$, $m(n_D)=1\text{GeV}$]:
 $m_{\gamma D}=25\text{ GeV}$, $c\tau=100\text{ mm}$

- Analysis requires four muons
 $p_T > 8\text{GeV}$ passing PF LooseMuon ID



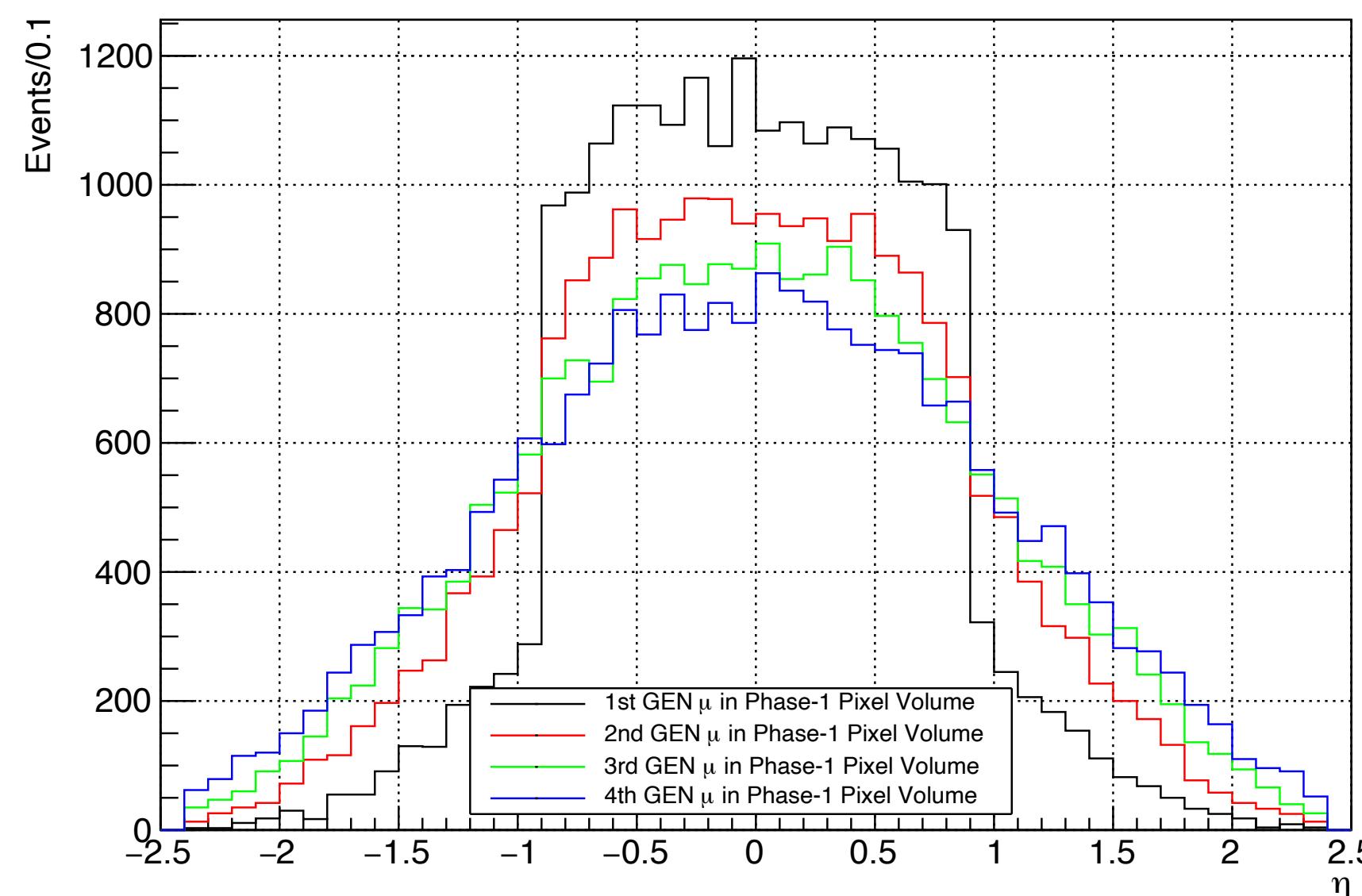
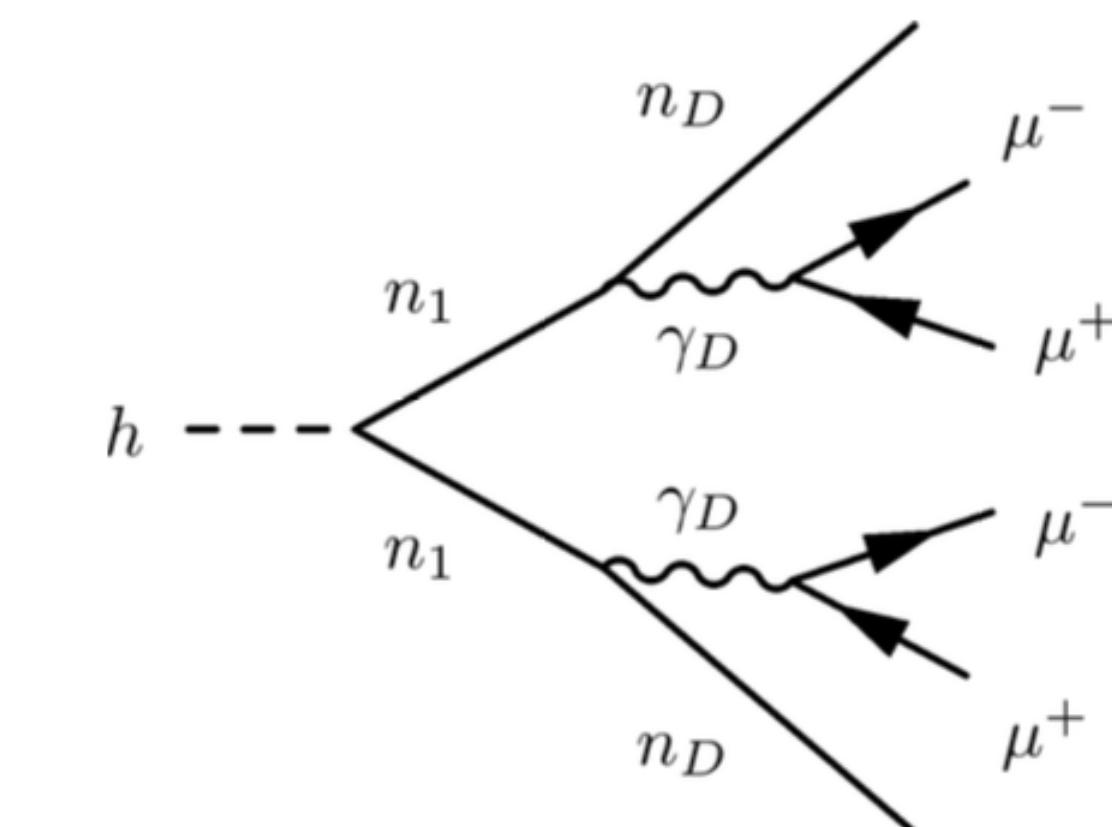
First four leading pT muons at GEN level



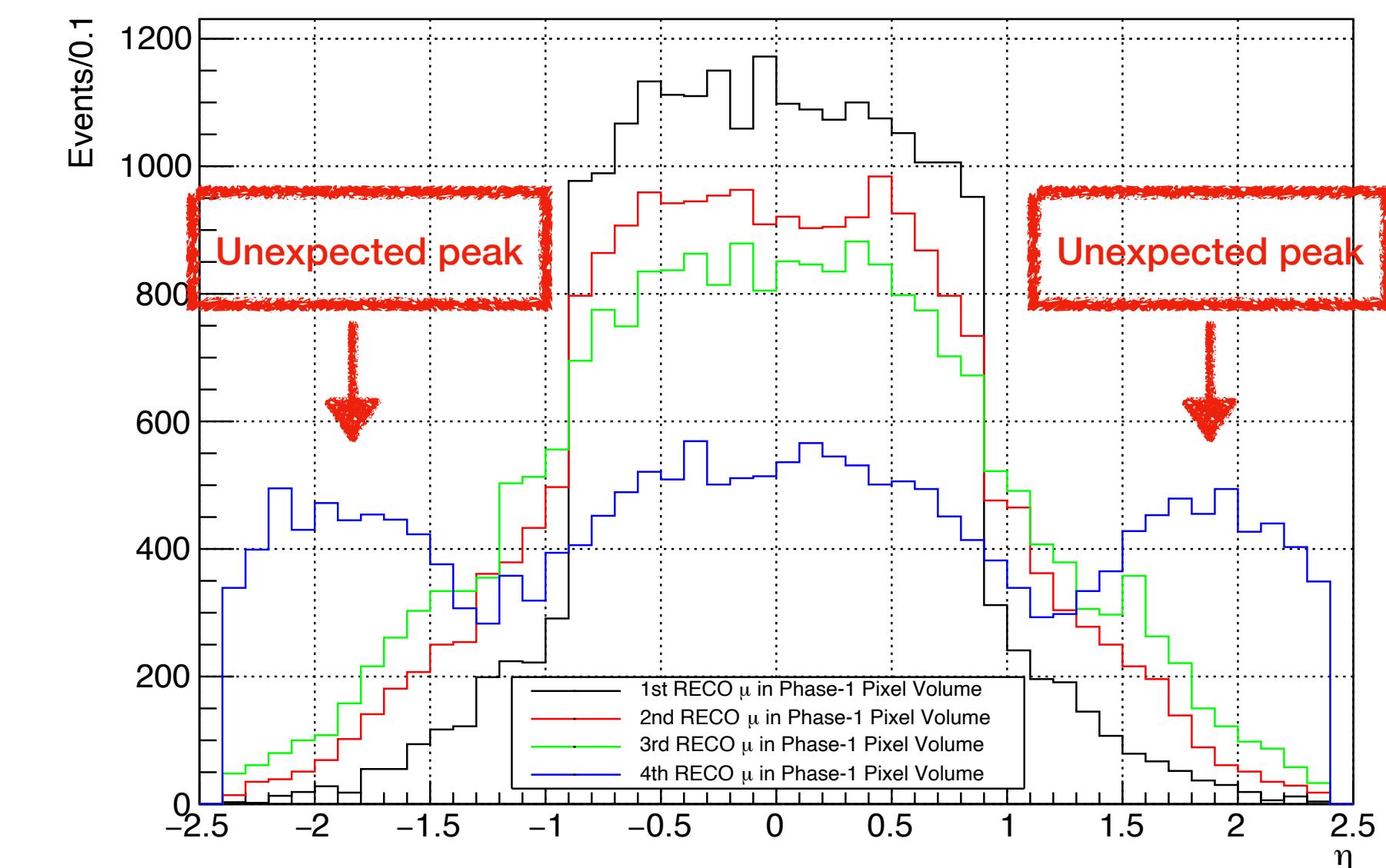
First four leading pT muons at RECO level

2017 MSSMD MC [$m(h)=125\text{GeV}$, $m(n_1)=60\text{GeV}$, $m(n_D)=1\text{GeV}$]:
 $m_{\gamma D}=25\text{ GeV}$, $c\tau=100\text{ mm}$

- Analysis requires four muons
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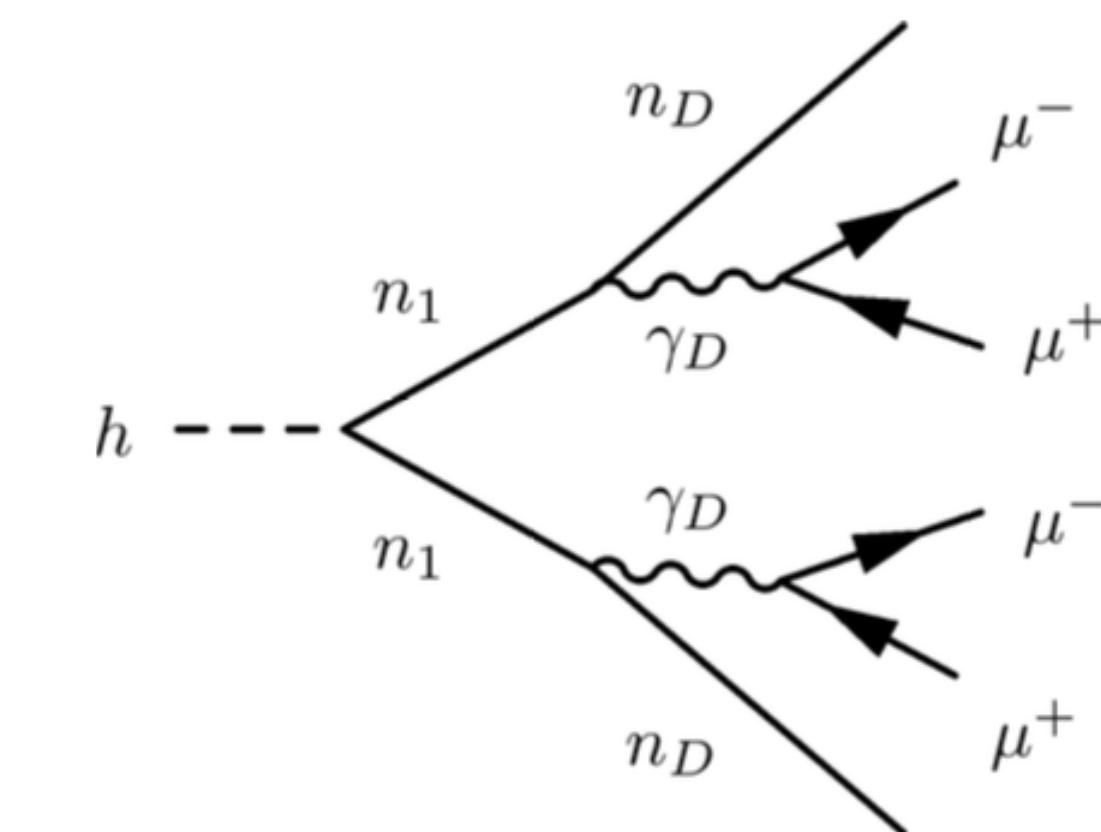
First four leading pT muons at GEN level



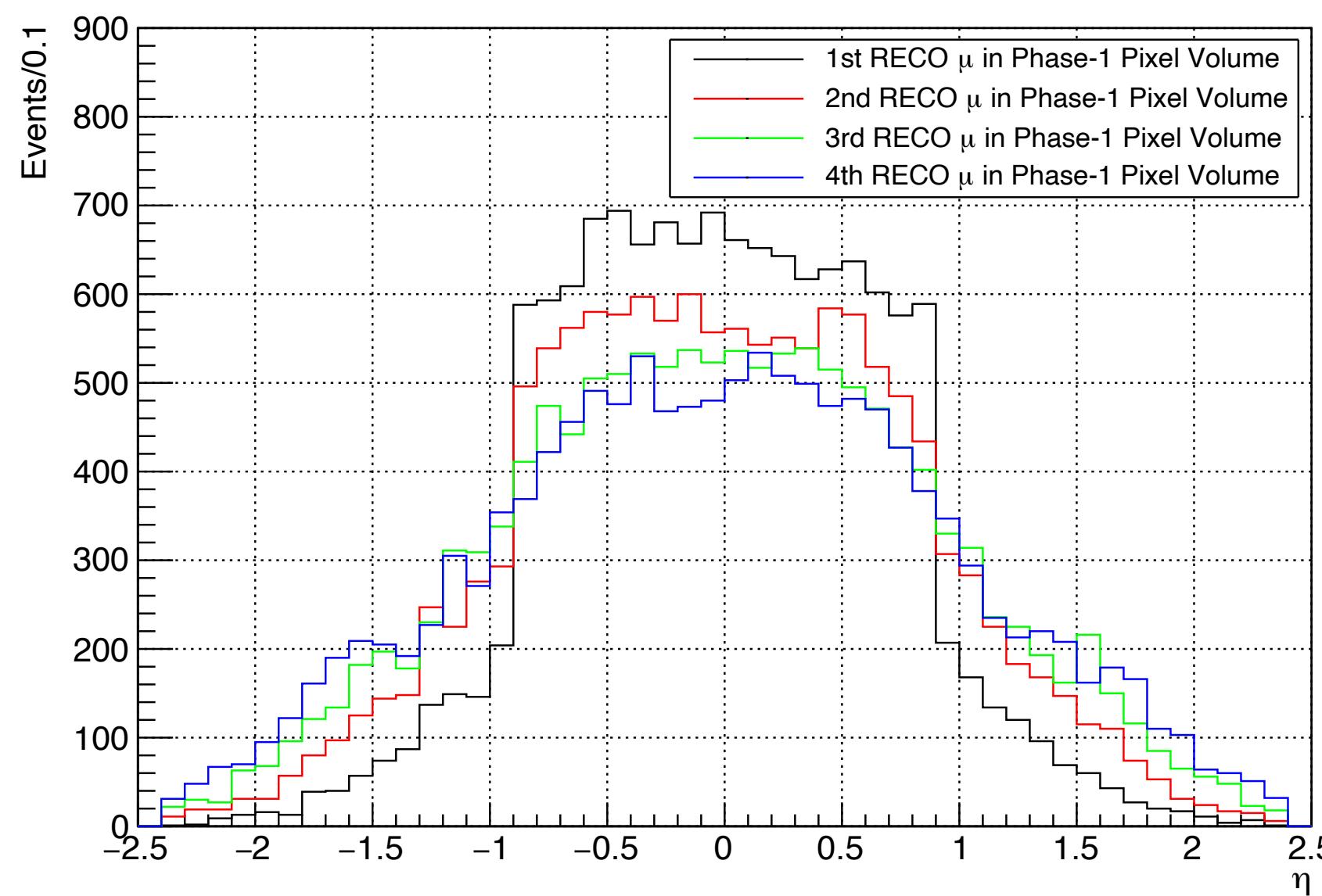
First four leading pT muons at RECO level

2017 MSSMD MC [$m(h)=125\text{GeV}$, $m(n_1)=60\text{GeV}$, $m(n_D)=1\text{GeV}$]:
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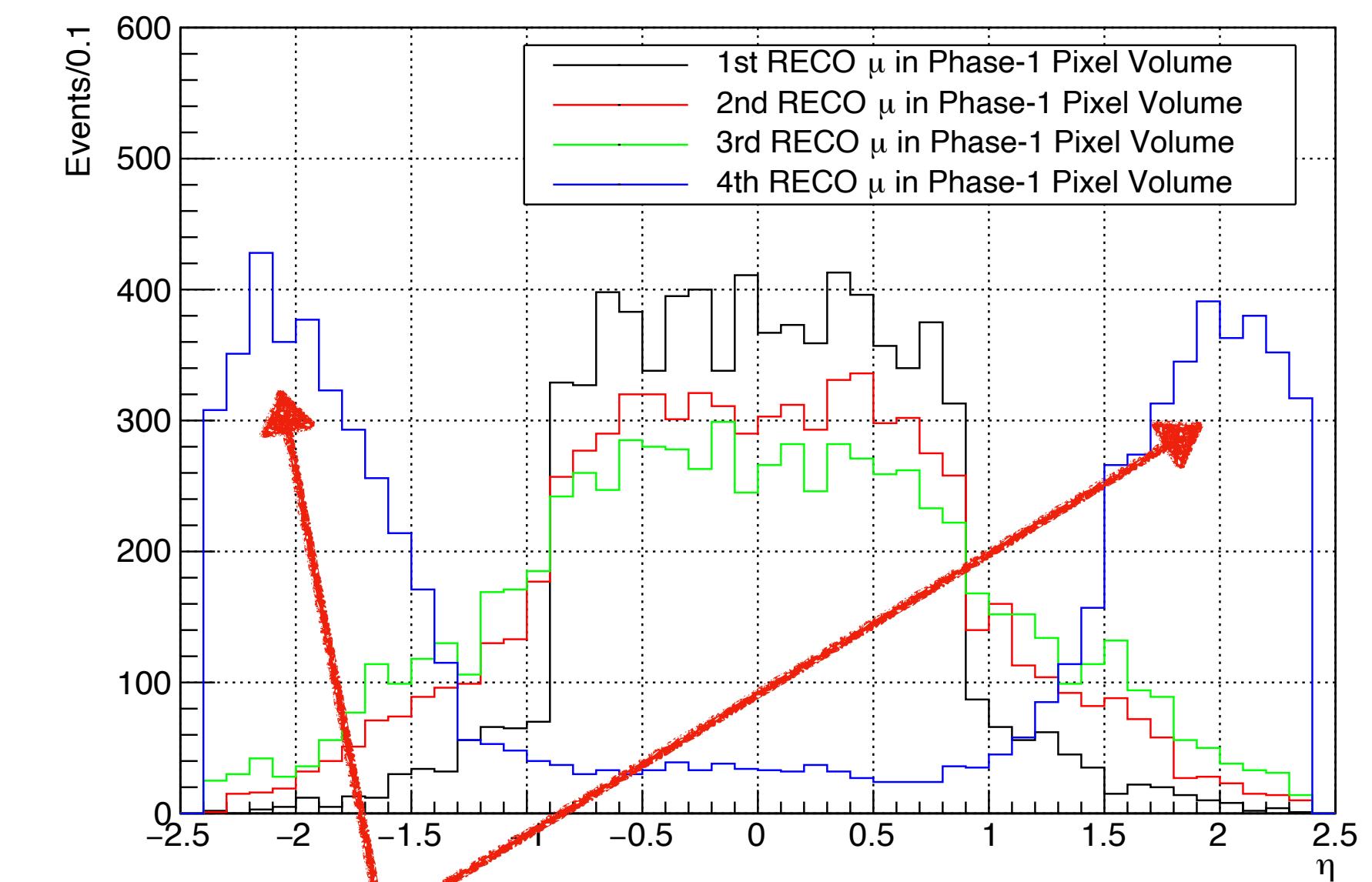
- Analysis requires four muons
 $pT>8\text{GeV}$ passing PF LooseMuon ID



4th RECO mu $pT>8\text{GeV}$

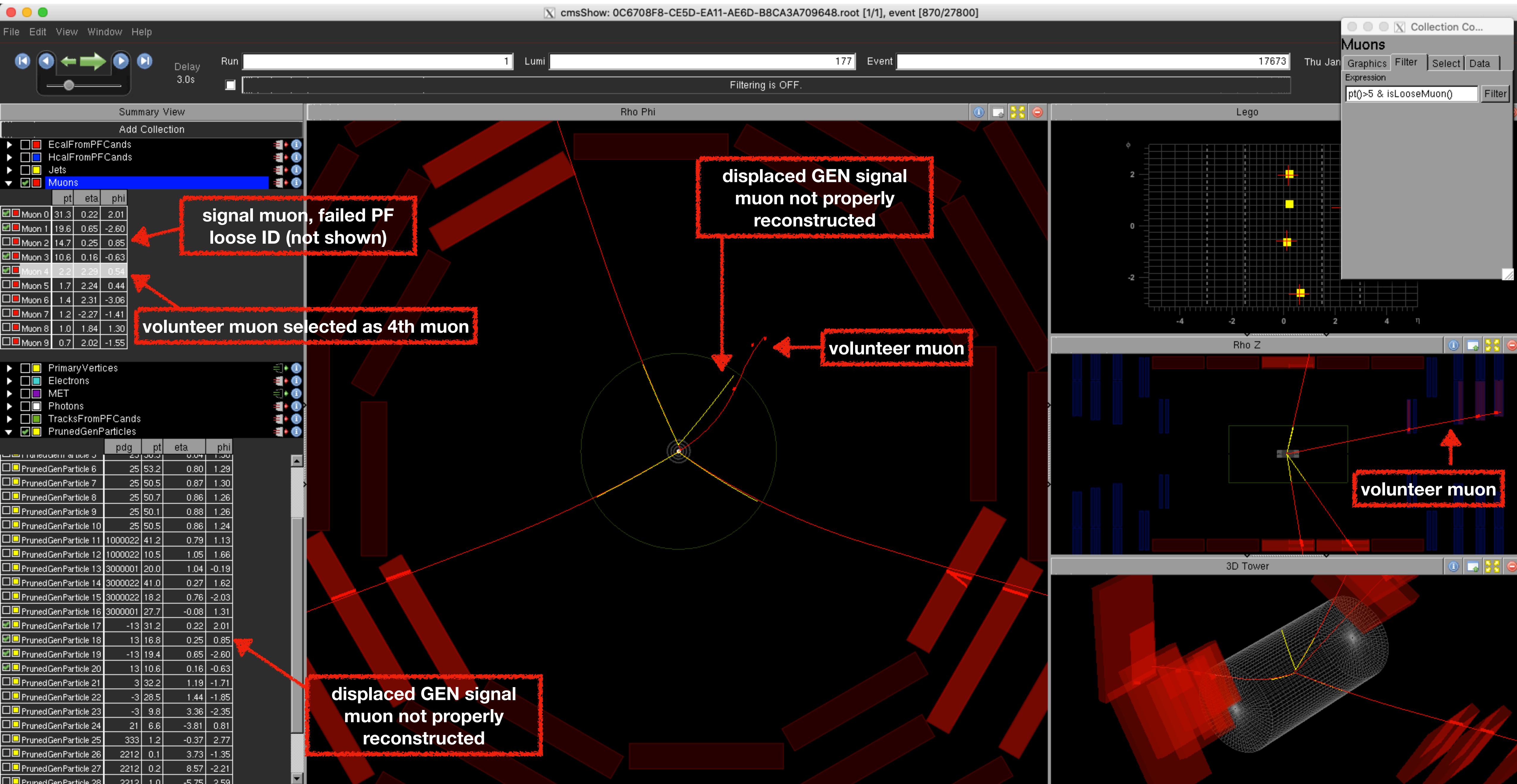


4th RECO mu $pT<8\text{GeV}$



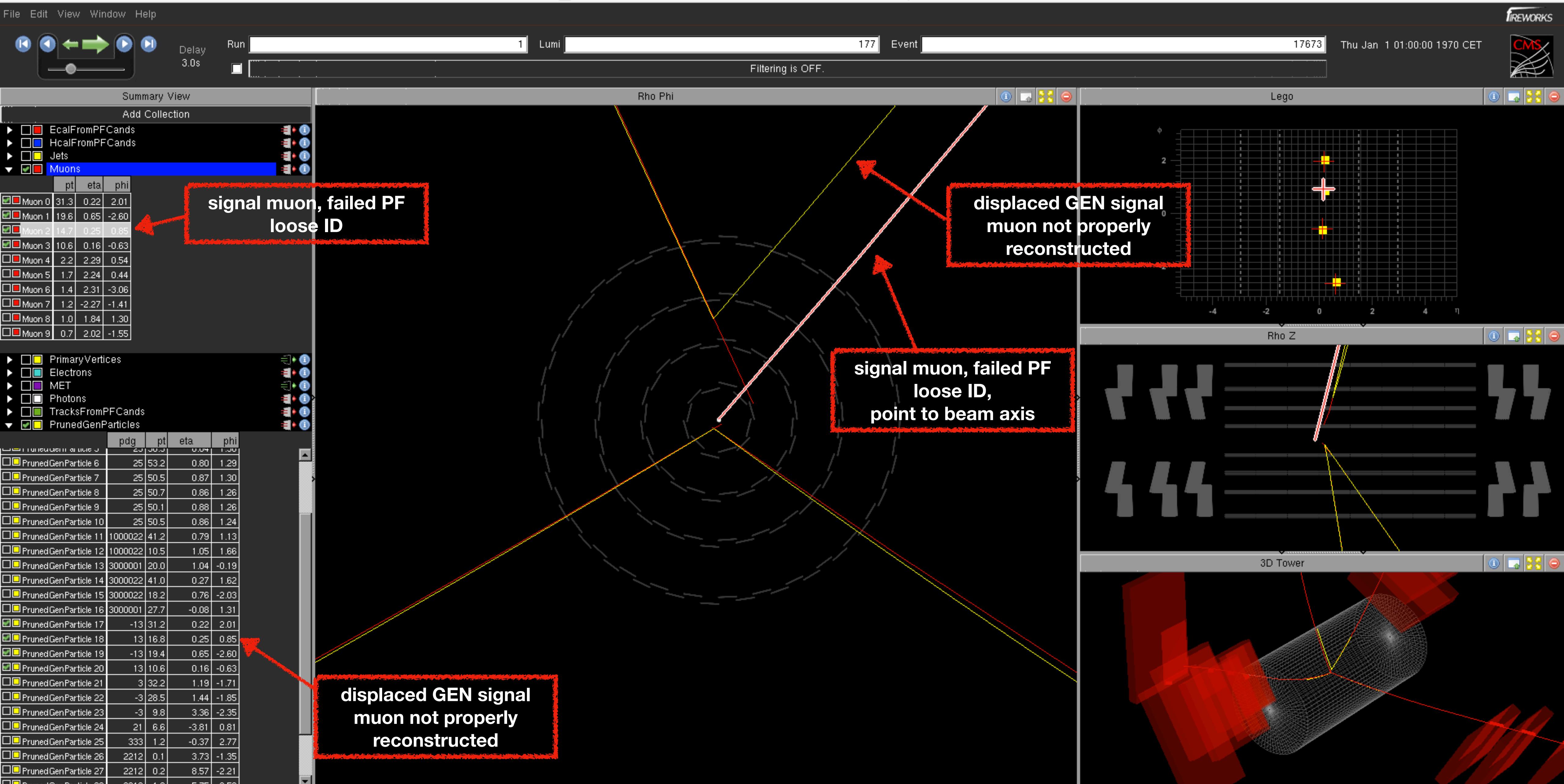
Volunteer RECO muons with low pT in the forward region: passed PF loose mu ID

MSSMD: m=25 GeV, cT=100 mm (2017) Event #1

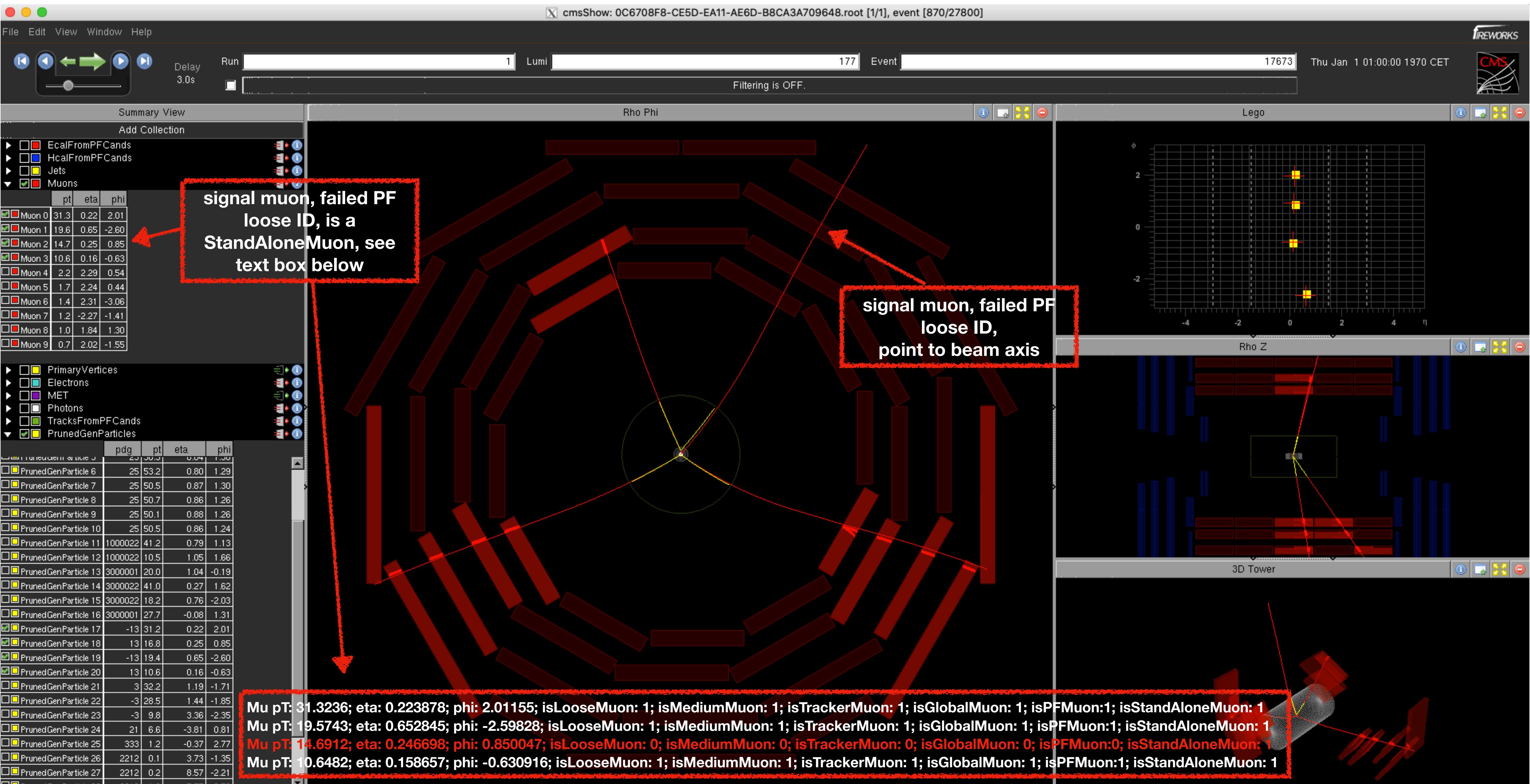


MSSMD: m=25 GeV, cT=100 mm (2017) Event #1

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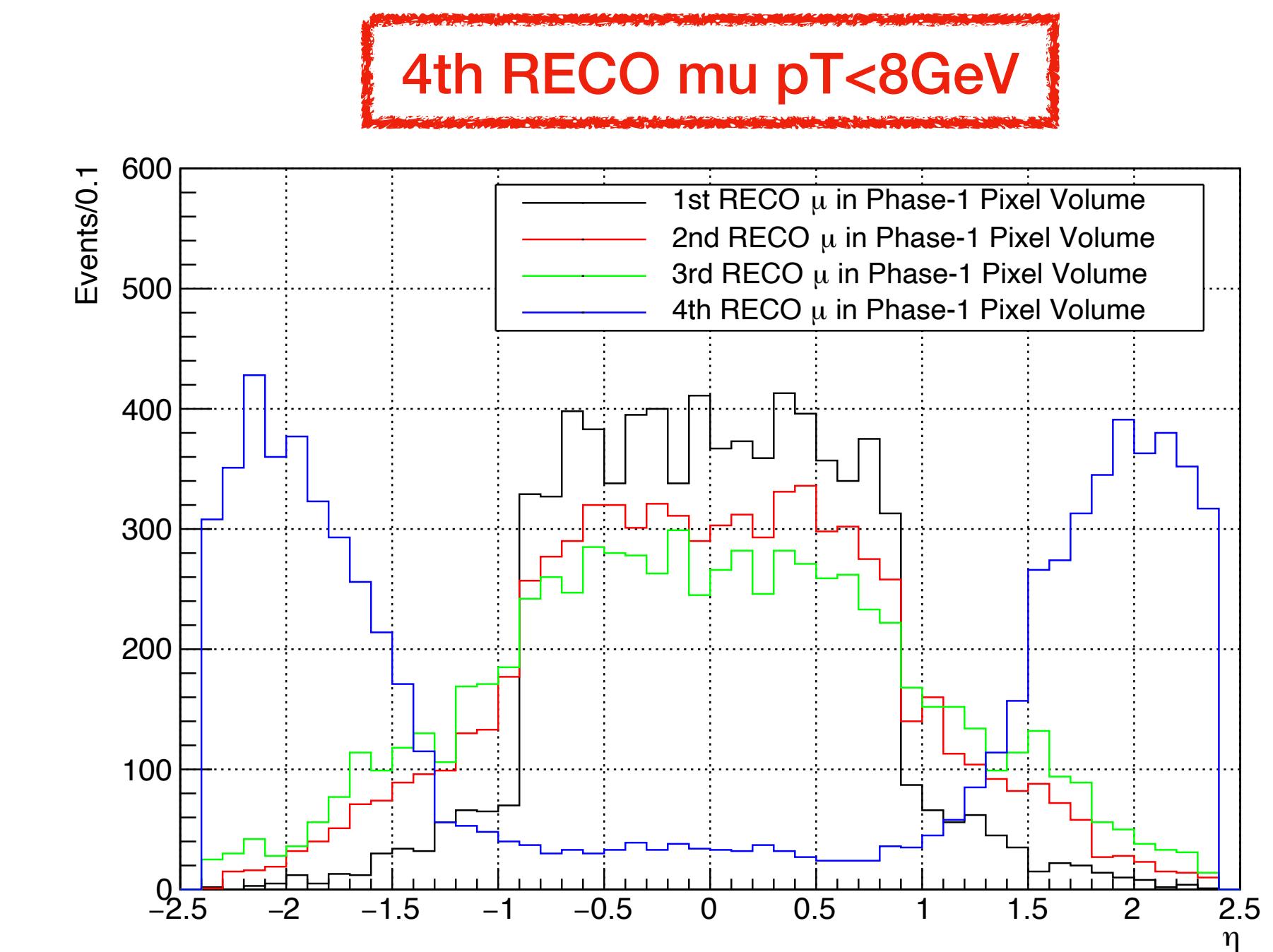


MSSMD: m=25 GeV, cT=100 mm (2017) Event #1



Summary & Questions

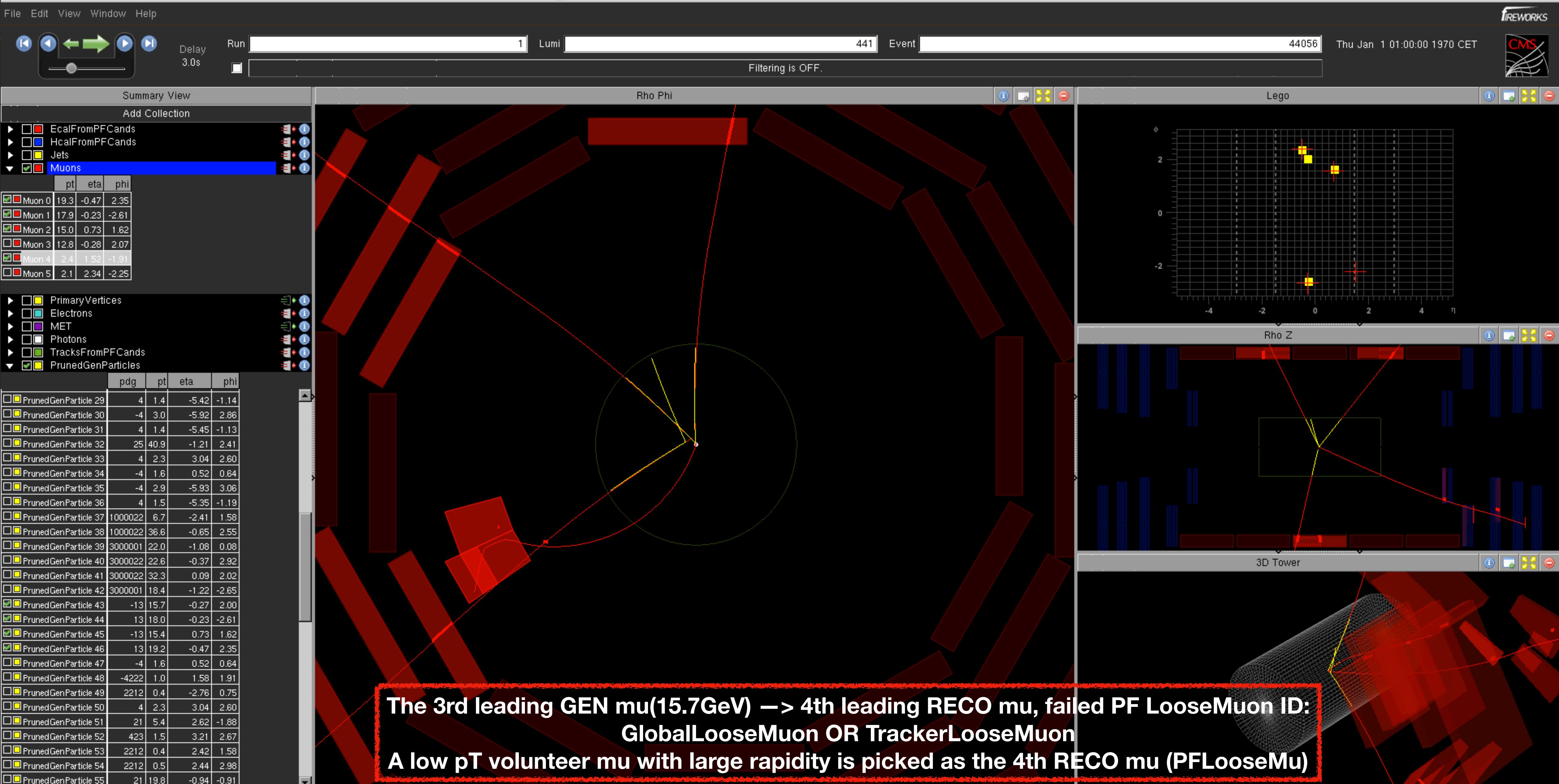
- Analysis has four muons in the final state
 - Use slimmedMuons collection in 2017-2018 MINIAODSIM
 - Ask four muons pass PF LooseMuon ID: $pT>8\text{GeV}$
- In many cases, a volunteer muon with large pseudorapidity is picked up as the 4th RECO signal muon because one of the actual displaced signal muons is NOT properly reconstructed:
 - The signal muon is reconstructed pointing back to beam axis (usually smaller pT)
 - The wrongly reconstructed muon shows up as a StandAlone muon
 - Something wrong when propagate outside-in to tracker or failed to find compatible tracker hit? Other possibilities?
- Why some displaced signal muons are reconstructed fine? Is this purely an inefficiency when reconstructing displaced muons? How can we mitigate this?



Back Up

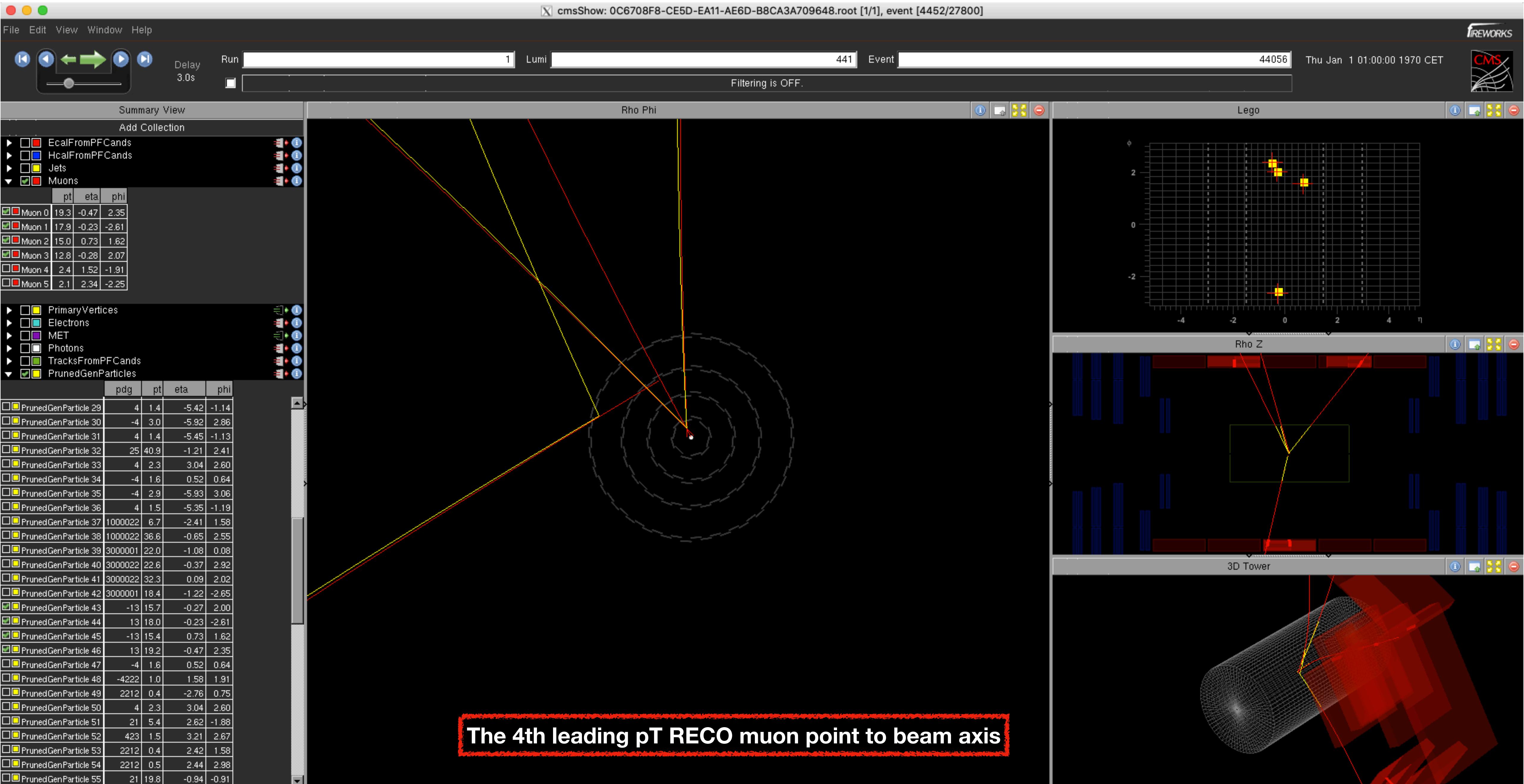
MSSMD: m=25 GeV, cT=100 mm (2017) Event #2

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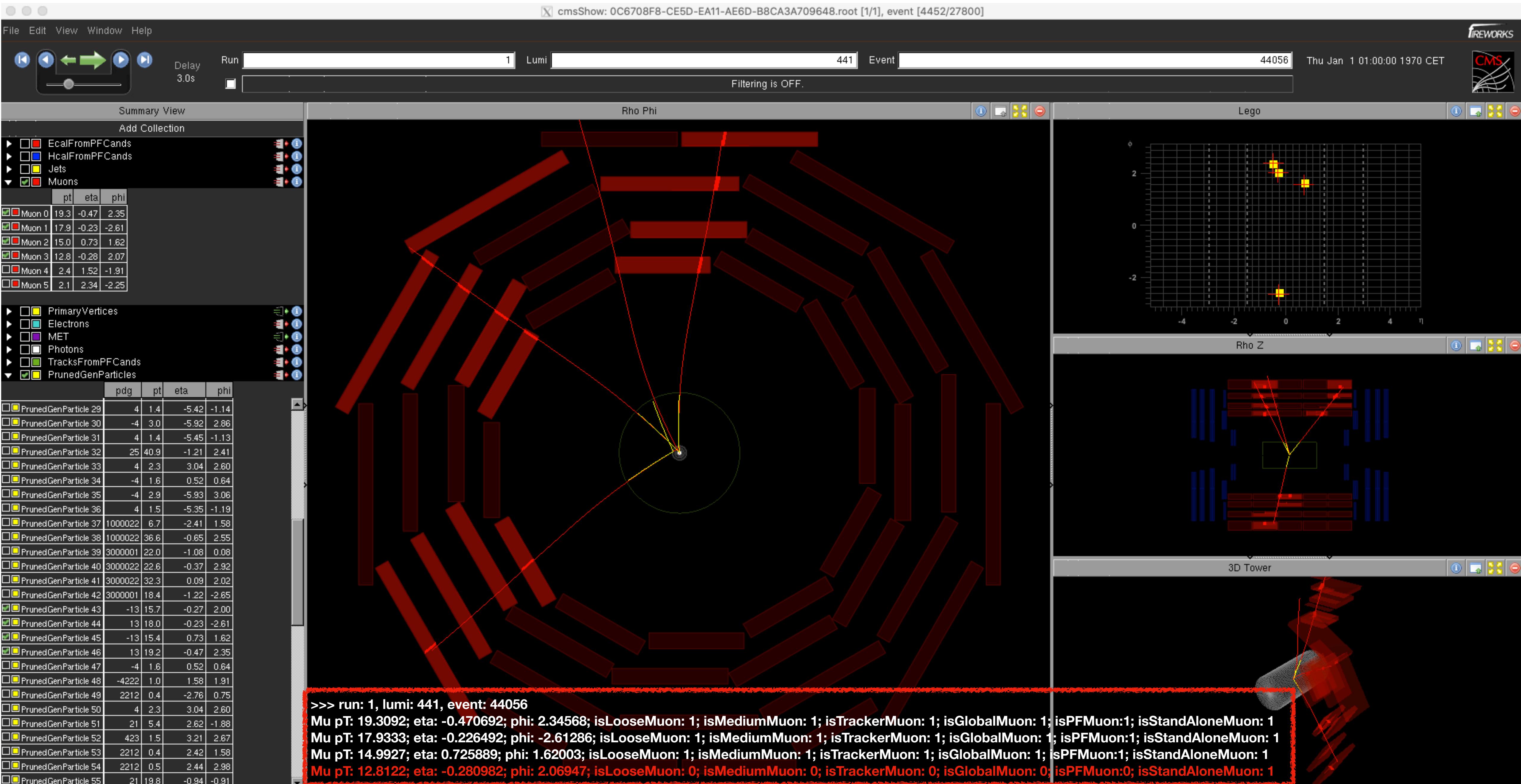
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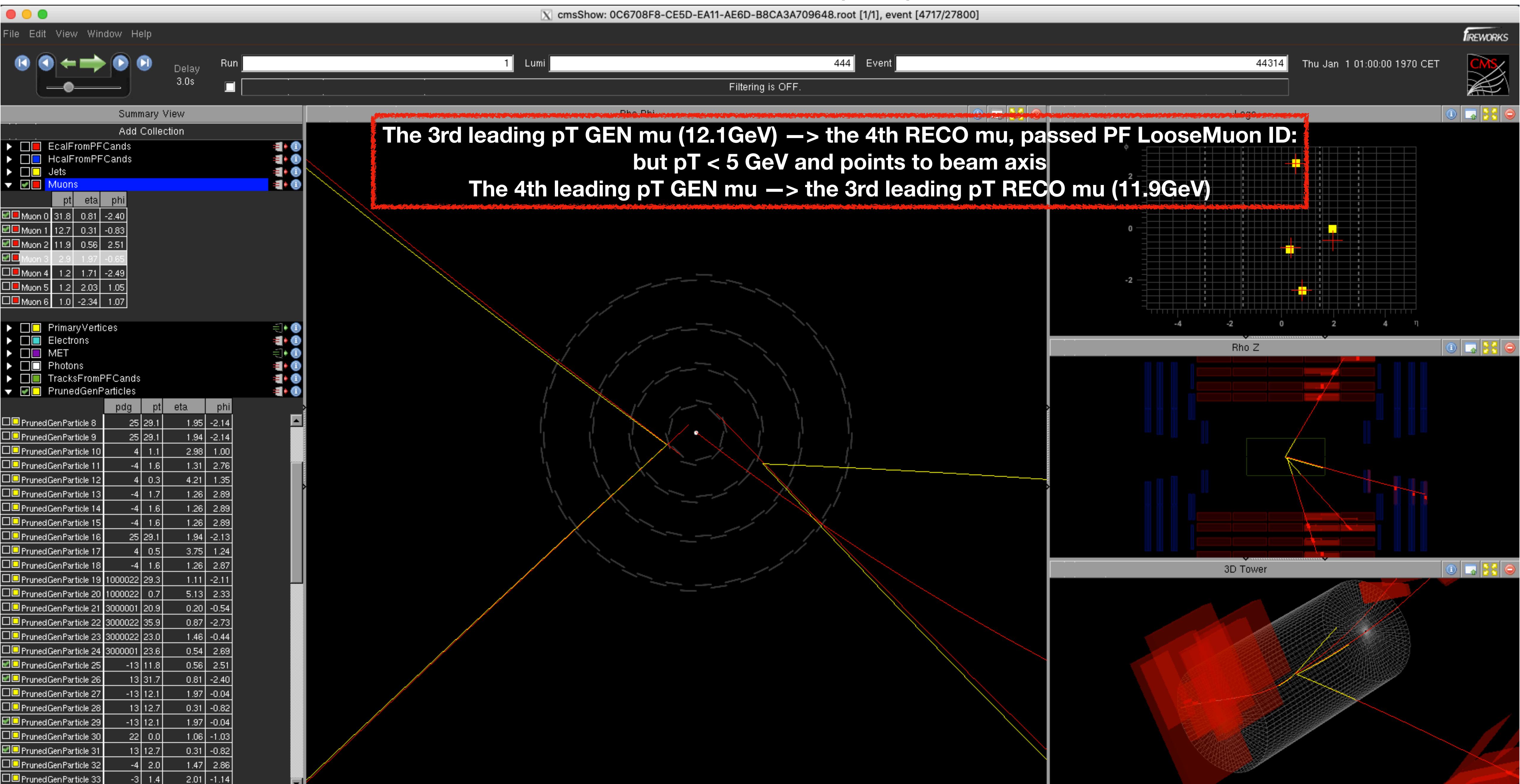
MSSMD: m=25 GeV, cT=100 mm (2017) Event #2

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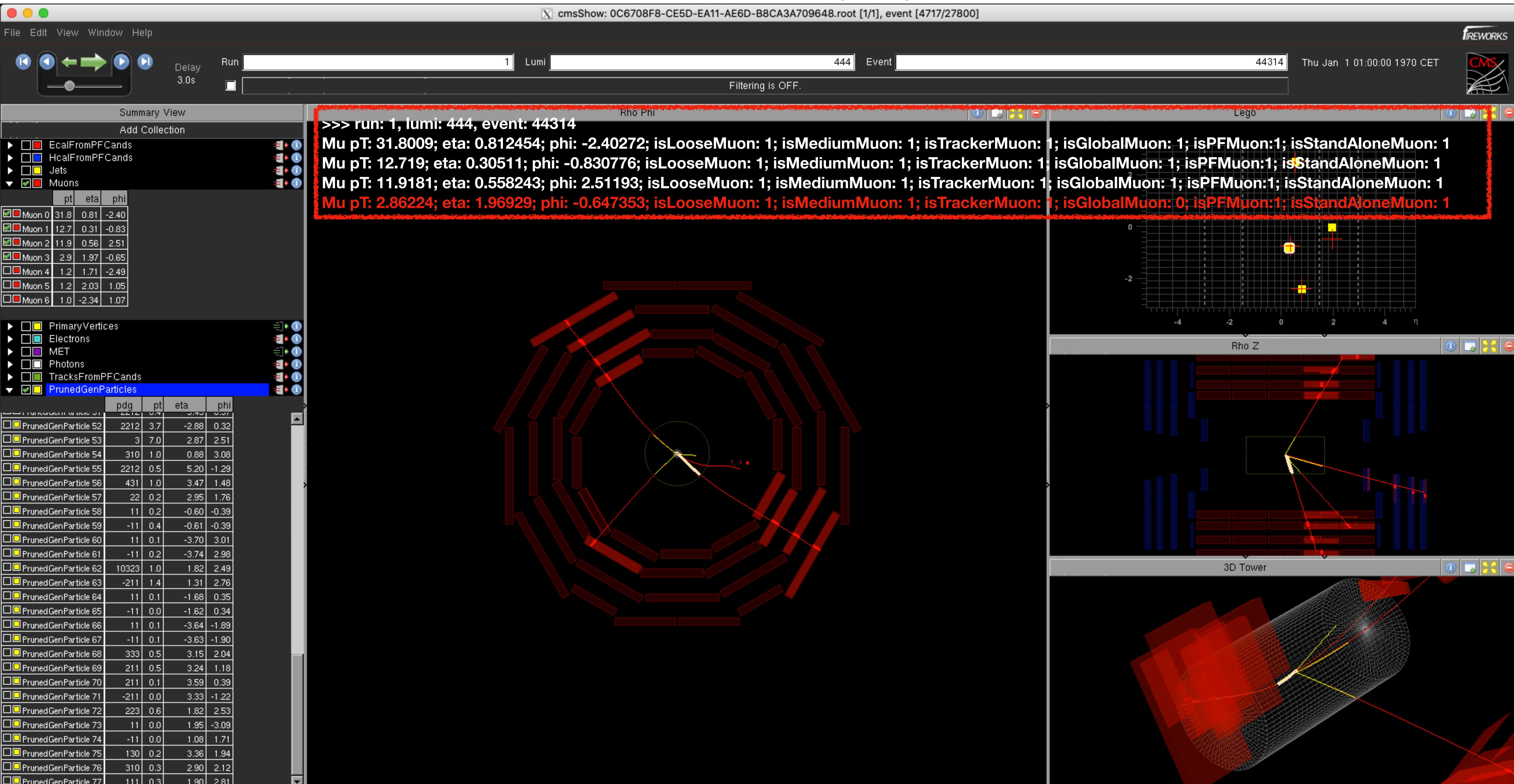


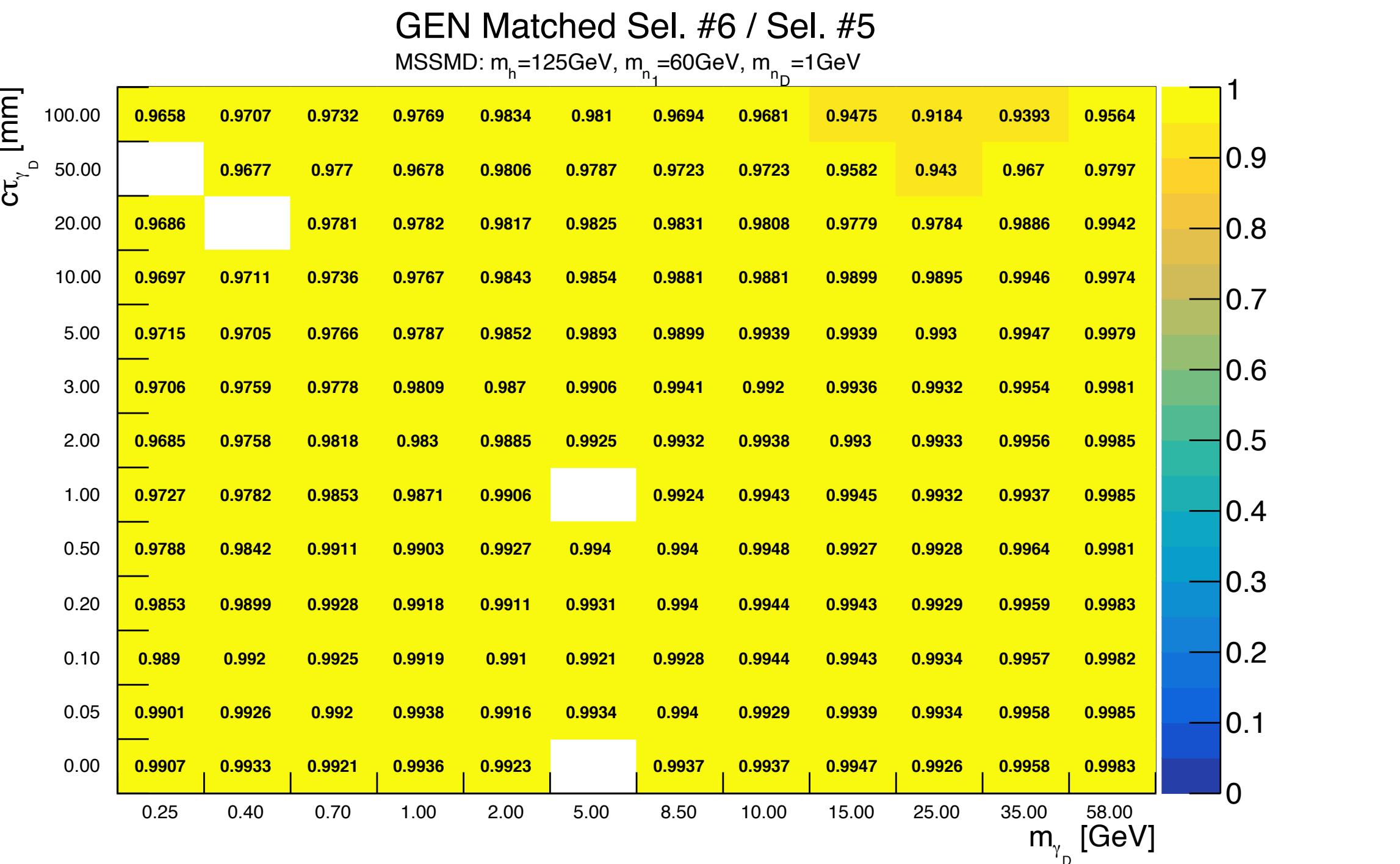
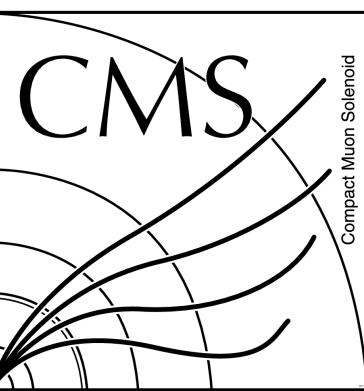
MSSMD: m=25 GeV, cT=100 mm (2017) Event #3

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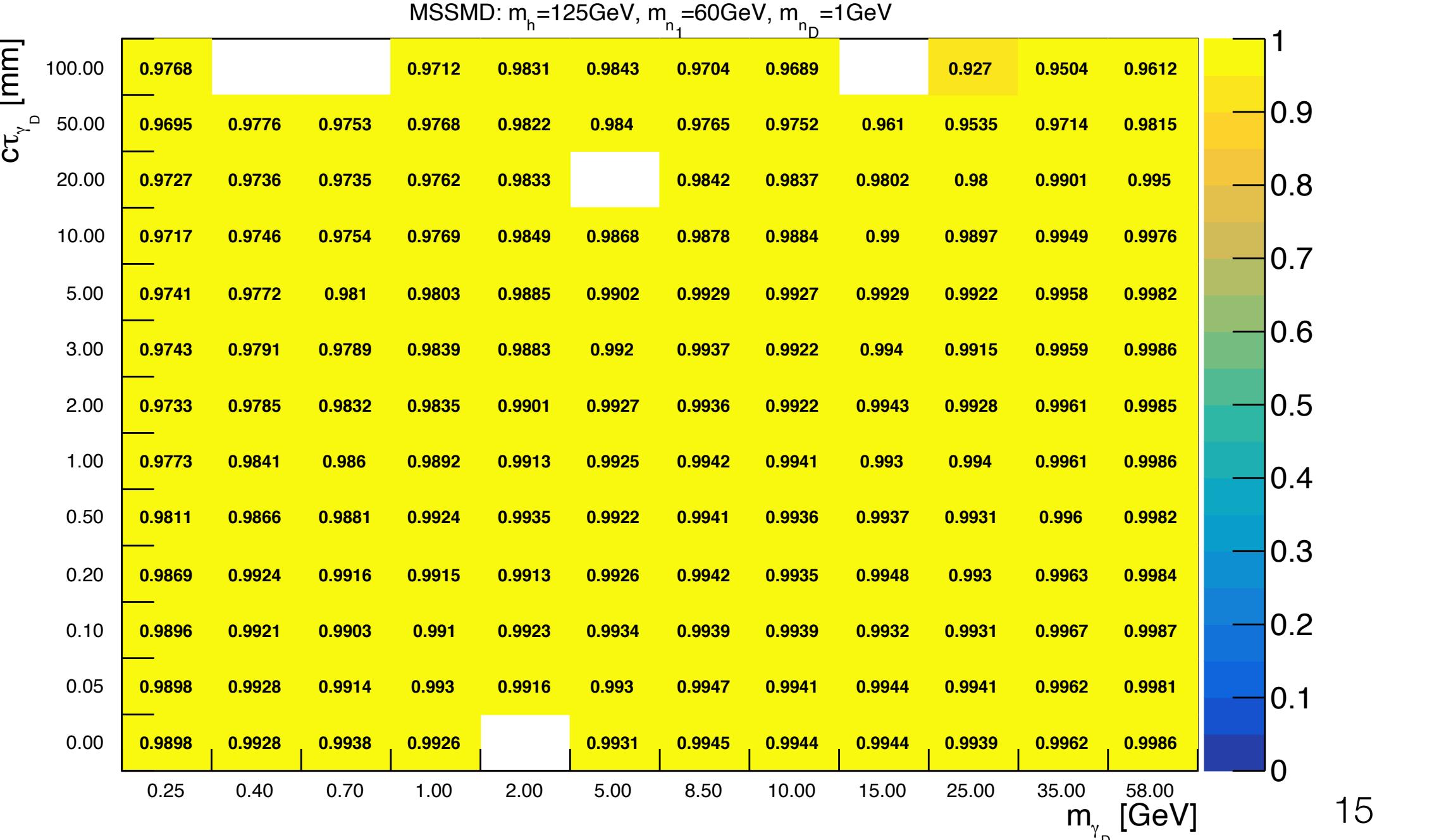


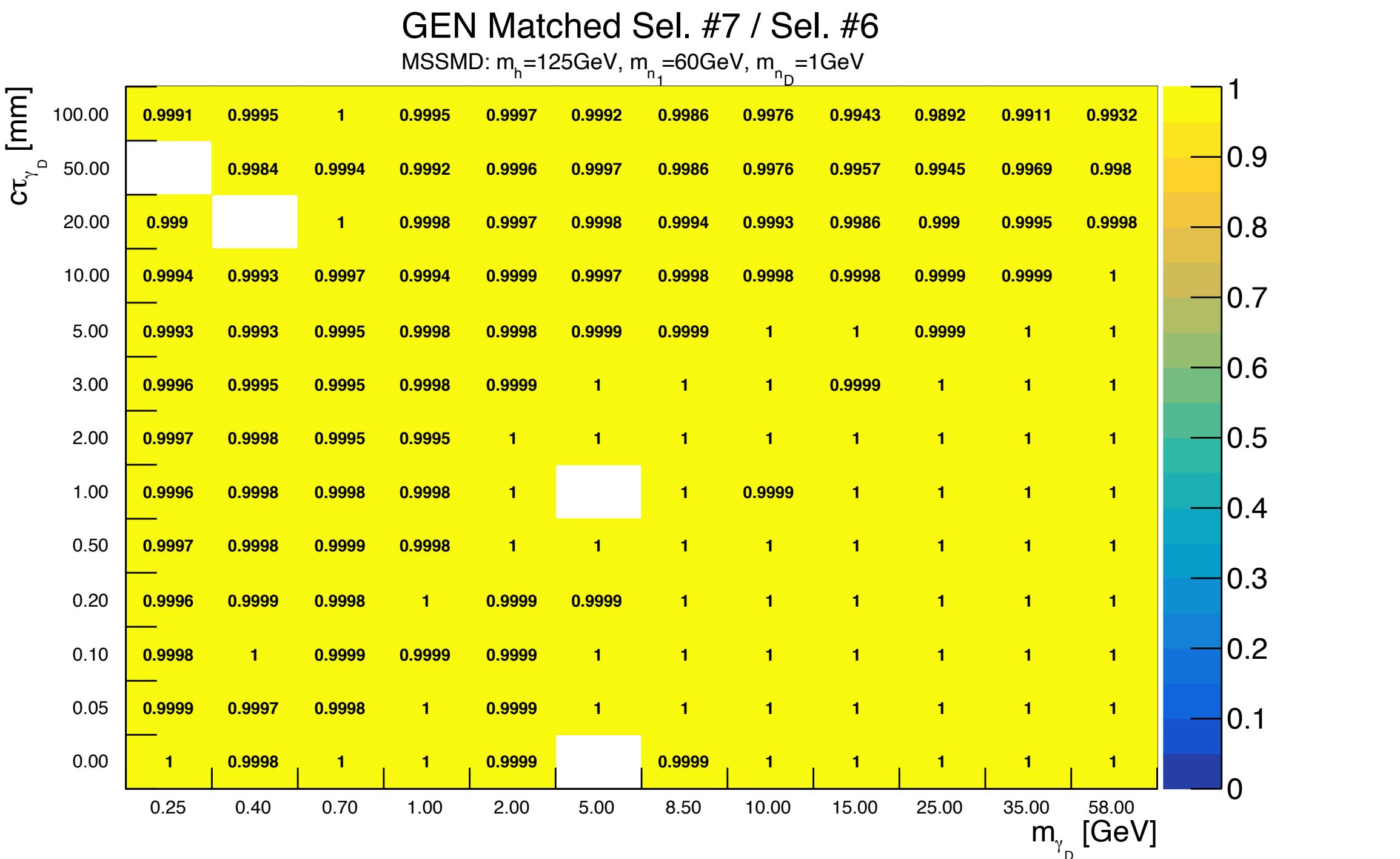
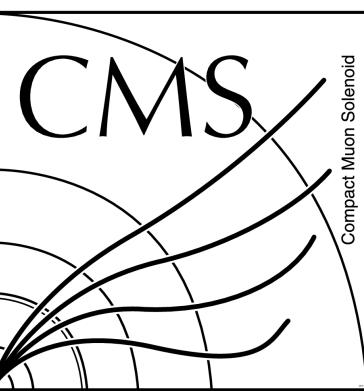
MSSMD: m=25 GeV, cT=100 mm (2017) Event #3



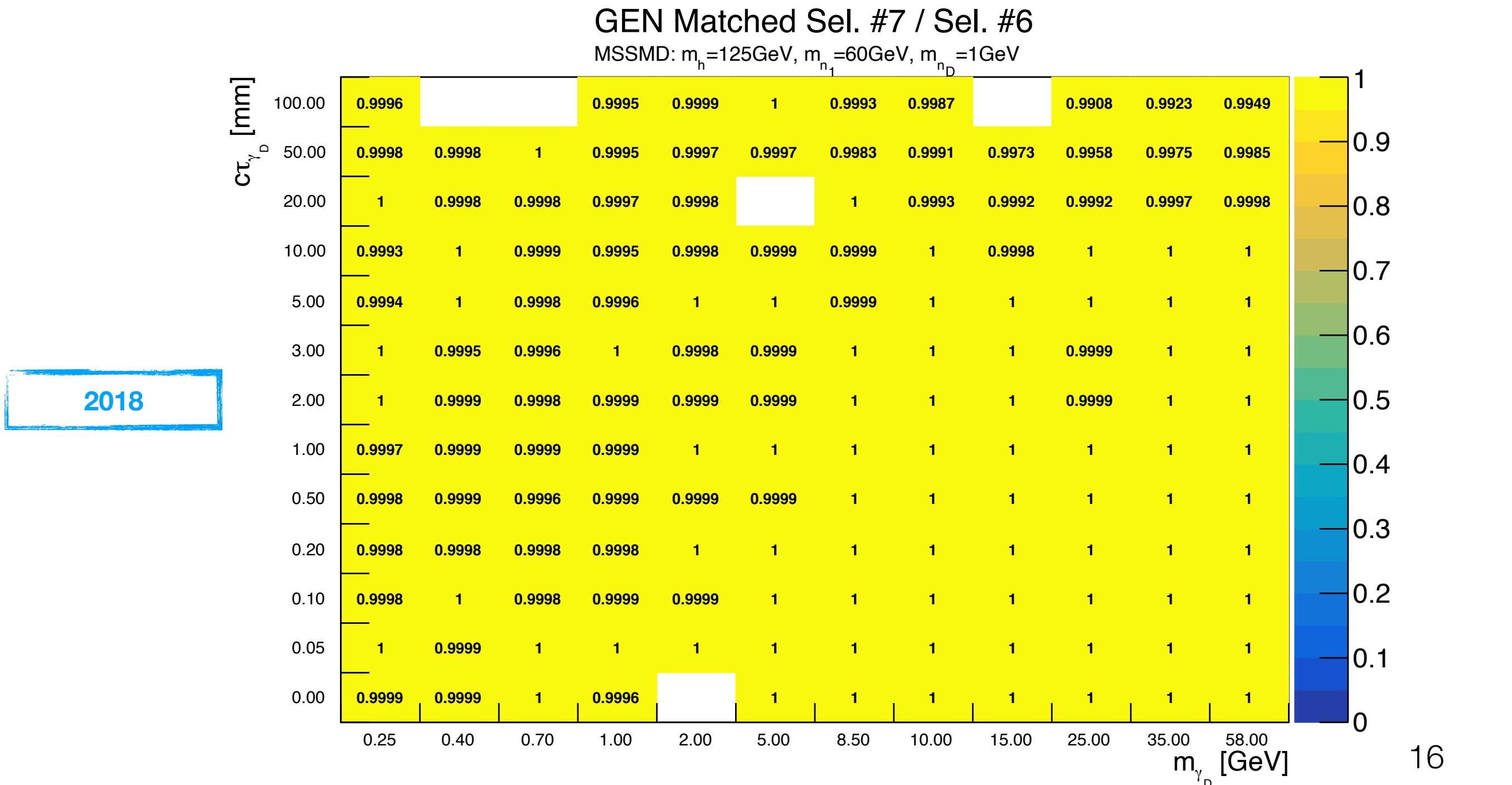


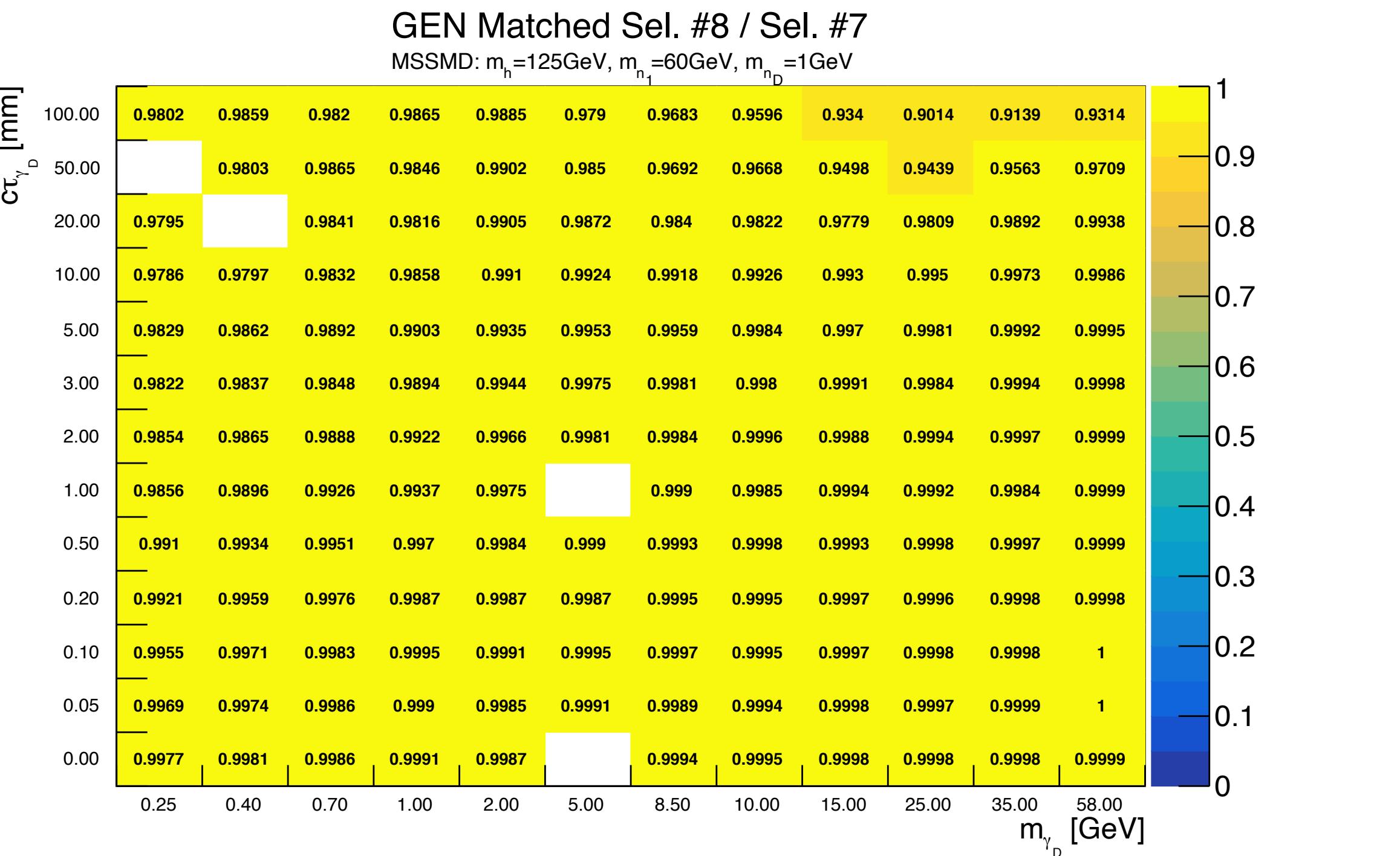
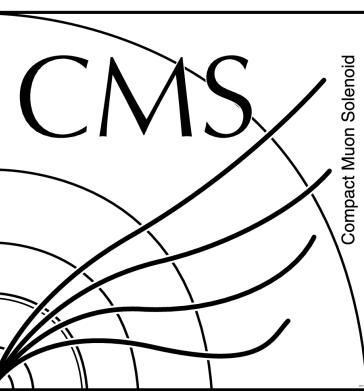
```
# Selection
#0 No cut
#1 is1GenMu17Barrel
#2 is2GenMu8
#3 is3GenMu8
#4 is4GenMu8
#5 Lxy<16.0cm && Lz<51.6cm
```





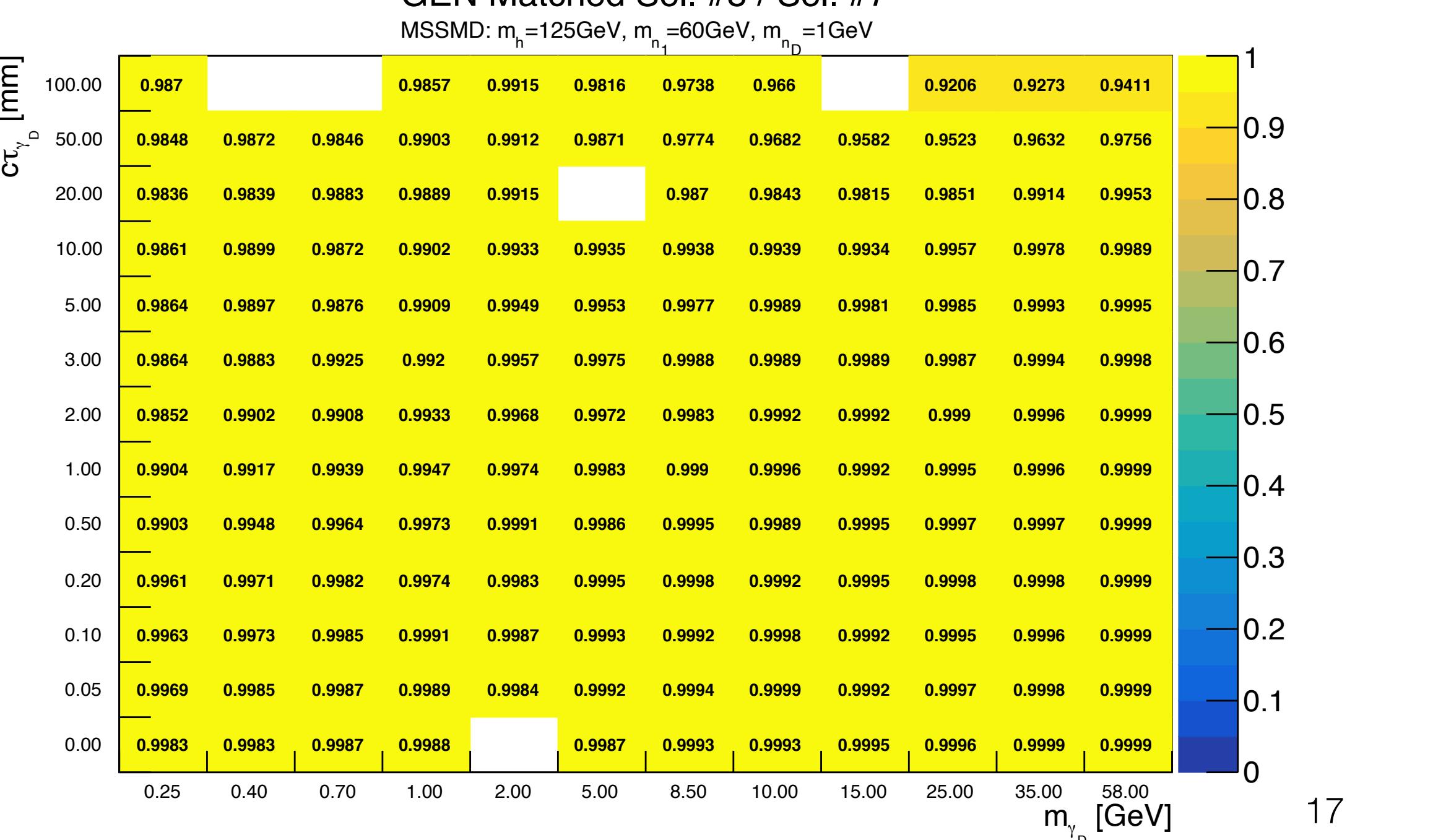
```
# Selection
#0 No cut
#1 is1GenMu17Barrel
#2 is2GenMu8
#3 is3GenMu8
#4 is4GenMu8
#5 Lxy<16.0cm && Lz<51.6cm
#6 is1SelMu17Barrel
#7 is2SelMu8
#8 is3SelMu8
#9 is4SelMu8
```

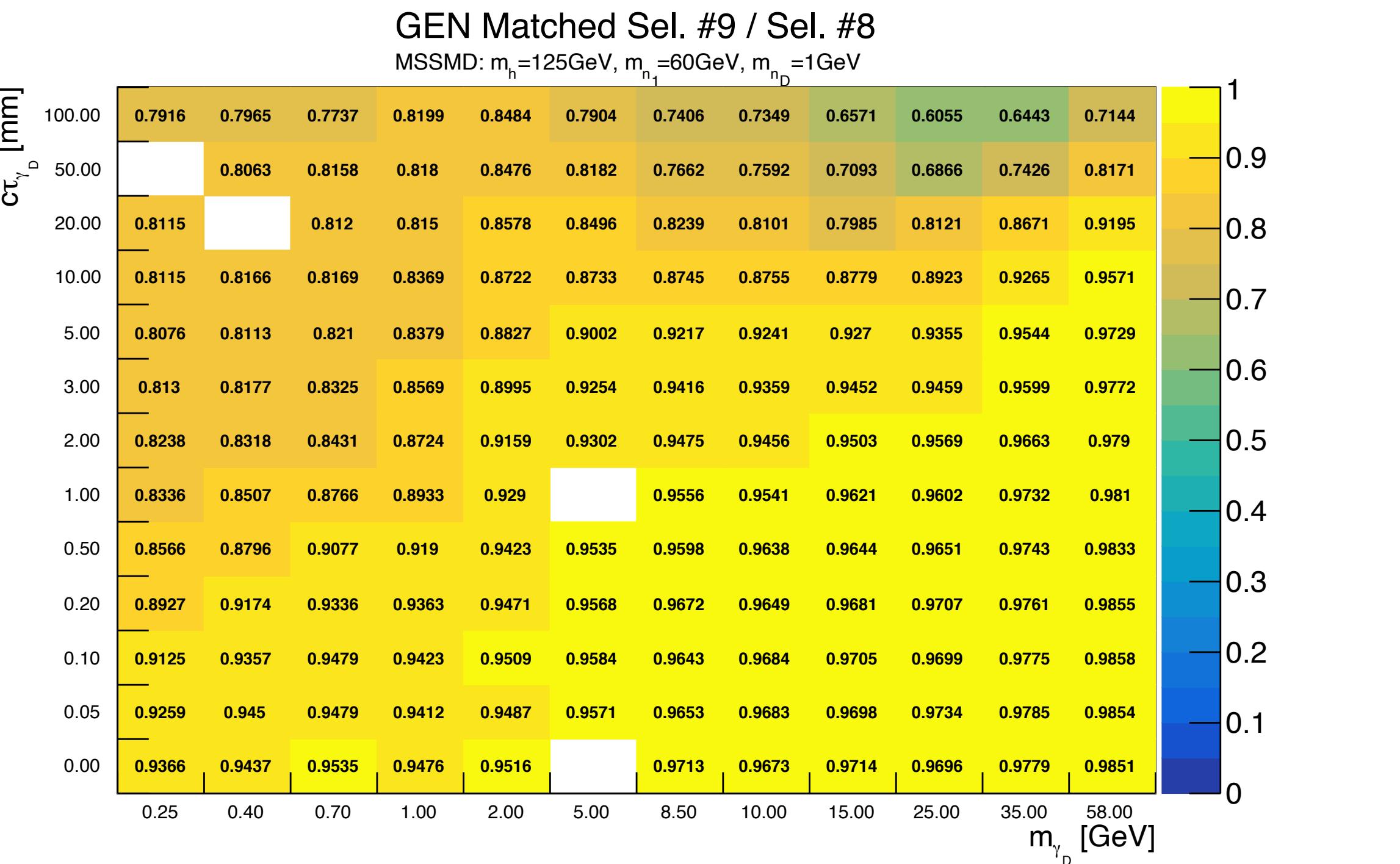
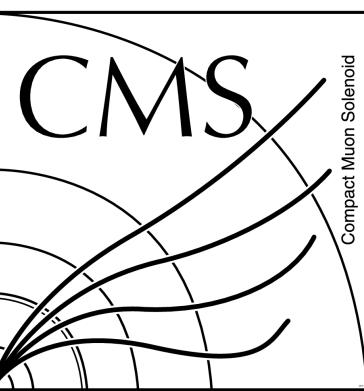




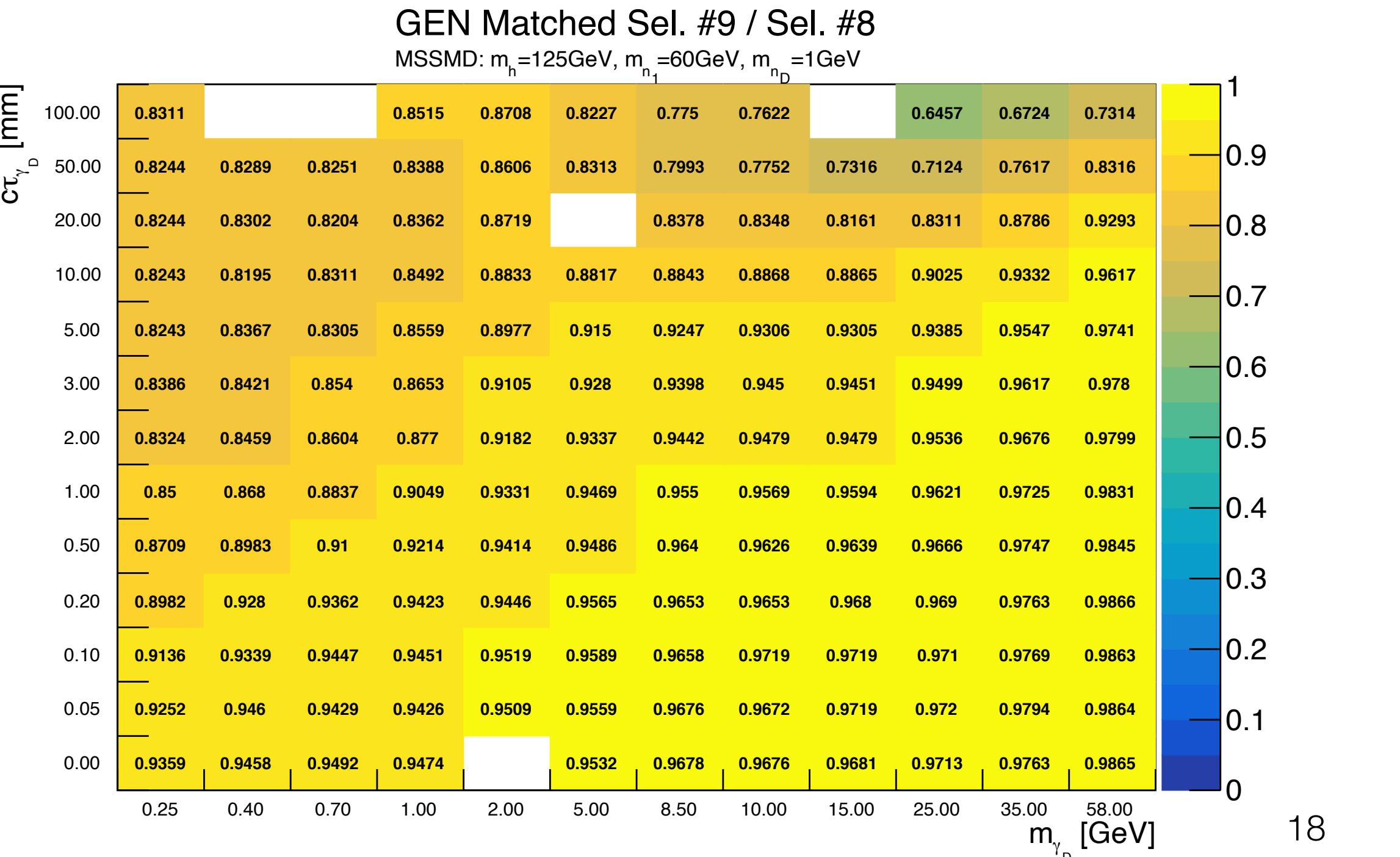
```
# Selection
#0 No cut
#1 is1GenMu17Barrel
#2 is2GenMu8
#3 is3GenMu8
#4 is4GenMu8
#5 Lxy<16.0cm && Lz<51.6cm
```

```
#6 is1SelMu17Barrel
#7 is2SelMu8
#8 is3SelMu8
#9 is4SelMu8
```




2017


```
# Selection
#0 No cut
#1 is1GenMu17Barrel
#2 is2GenMu8
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#5 Lxy<16.0cm && Lz<51.6cm
#6 is1SelMu17Barrel
#7 is2SelMu8
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#9 is4SelMu8
```


2018
