

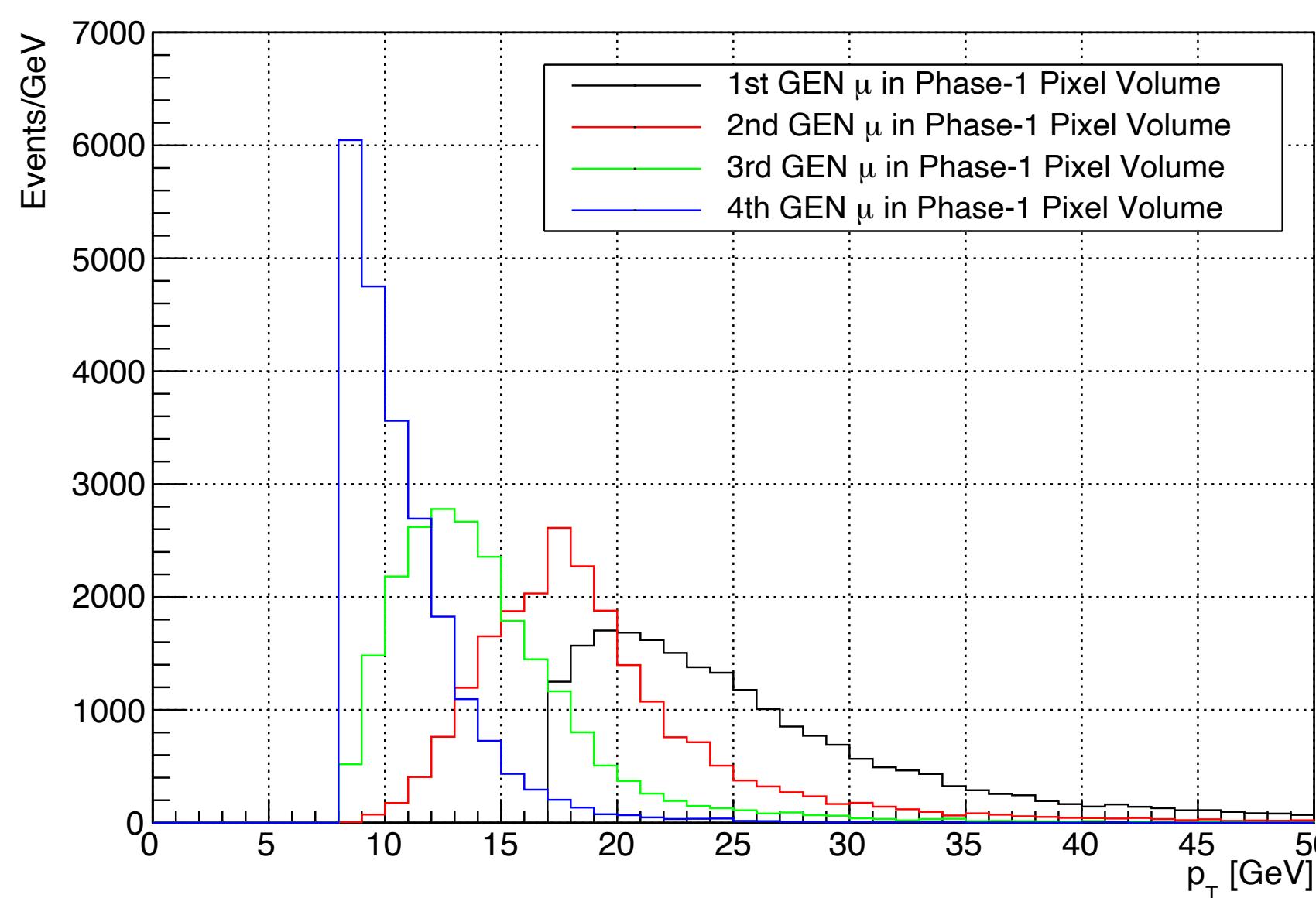
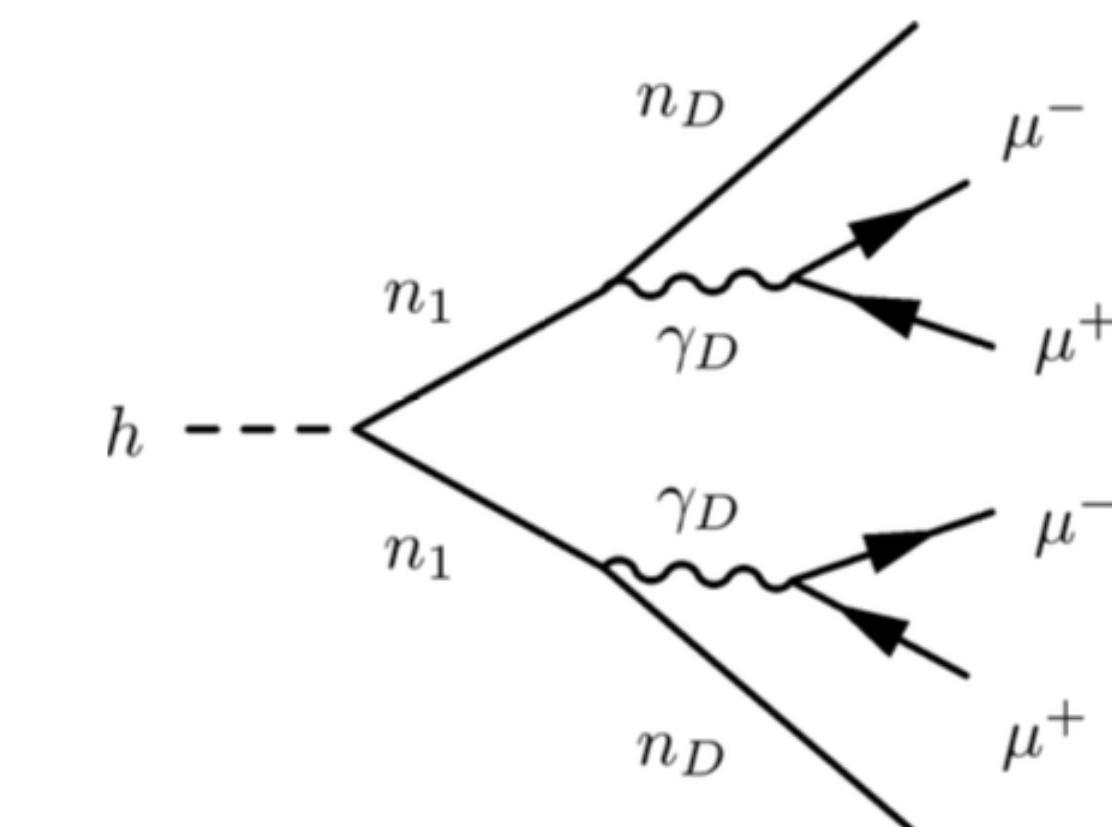
# **Reconstruction for Displaced Muons in MiniAODSIM**

Wei Shi

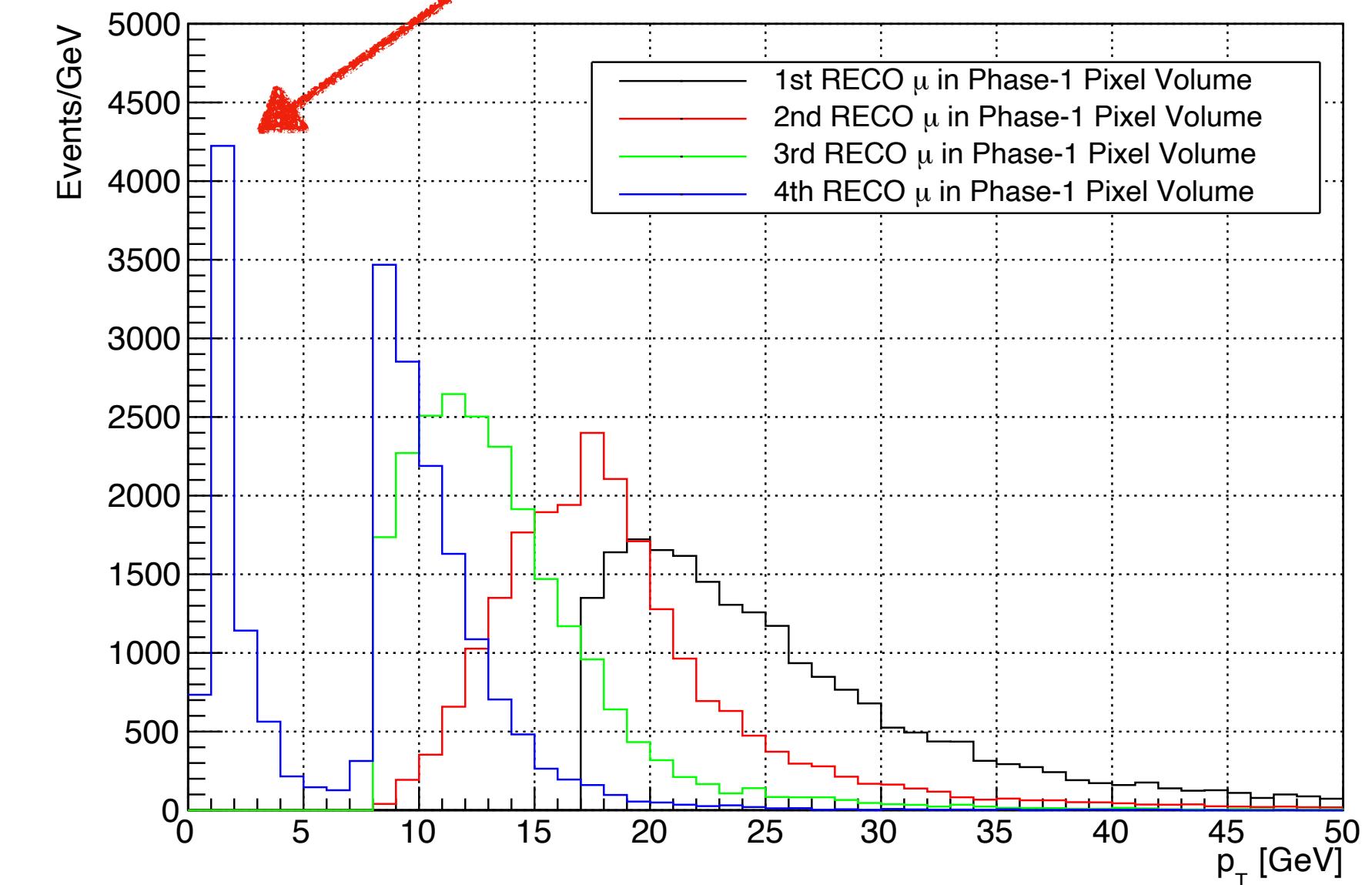
Rice U.

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



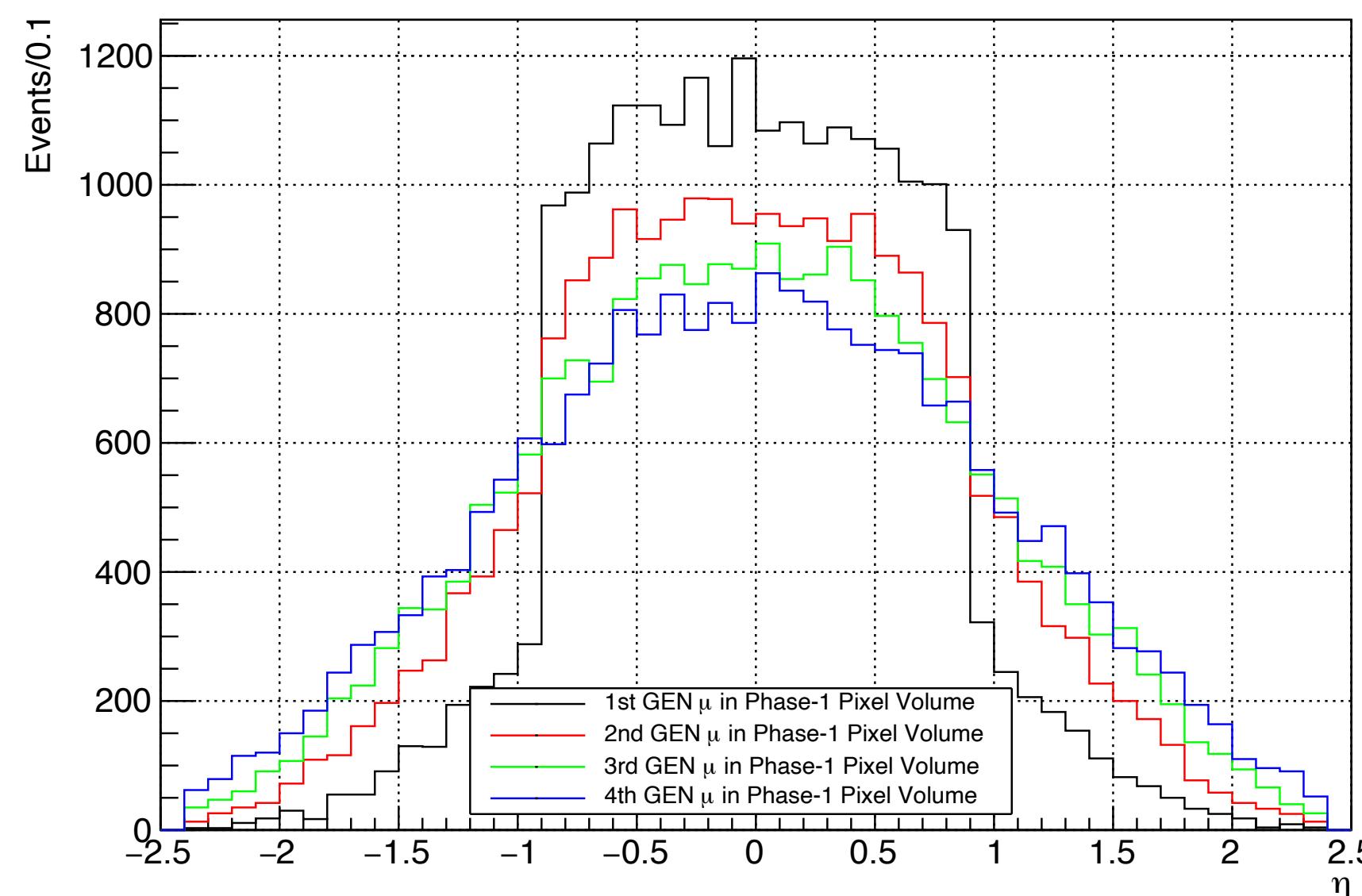
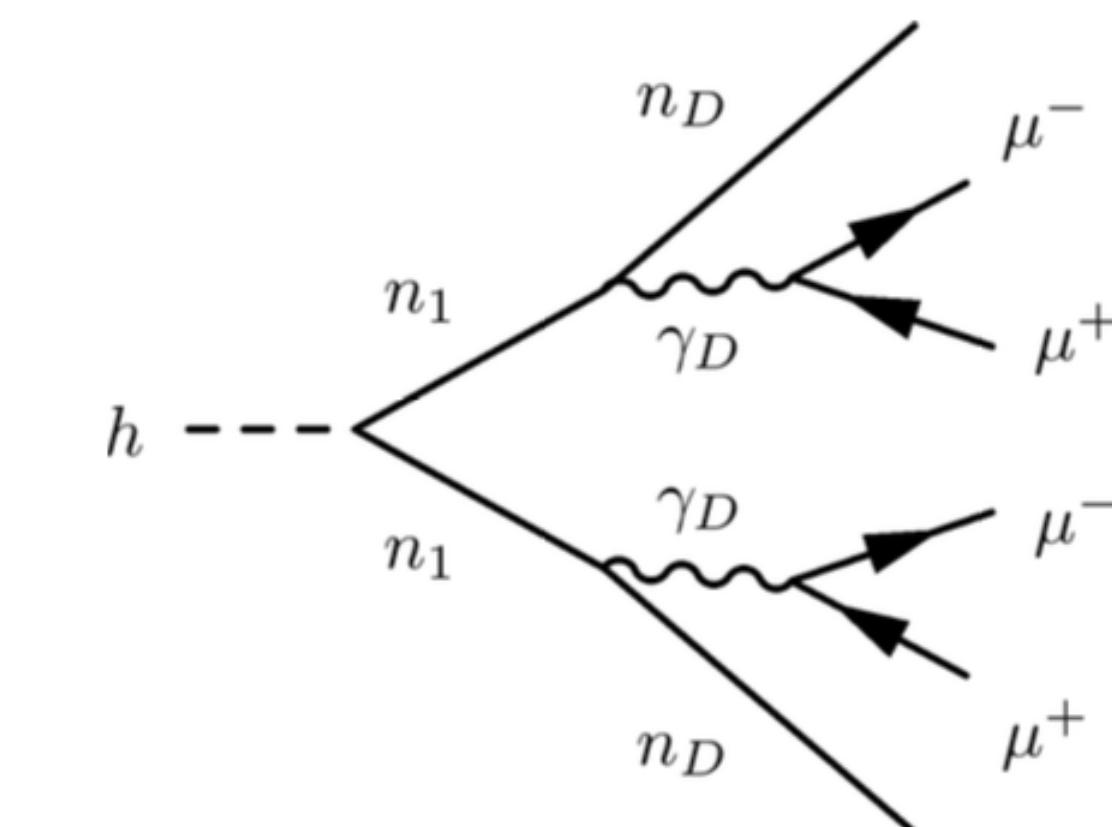
First four leading pT muons at GEN level



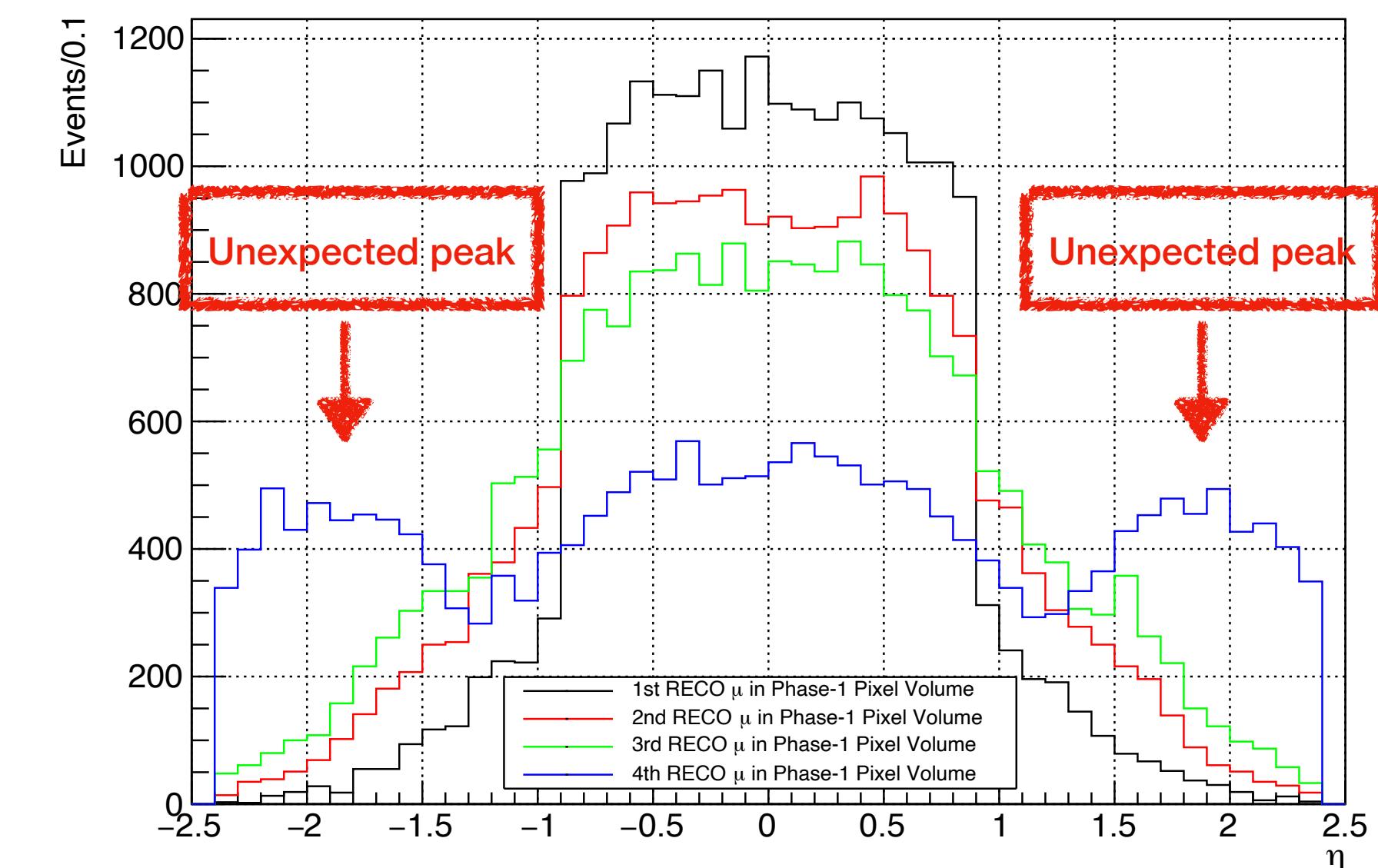
First four leading pT muons at RECO level

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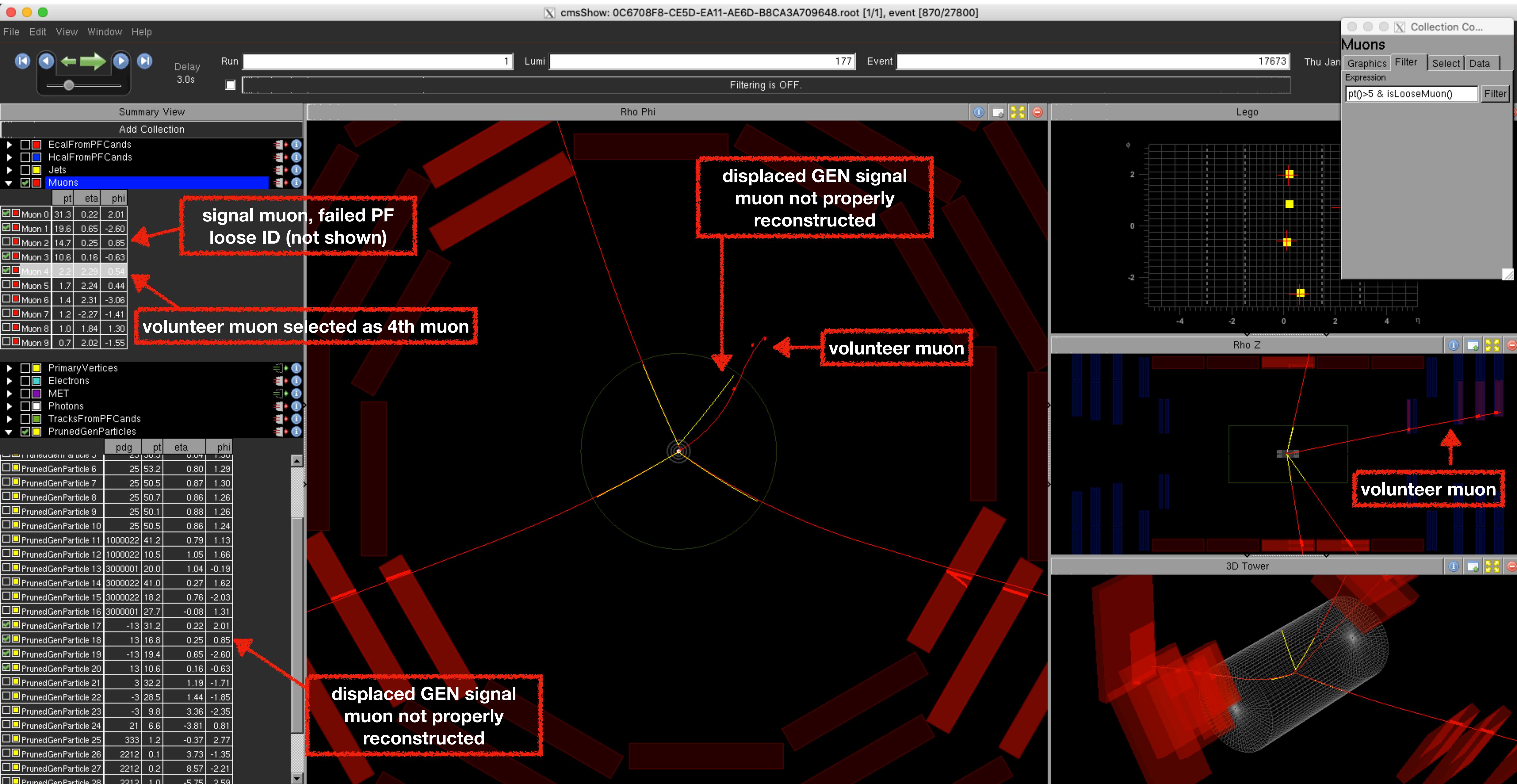


First four leading pT muons at GEN level



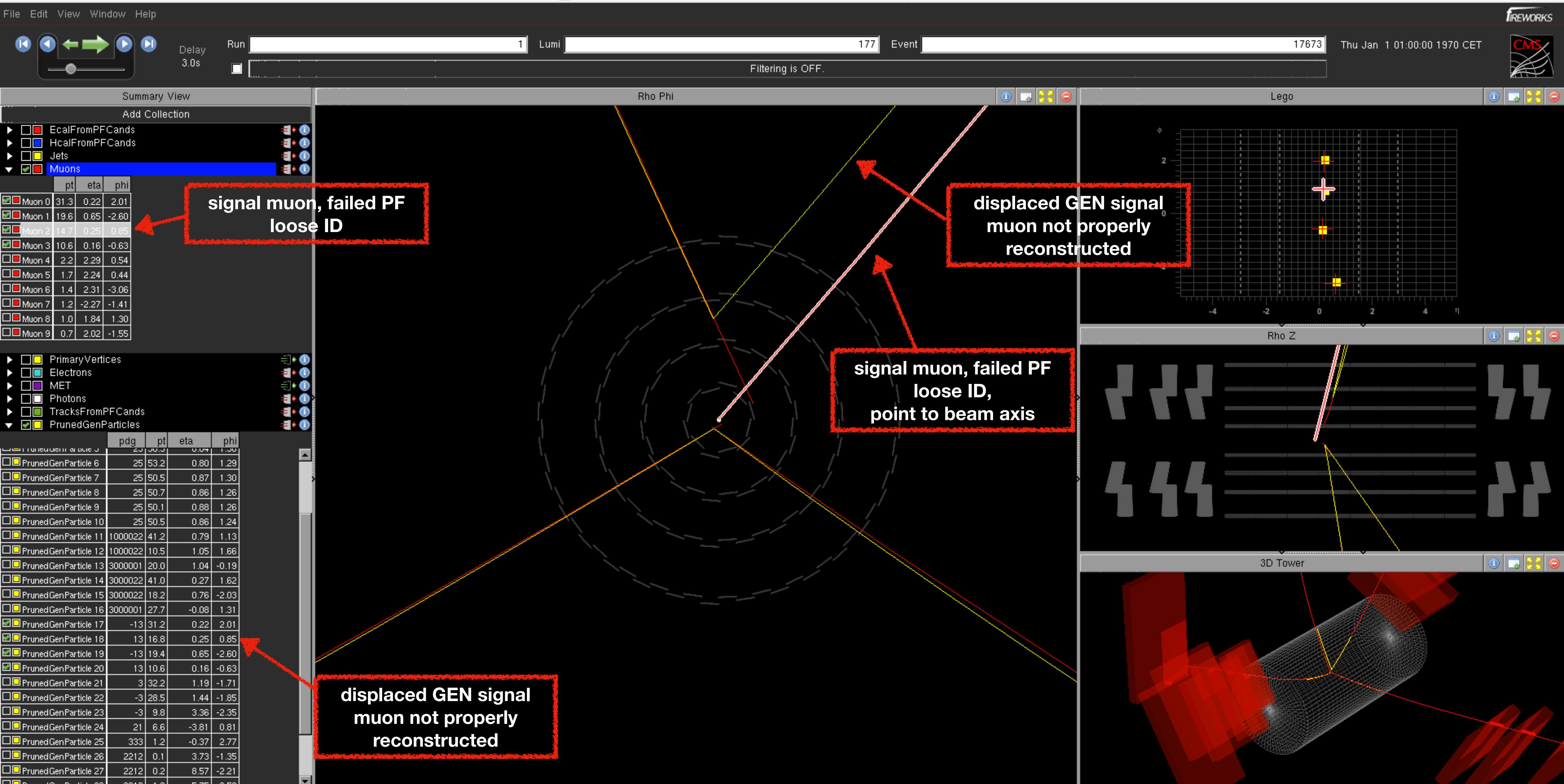
First four leading pT muons at RECO level

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

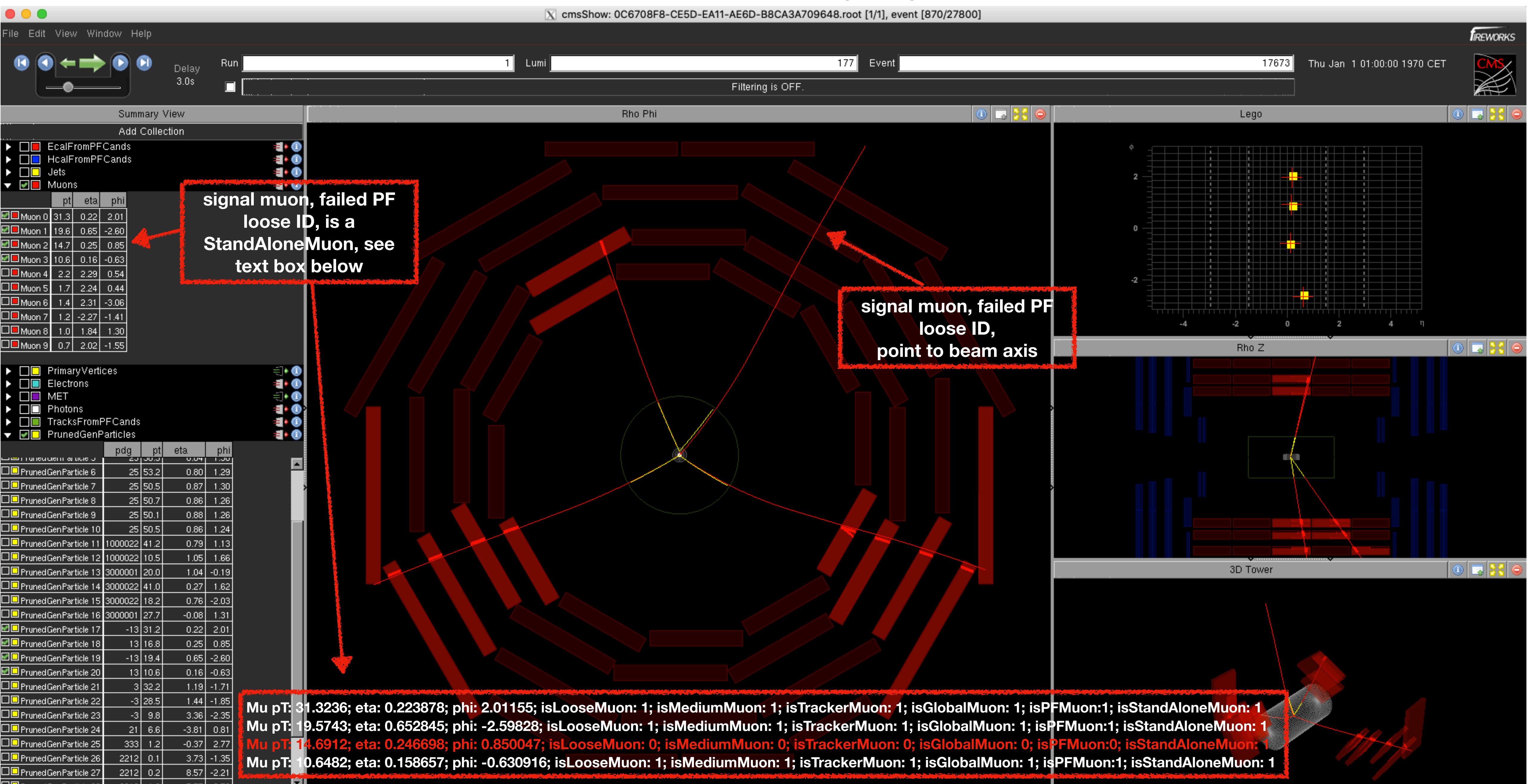


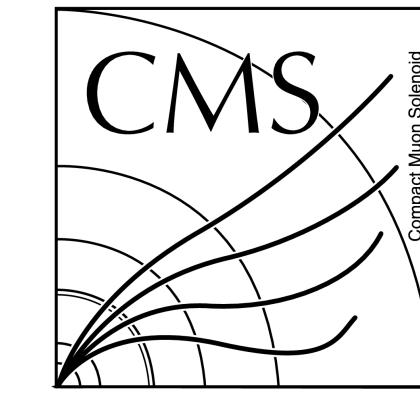
# MSSMD: m=25 GeV, cT=100 mm (2017) Event #1

cmsShow: 0C6708F8-CE5D-EA11-AE6D-B8CA3A709648.root [1/1], event [870/27800]



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





RICE

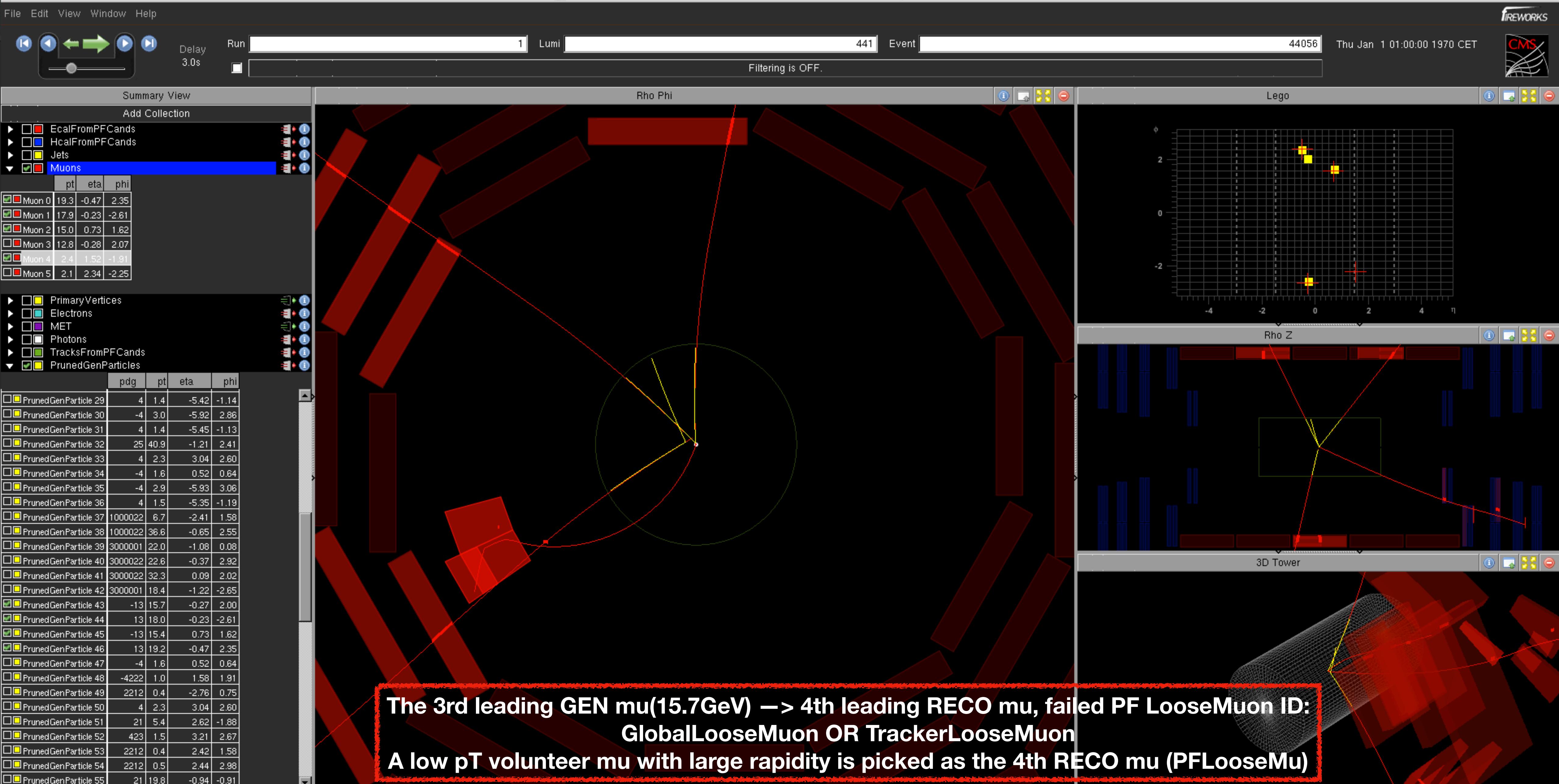
# Summary & Questions

- 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**

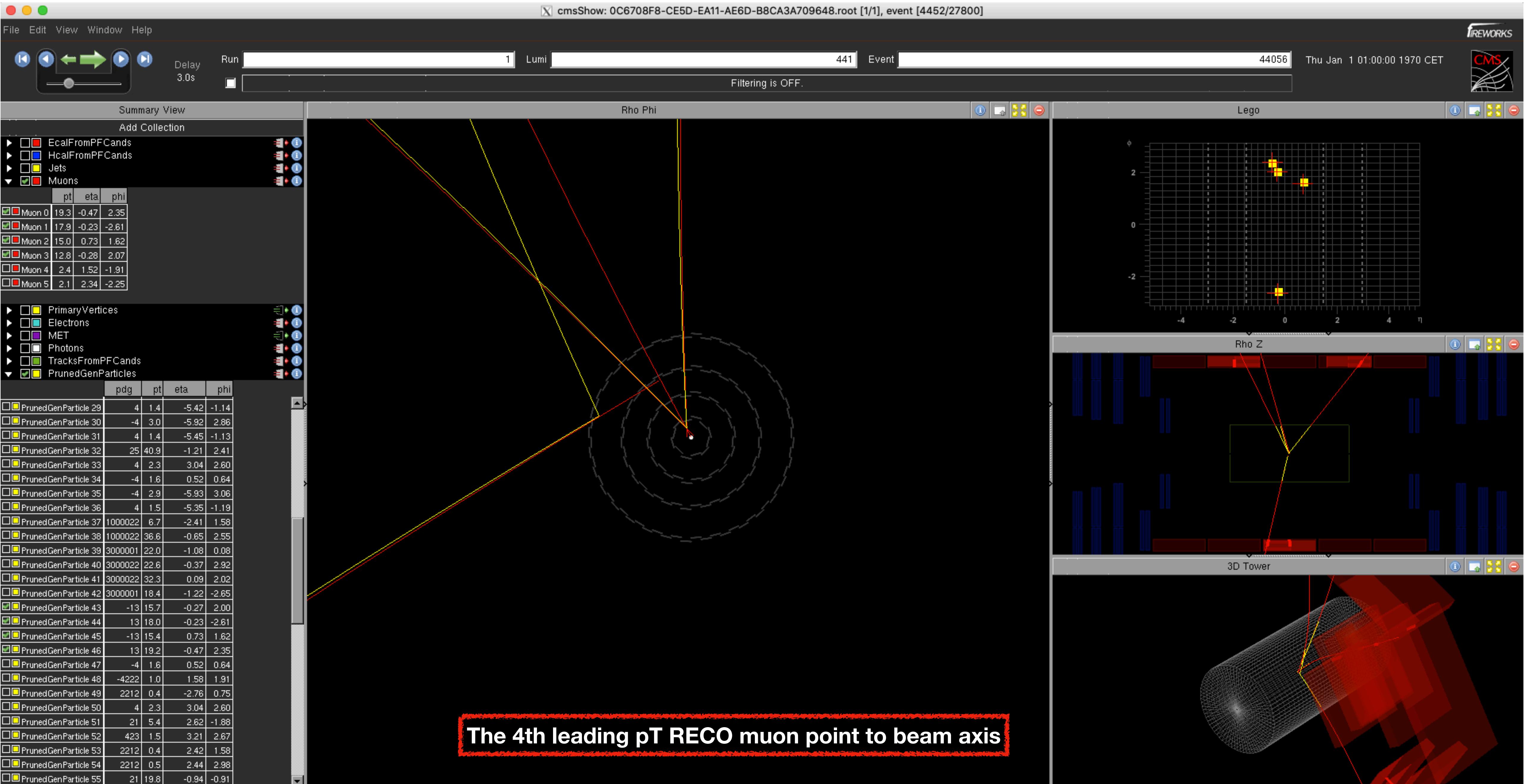
# MSSMD: m=25 GeV, cT=100 mm (2017) Event #2

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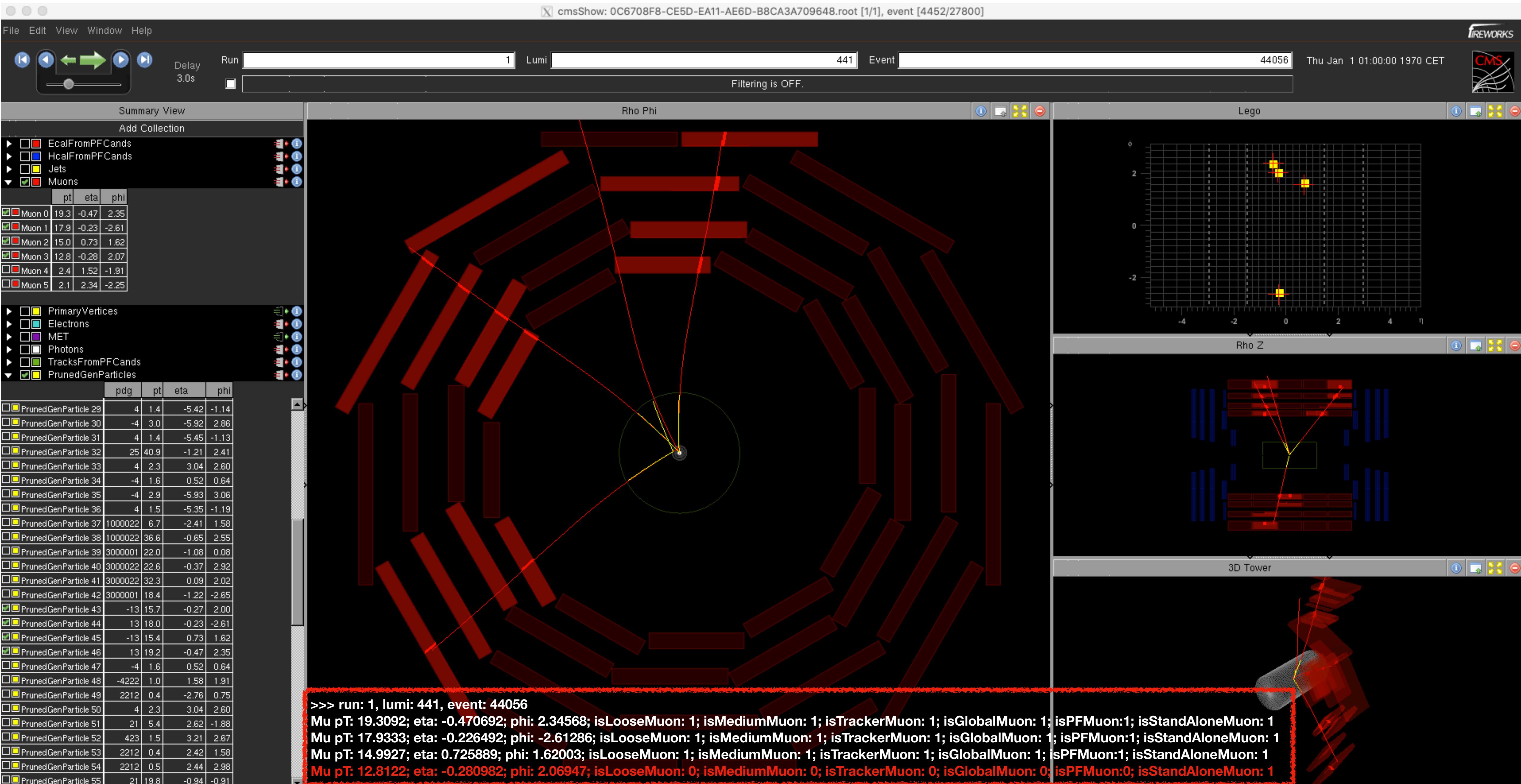
# MSSMD: m=25 GeV, cT=100 mm (2017) Event #2

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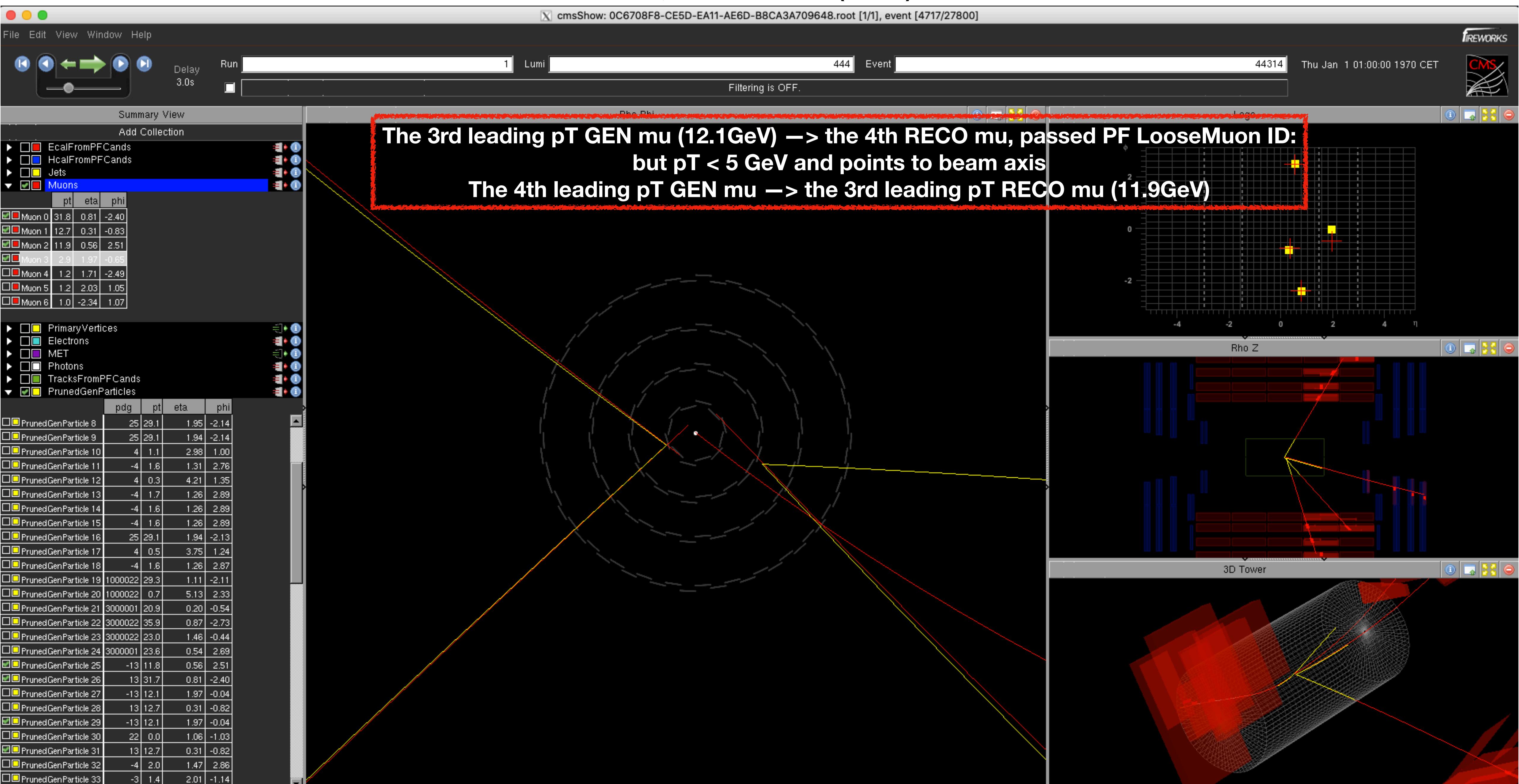
# MSSMD: m=25 GeV, cT=100 mm (2017) Event #2

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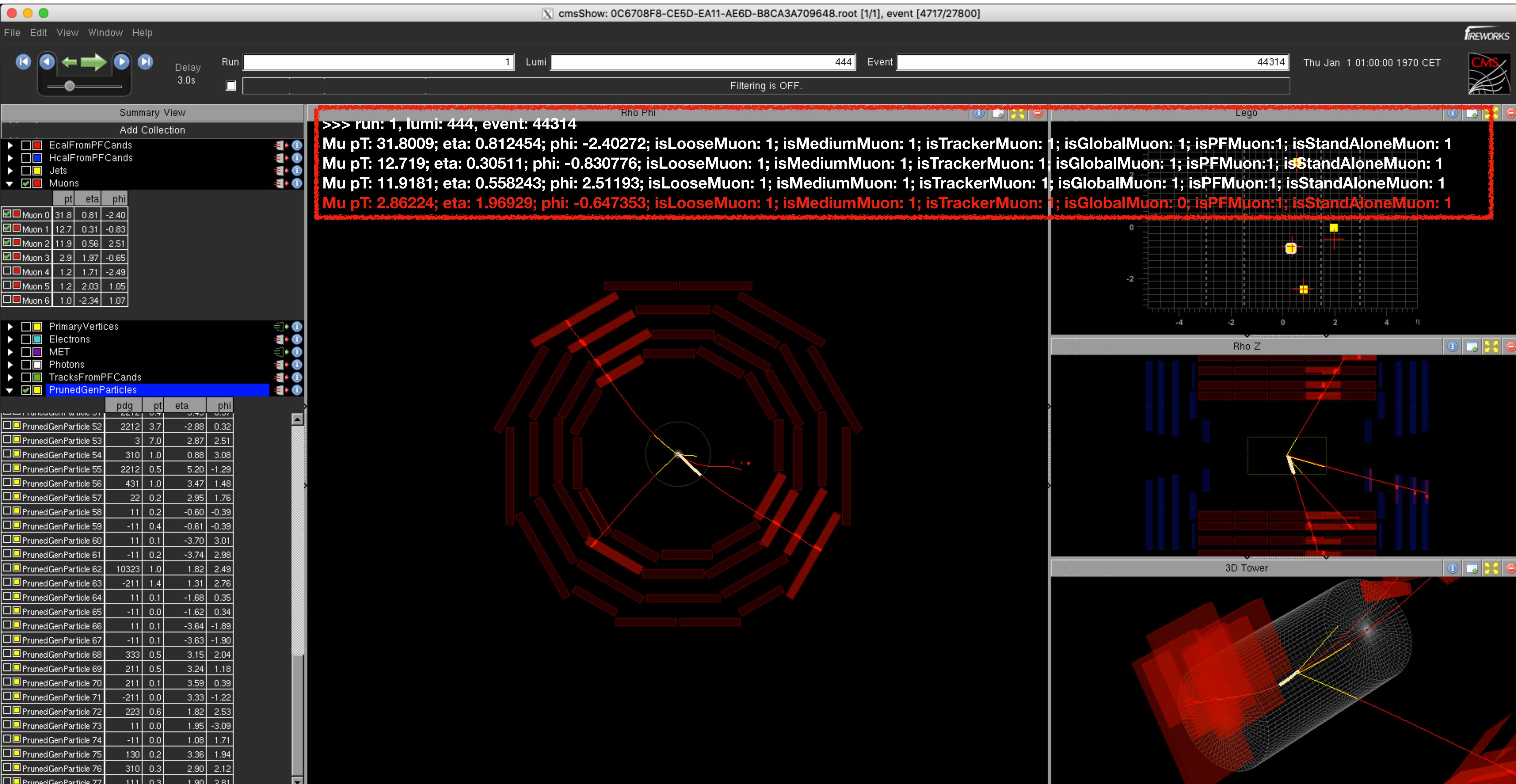


# MSSMD: m=25 GeV, cT=100 mm (2017) Event #3

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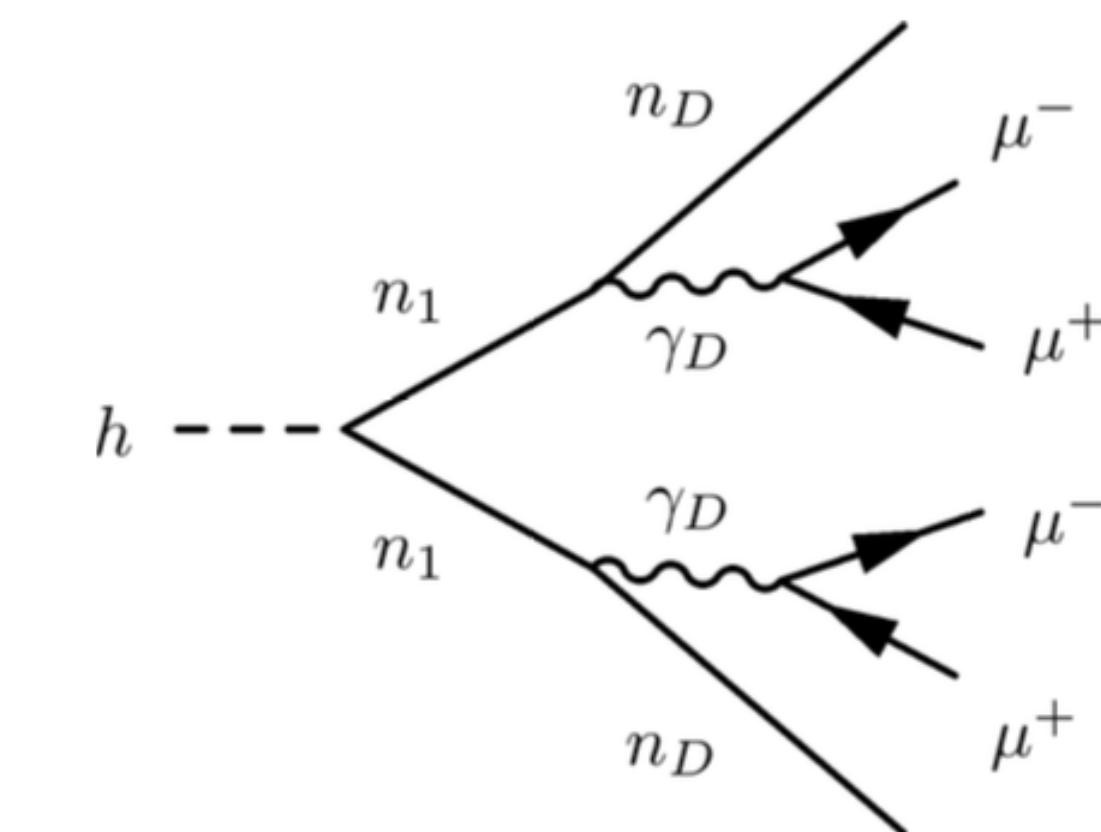


# MSSMD: m=25 GeV, cT=100 mm (2017) Event #3

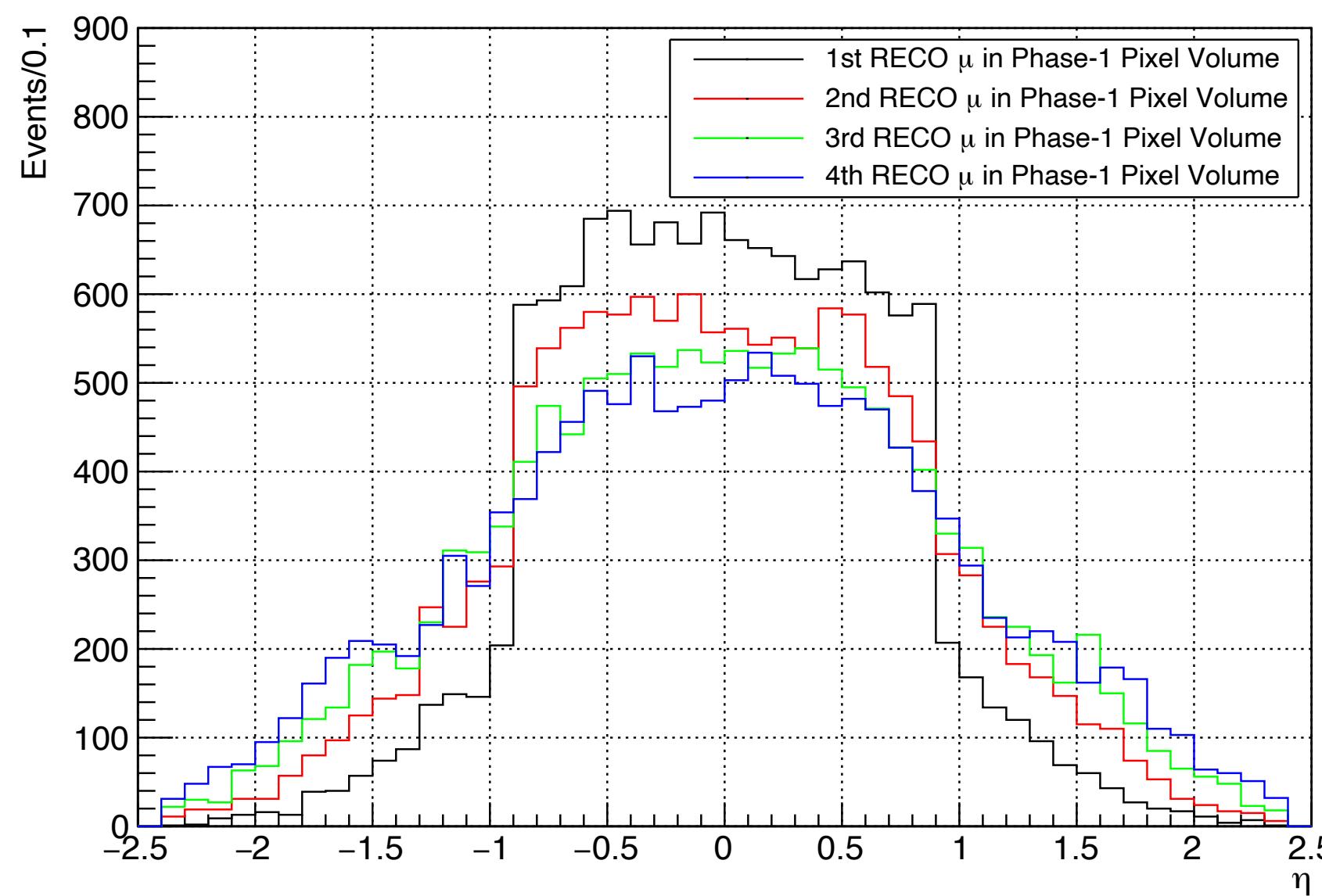


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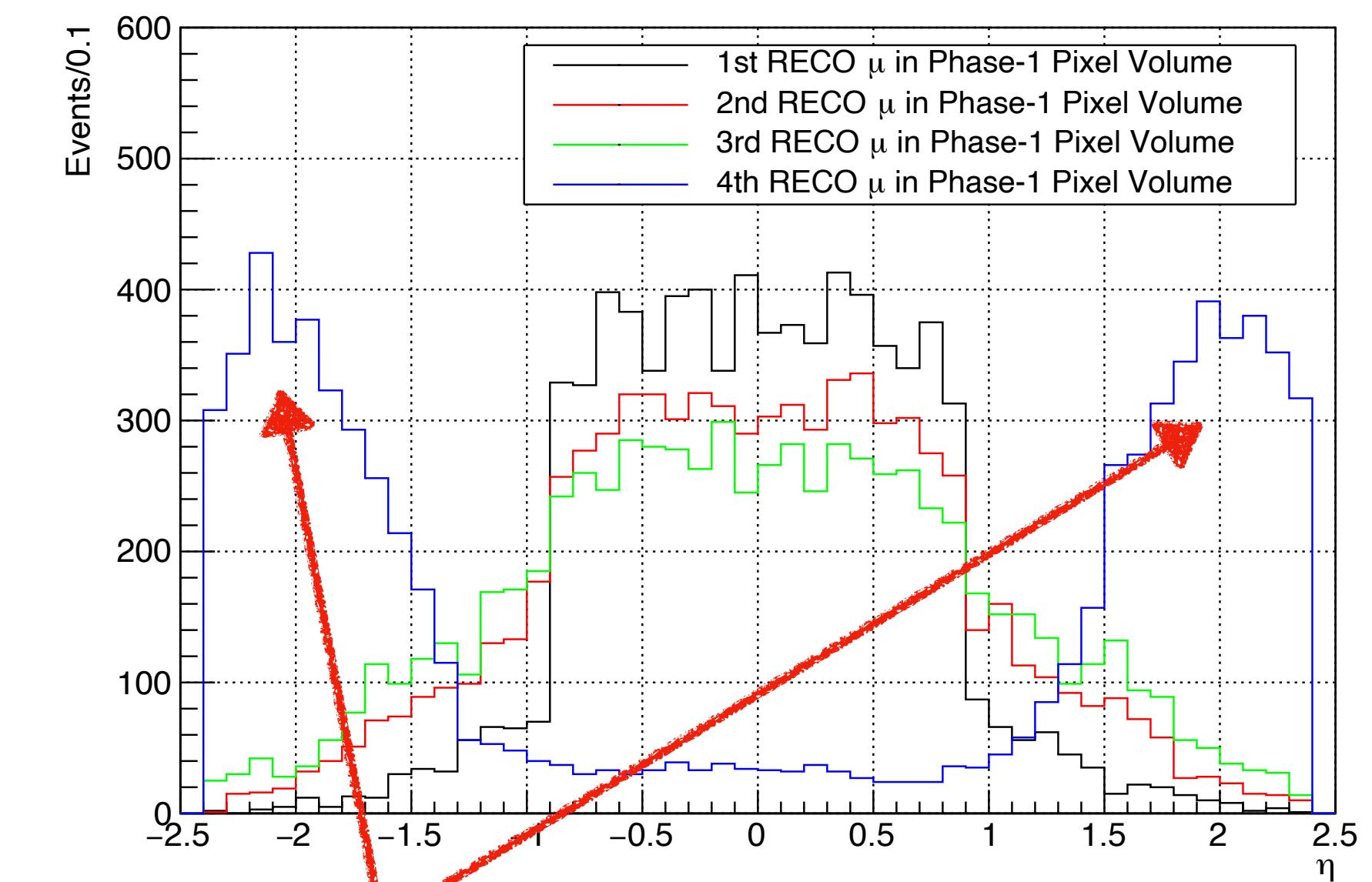
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 $pT>8\text{GeV}$  passing PF LooseMuon ID



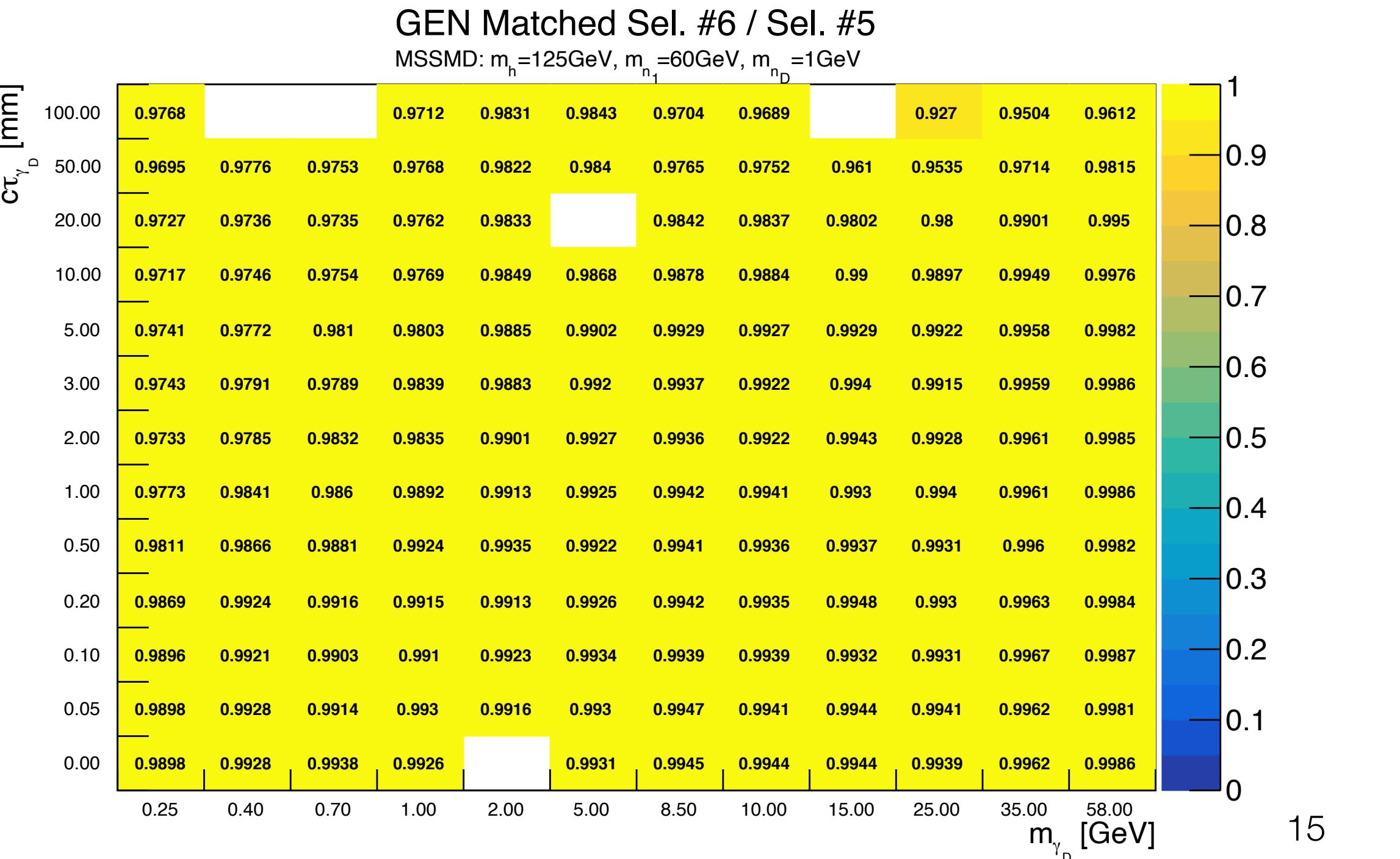
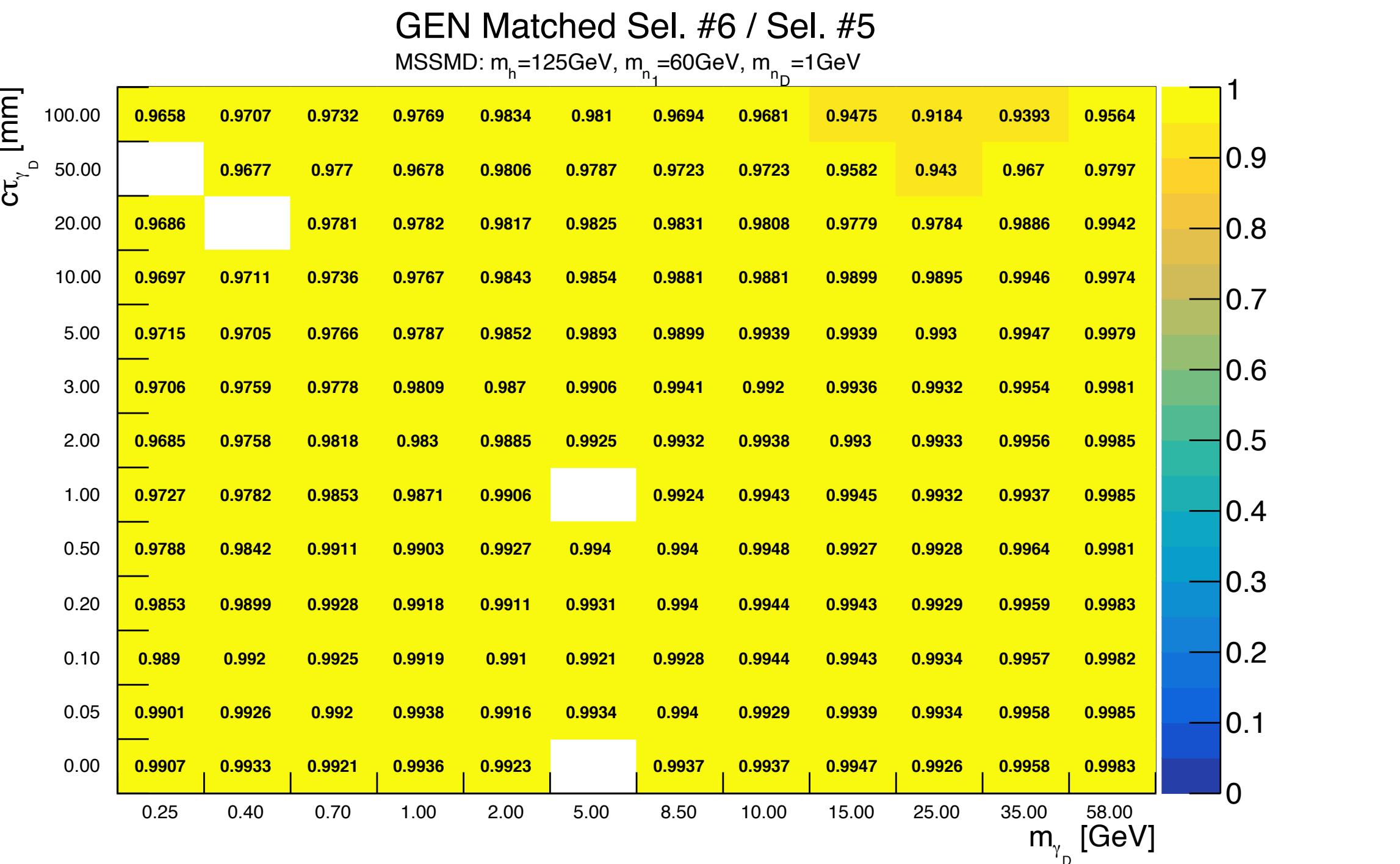
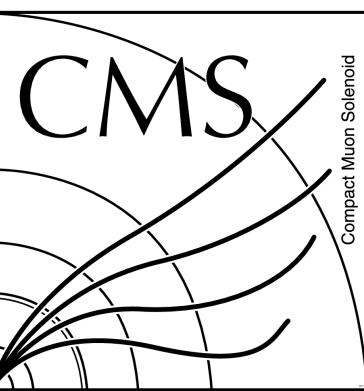
4th RECO mu  $pT>8\text{GeV}$



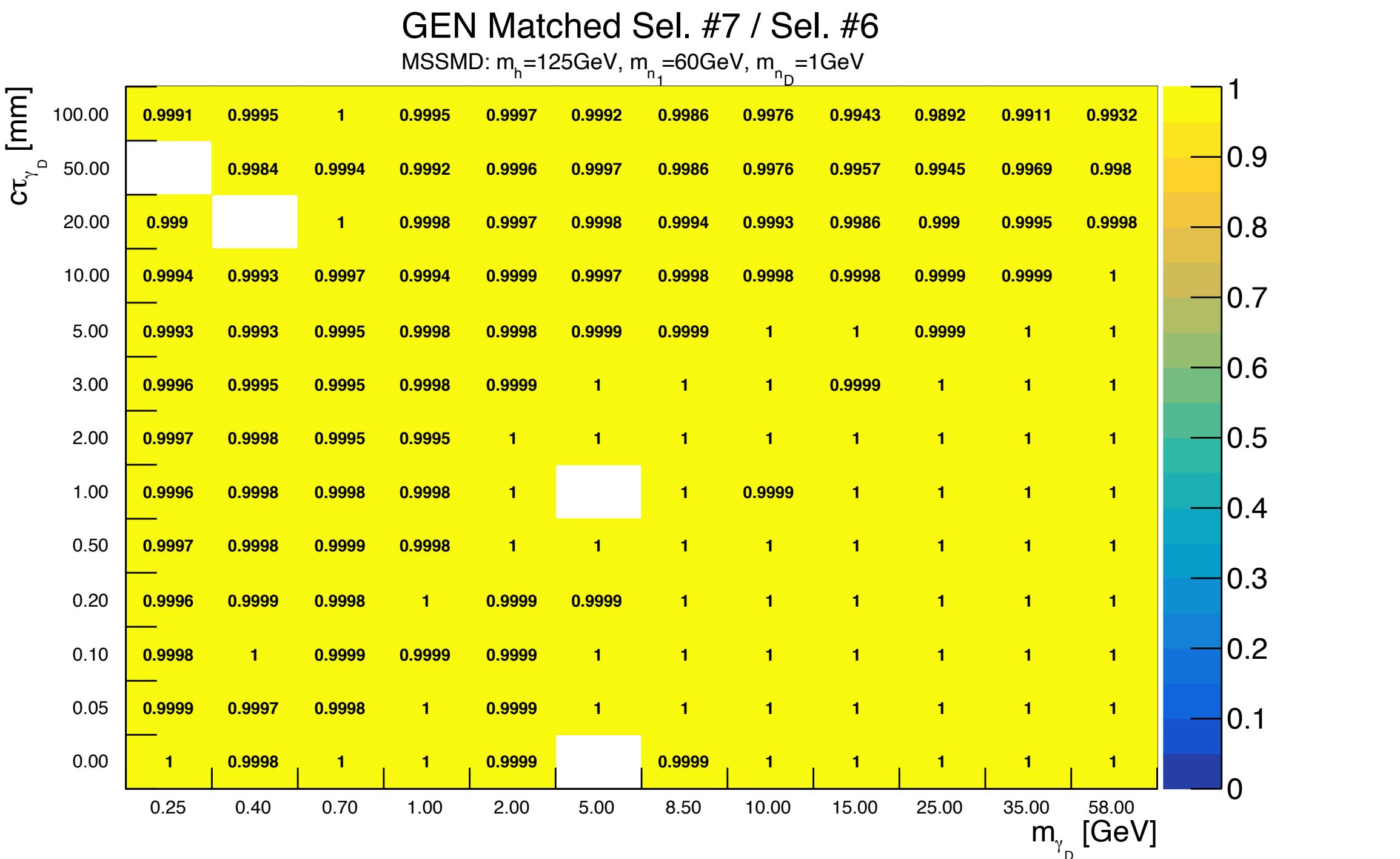
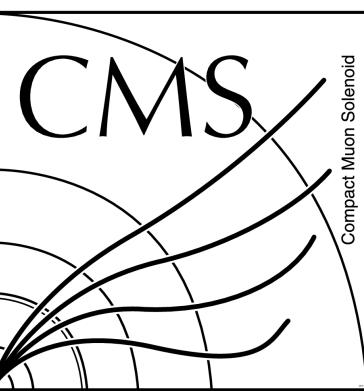
4th RECO mu  $pT<8\text{GeV}$



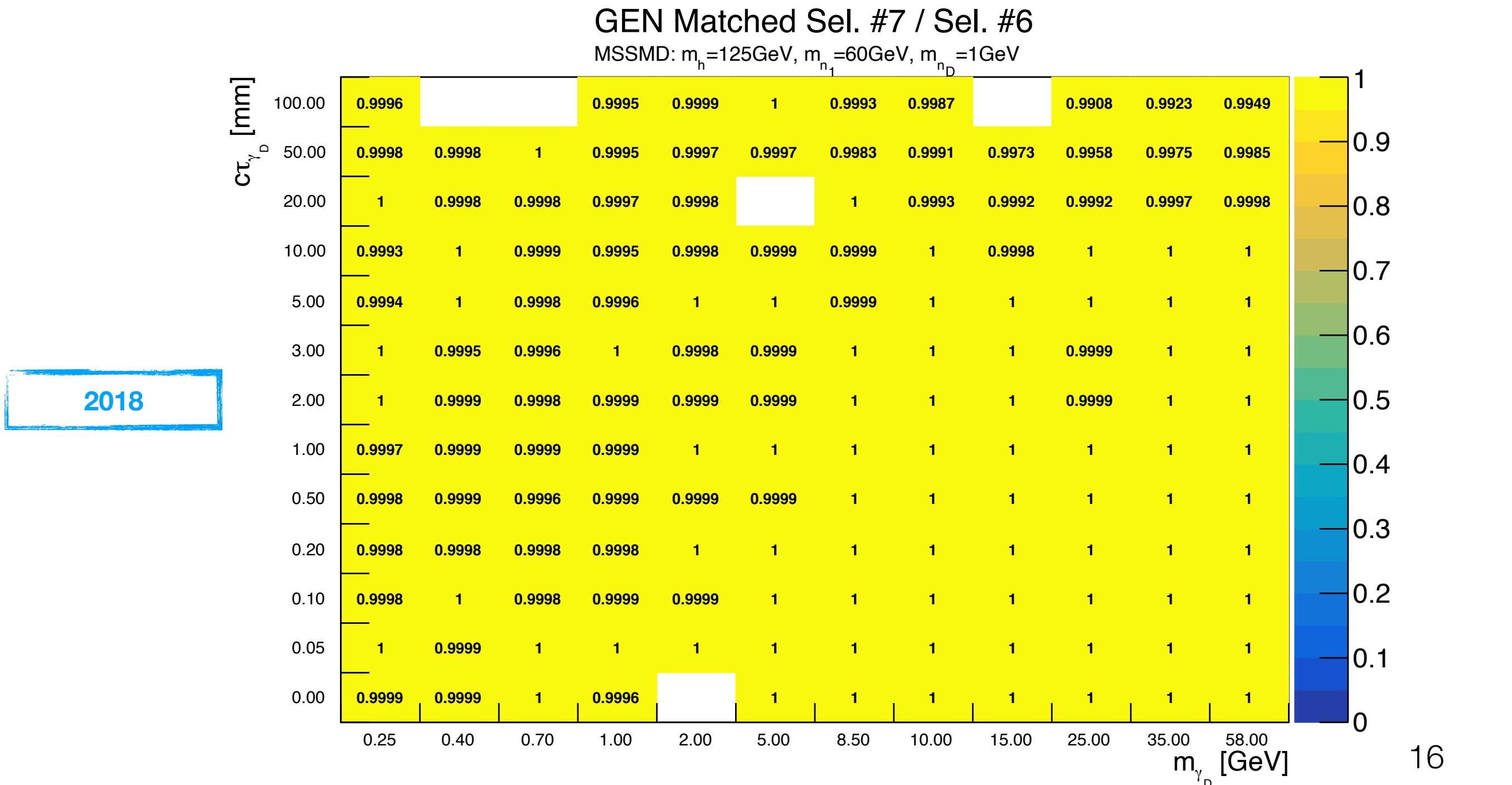
Volunteer RECO muons with low  $pT$  in the forward region: passed PF loose mu ID

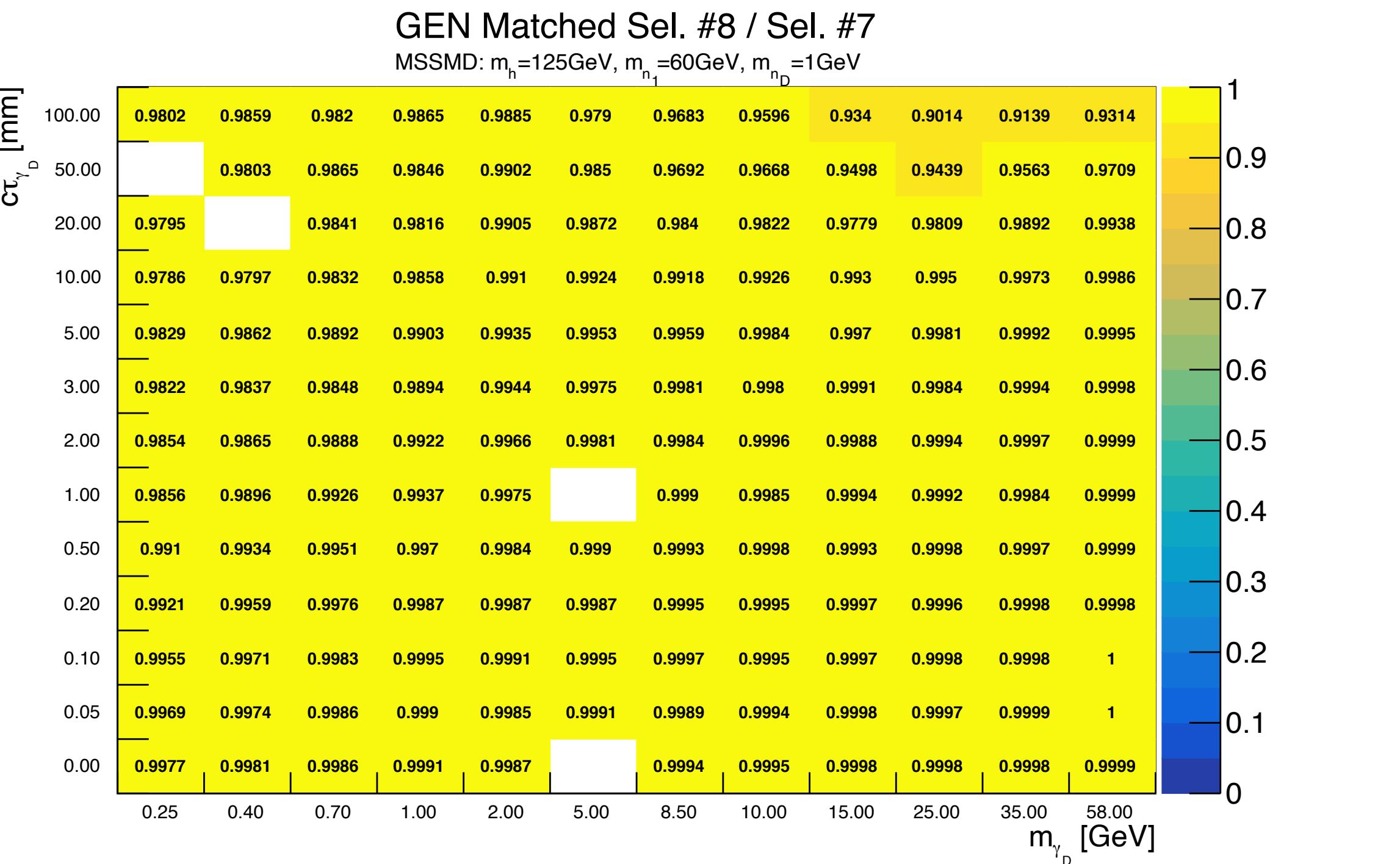
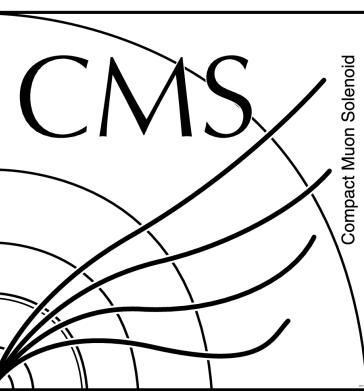


```
# Selection
#0 No cut
#1 is1GenMu17Barrel
#2 is2GenMu8
#3 is3GenMu8
#4 is4GenMu8
#5 Lxy<16.0cm && Lz<51.6cm
#6 is1SelMu17Barrel
#7 is2SelMu8
#8 is3SelMu8
#9 is4SelMu8
```

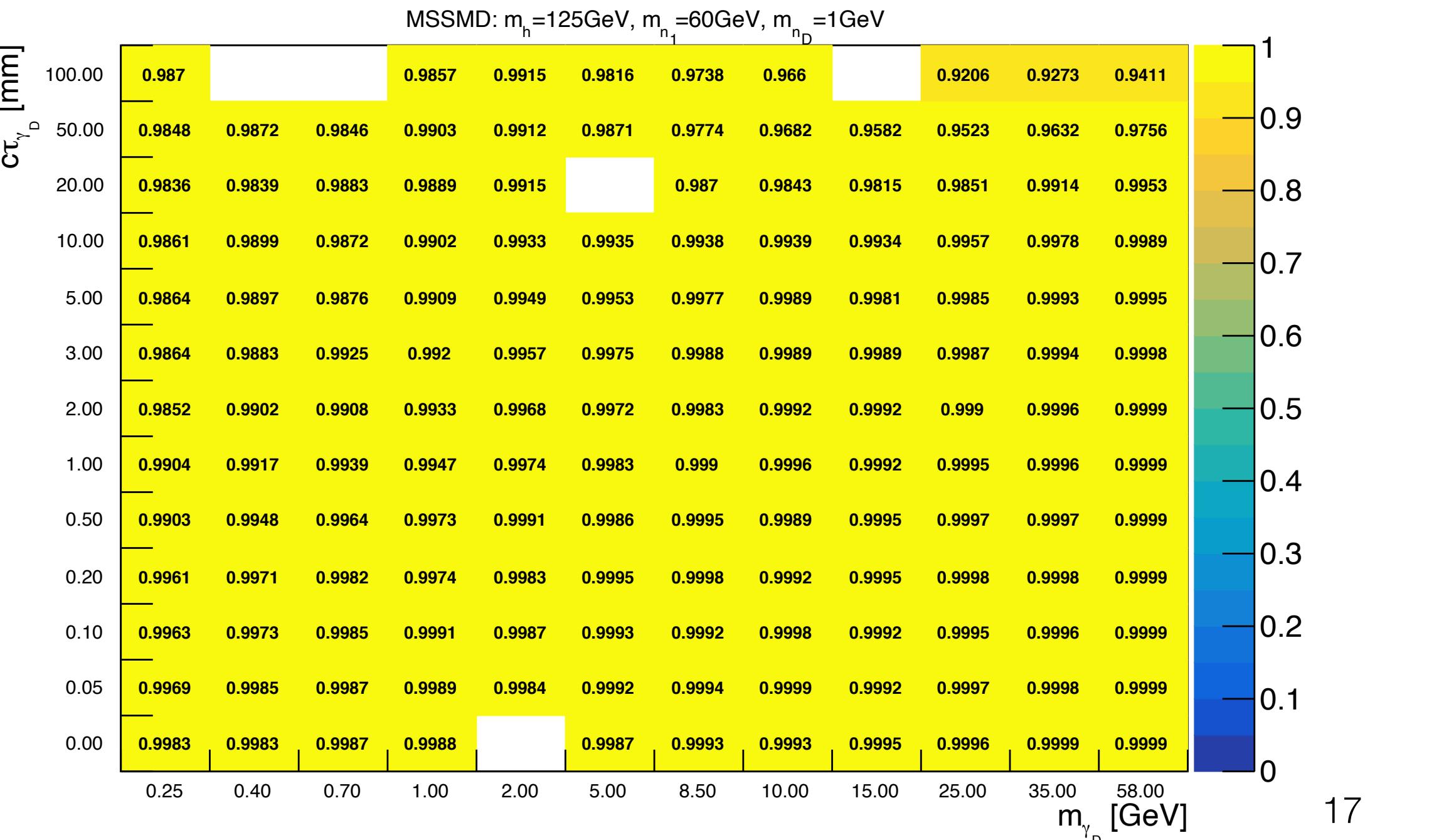


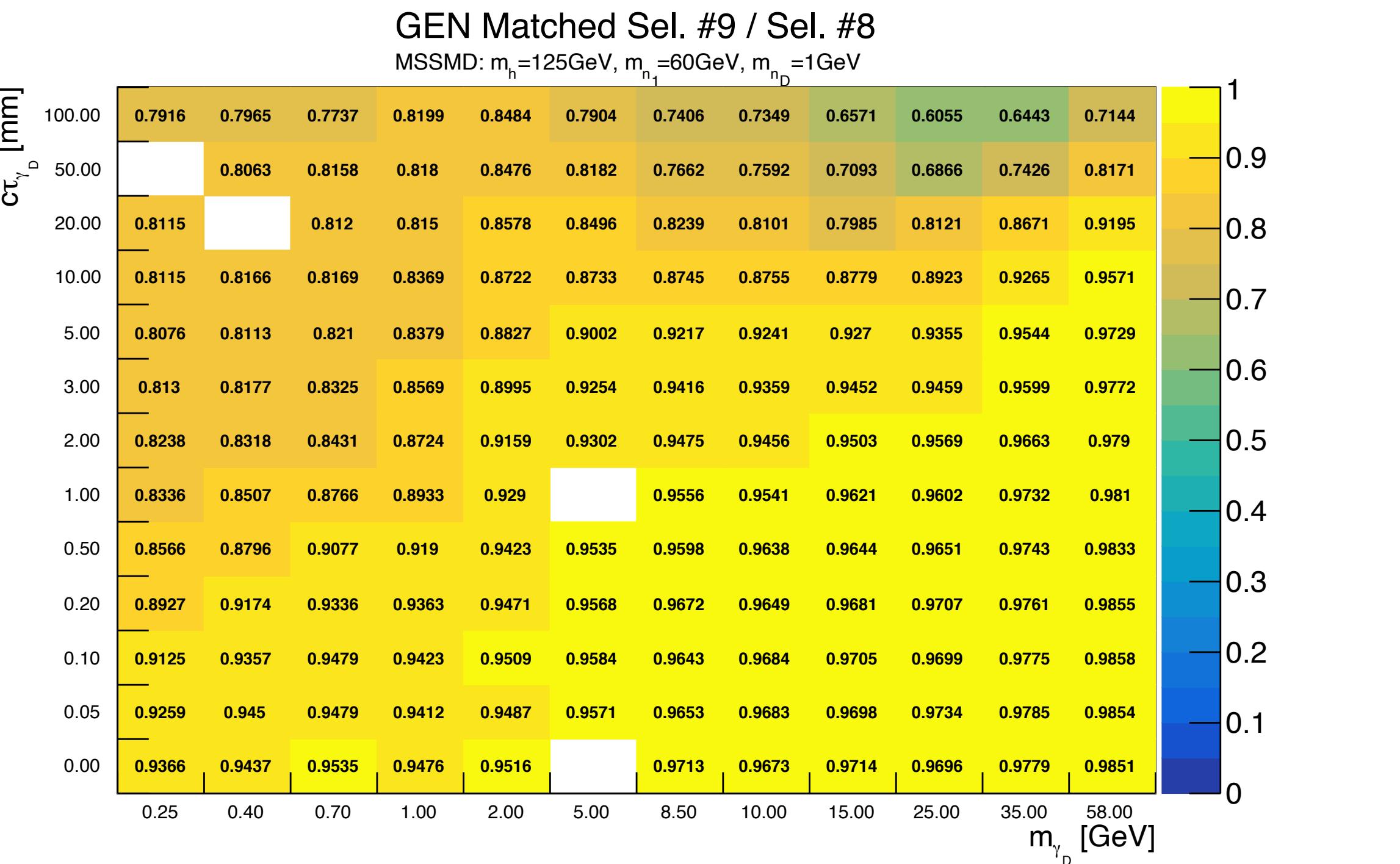
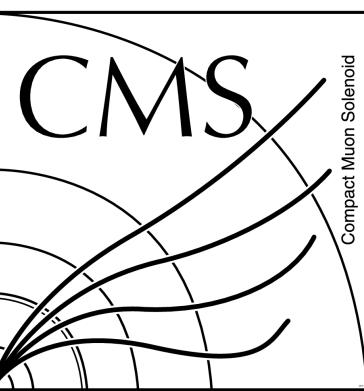
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