



CEPC samples updates

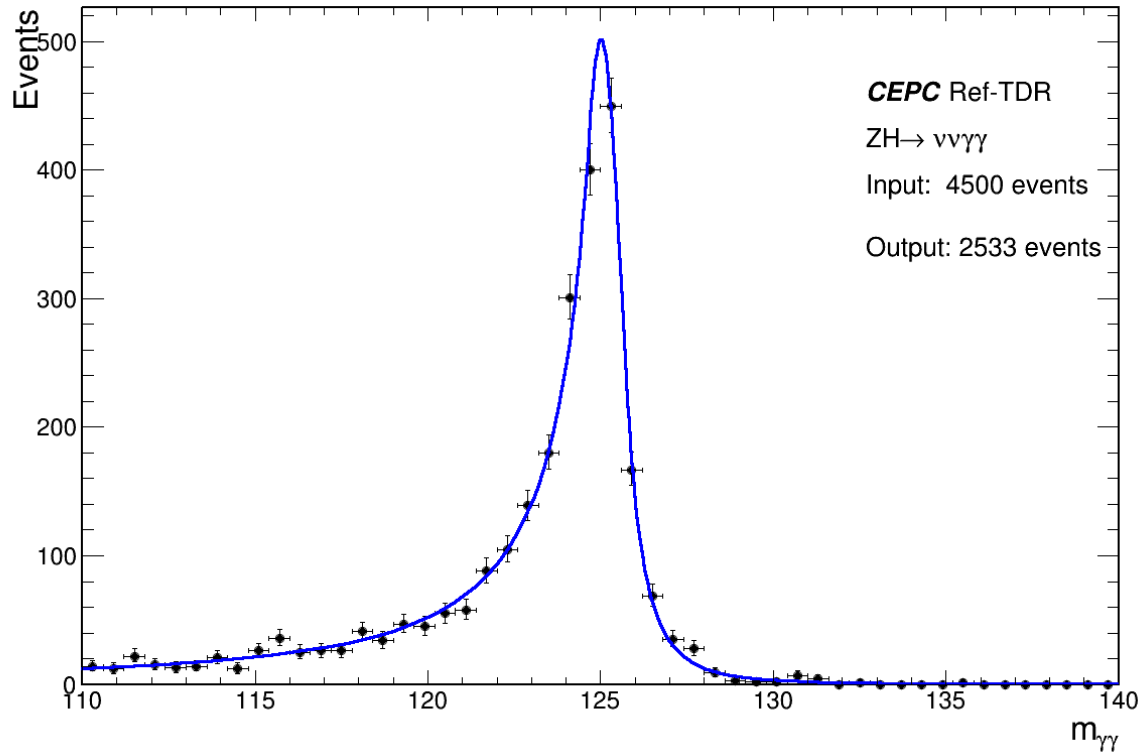
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Diphoton

$$\begin{aligned}\alpha_{Hi} &= 1.2826 \pm 0.1063 \\ \alpha_{Lo} &= 0.5913 \pm 0.0685 \\ n_{Hi} &= 3.1292 \pm 0.5072 \\ n_{Lo} &= 1.4994 \pm 0.1298 \\ \sigma_{CB} &= 0.6048 \pm 0.0472 \\ m_{\gamma\gamma} &= 125.01 \pm 0.0462\end{aligned}$$



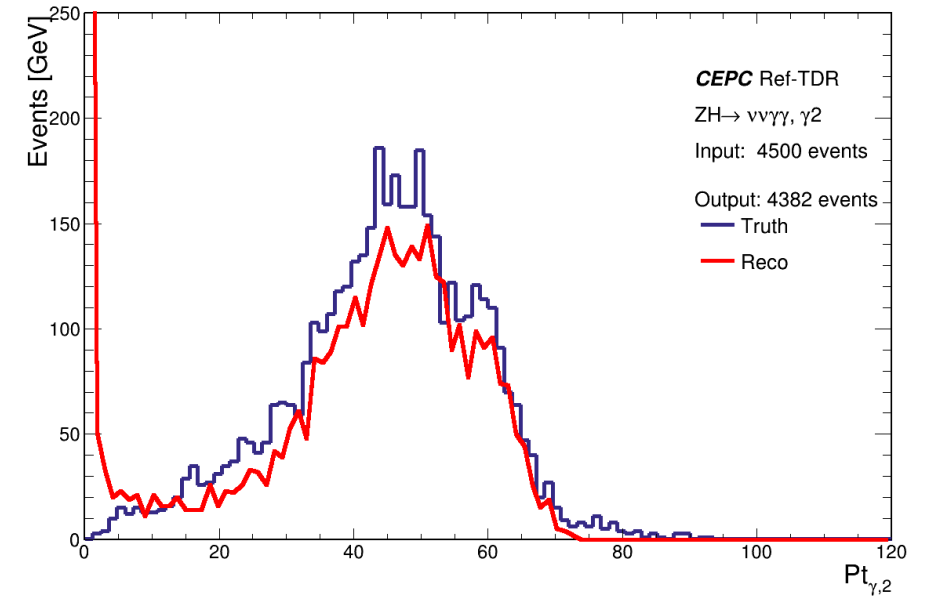
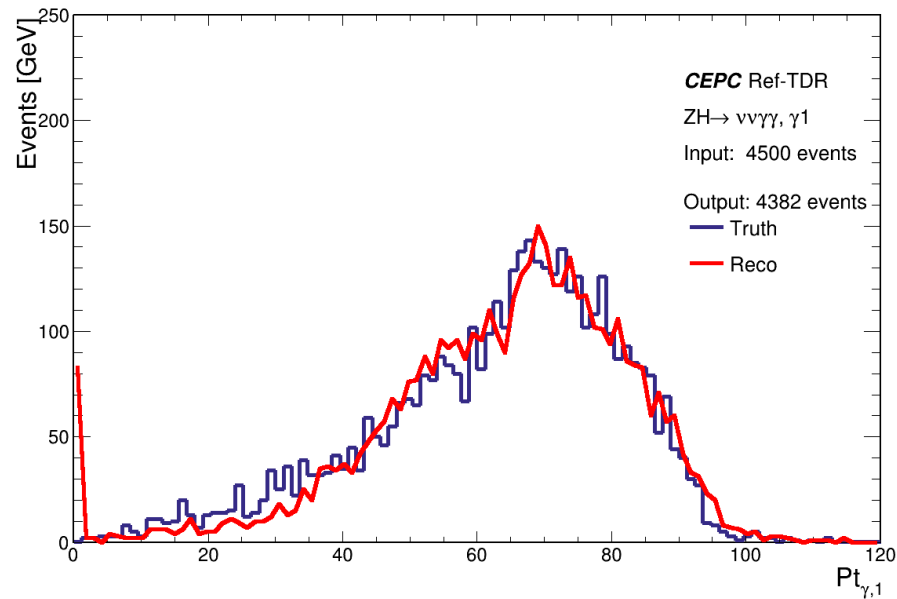
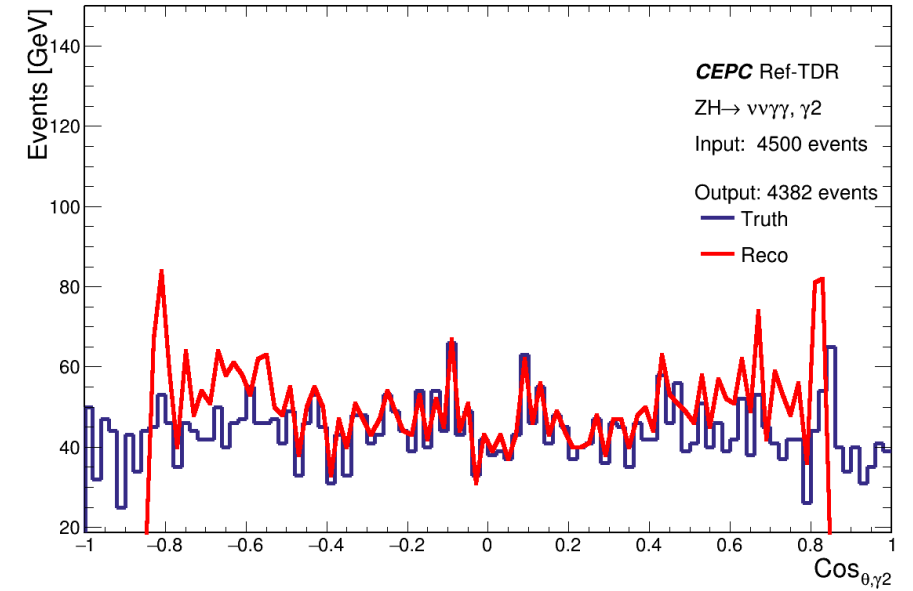
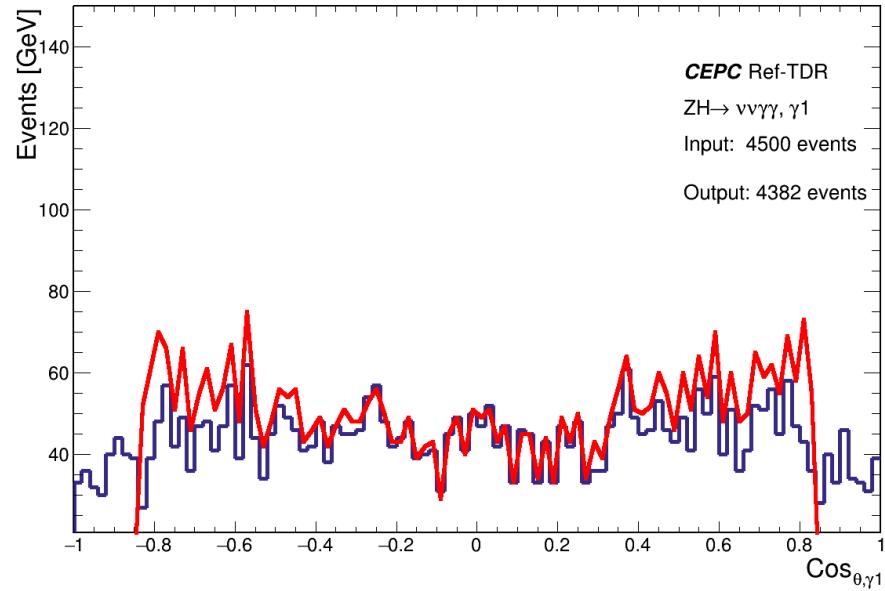
- | | | |
|-----------------------------------|------|--------|
| • Total | 4500 | Events |
| • With 2 PFOs: | 4424 | 98.3% |
| • $ \cos \theta_{truth} < 0.8$: | 3064 | 68.0% |
| • $110 < m_{yy_{reco}} < 140$: | 2533 | 56.2% |

Reco eff: $2533/3064 = 82.67\%$

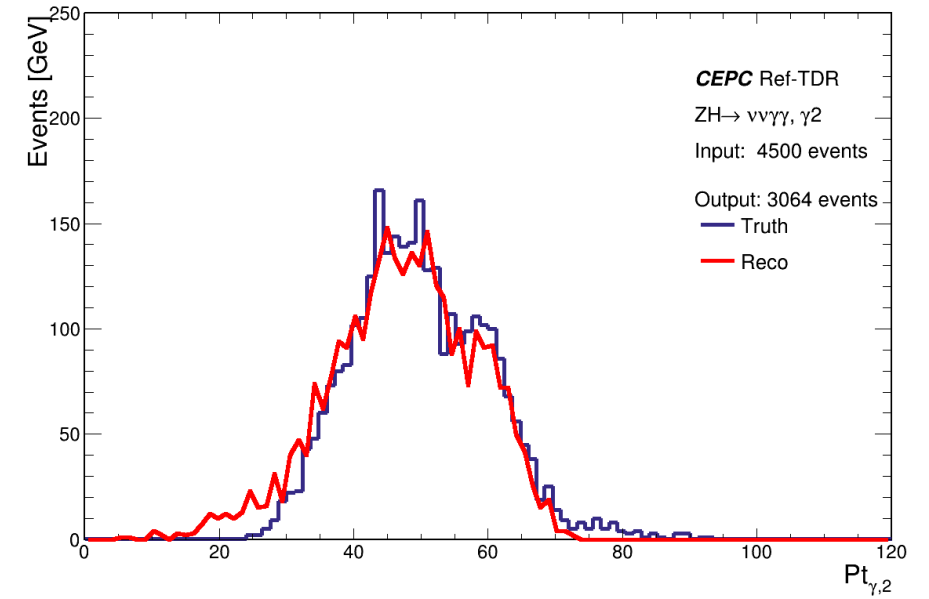
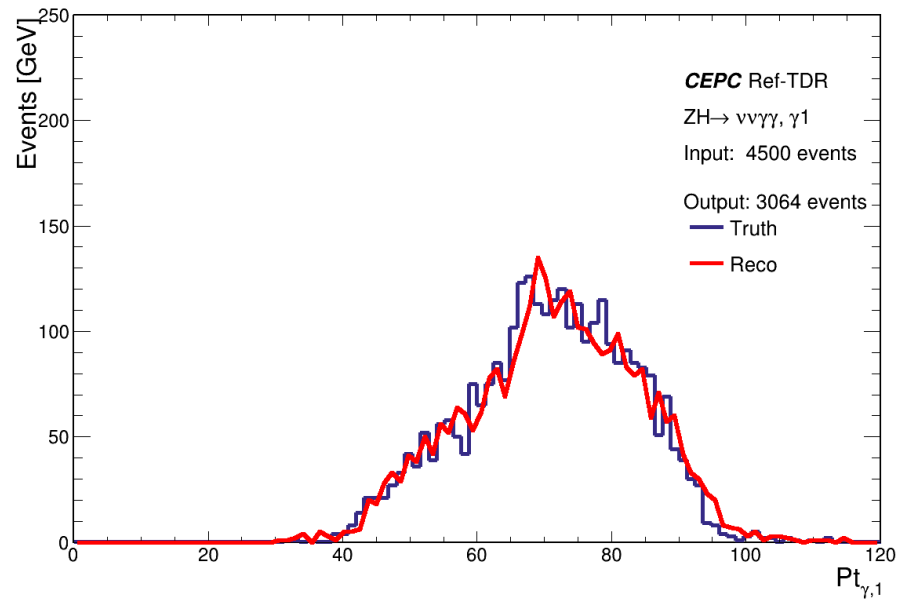
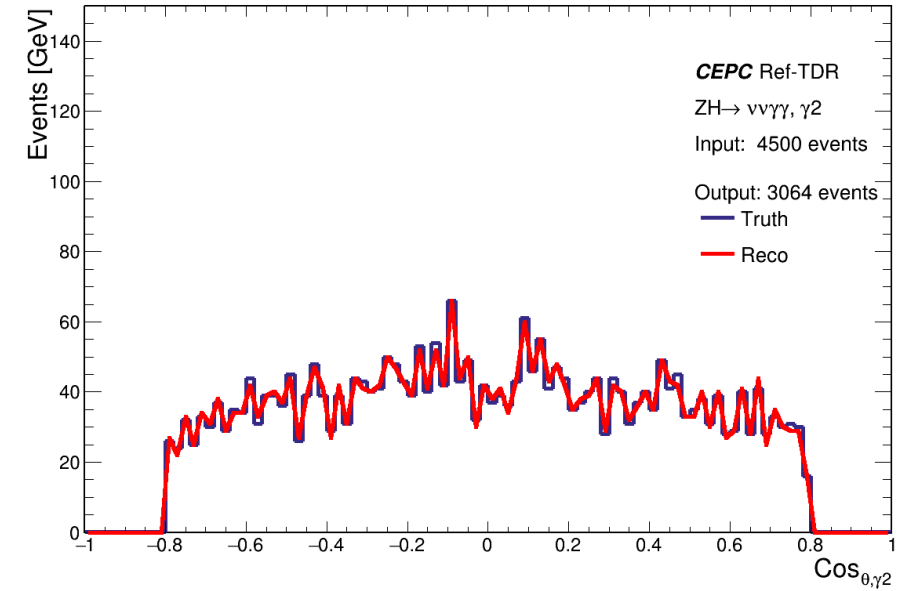
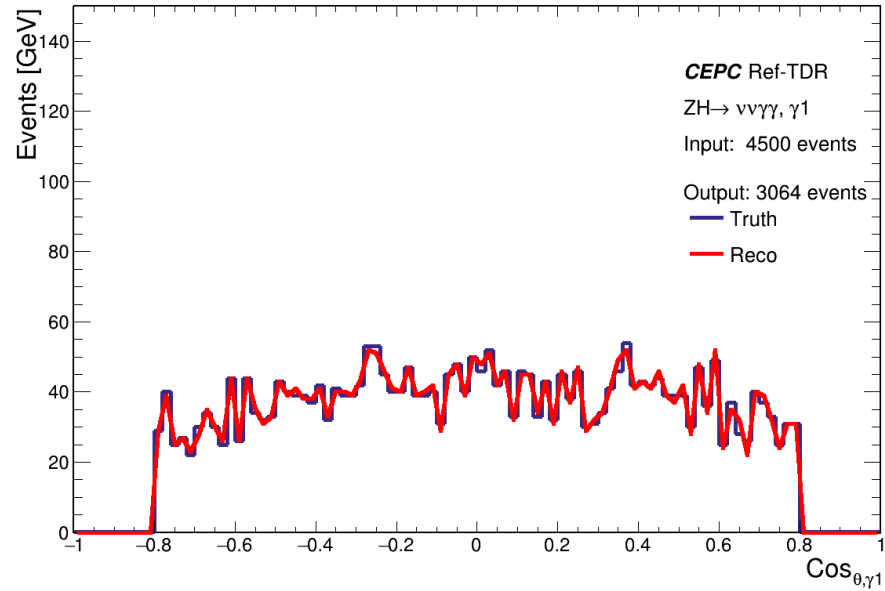
In DSCB fit:

- Sigma: 0.60 GeV
- Resolution: **0.48%**

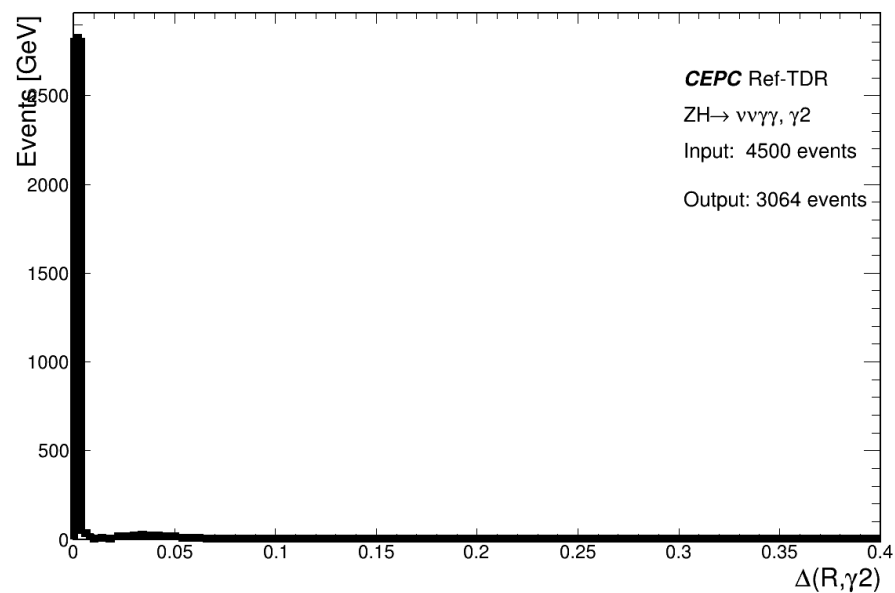
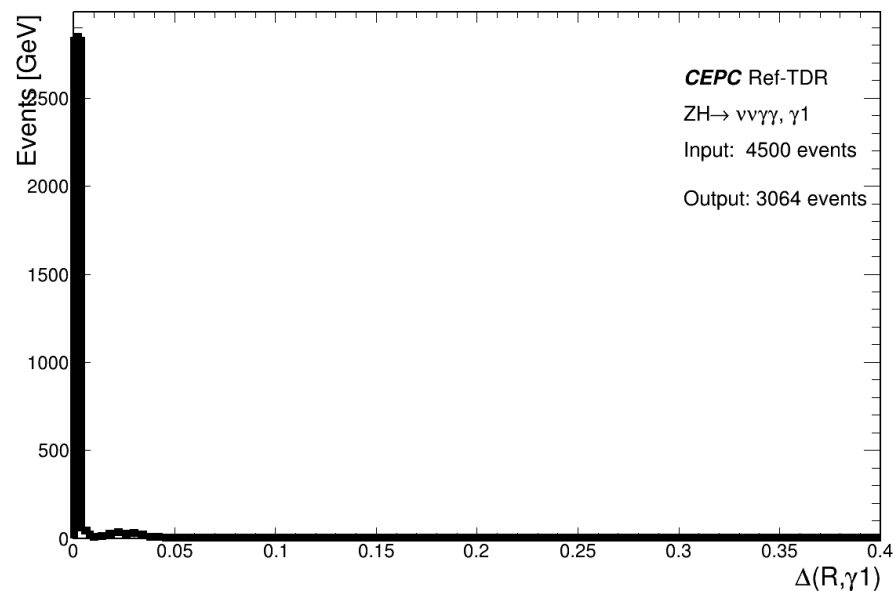
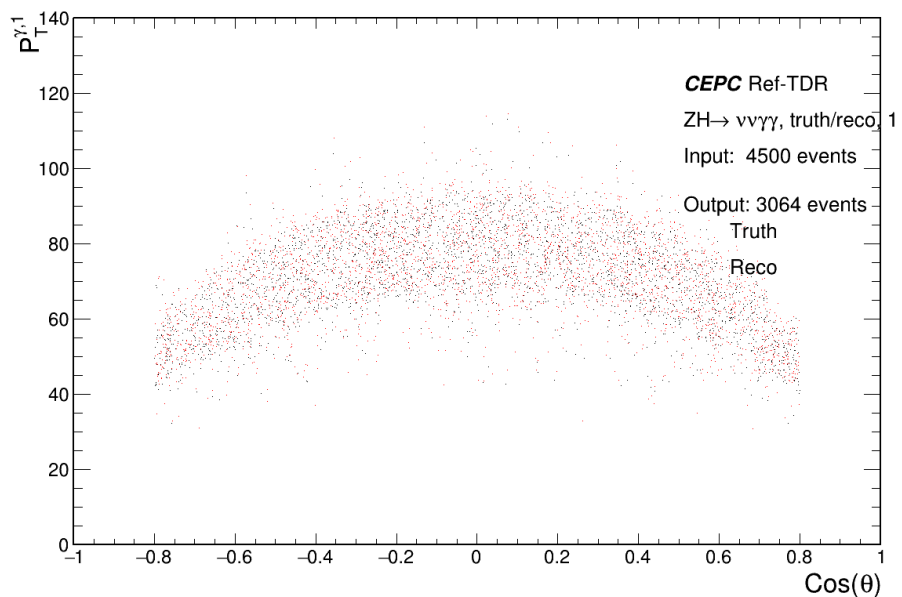
Diphoton Genmatch



Diphoton Genmatch $|\cos \theta_{truth}| < 0.8$:



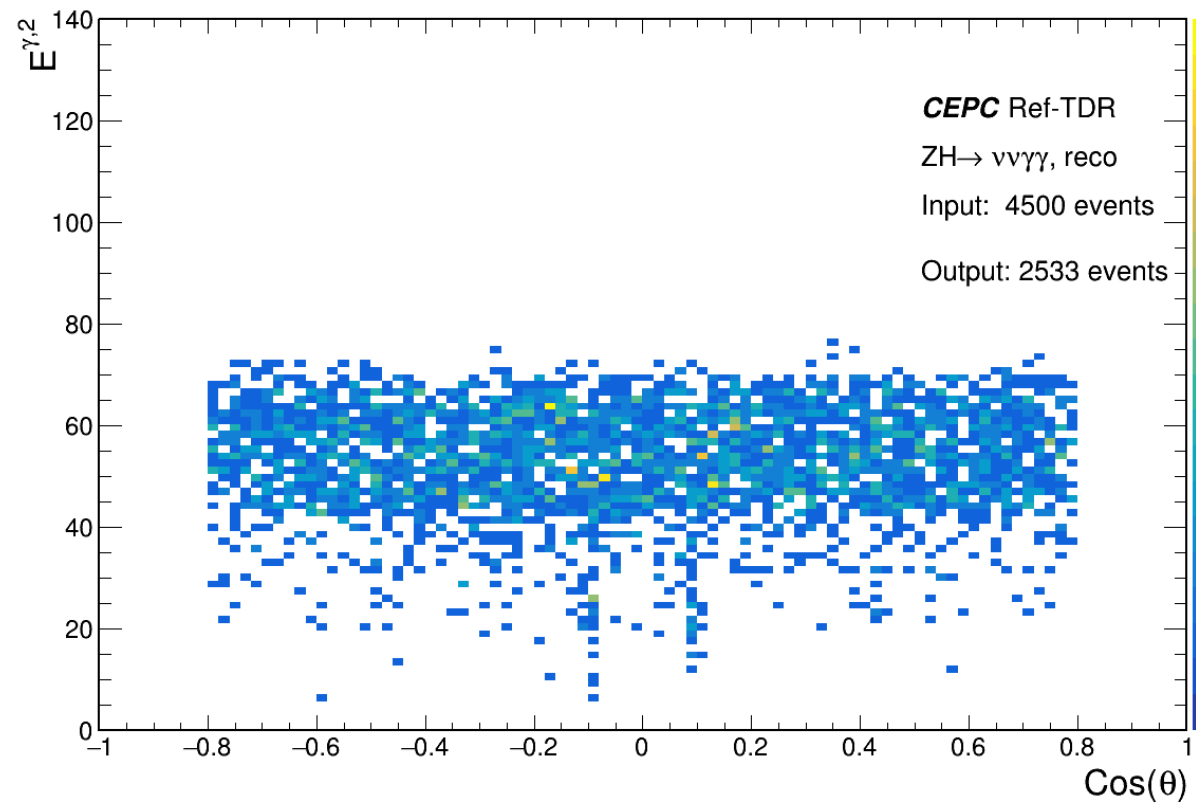
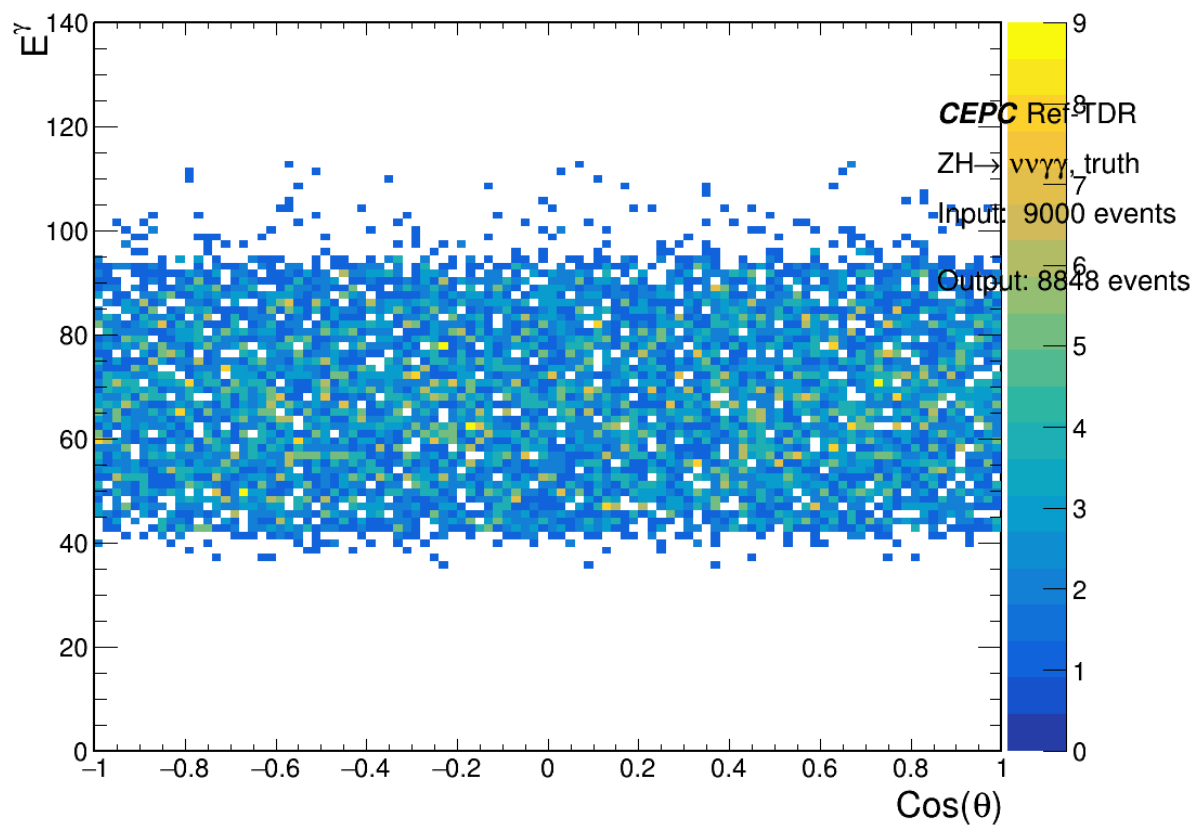
yy DeltaR match



- With $|\cos \theta_{truth}| < 0.8$
 Delta R(0.4) match mismatch ratio: 0.5%

2D scattering:

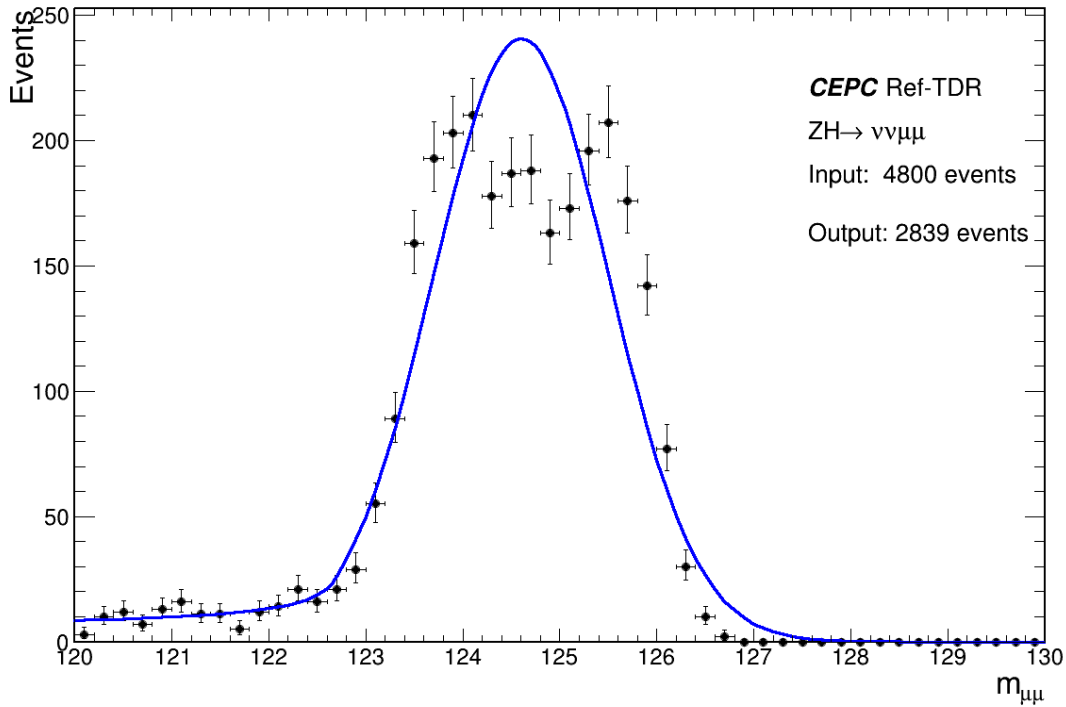
By choosing $|\cos \theta_{truth}| < 0.8$, make sure there no broken photons.



Note for diphoton:

- Mass calibration factor **0.968** Raw mean value: 129.084, shift to 125.0;
- PFO selection: 2 PFOs with largest E.
 - Current PFOs are not sorted with energy. Manual sorting needed.
 - Average PFOs in one event: 13.8. Now all PFOs with nonzero energy.(Hcal energy included)
 - Reco eff (Defined as 2 good diphotons and in mass window) 82.67%
- Truth selection: the final 2 truth photons
 - `PDG==22 && GeneratorStatus==1`
- Long tail energy loss need better treatment.

$$\sigma_{CB} = 0.9031 \pm 0.0182$$
$$m_{\mu\mu} = 124.60 \pm 0.1820$$



- Total 4800 Events
- With 2 opposite PFOs: 4686 97.6%
- $|\cos\theta_{truth}| < 0.8$: 3269 68.1%
- $120 < m_{\mu\mu reco} < 130$: 2839 59.1%
 - $m_{\mu\mu reco} < 120$: 426.

Reco eff: $2839/3269 = 86.8\%$

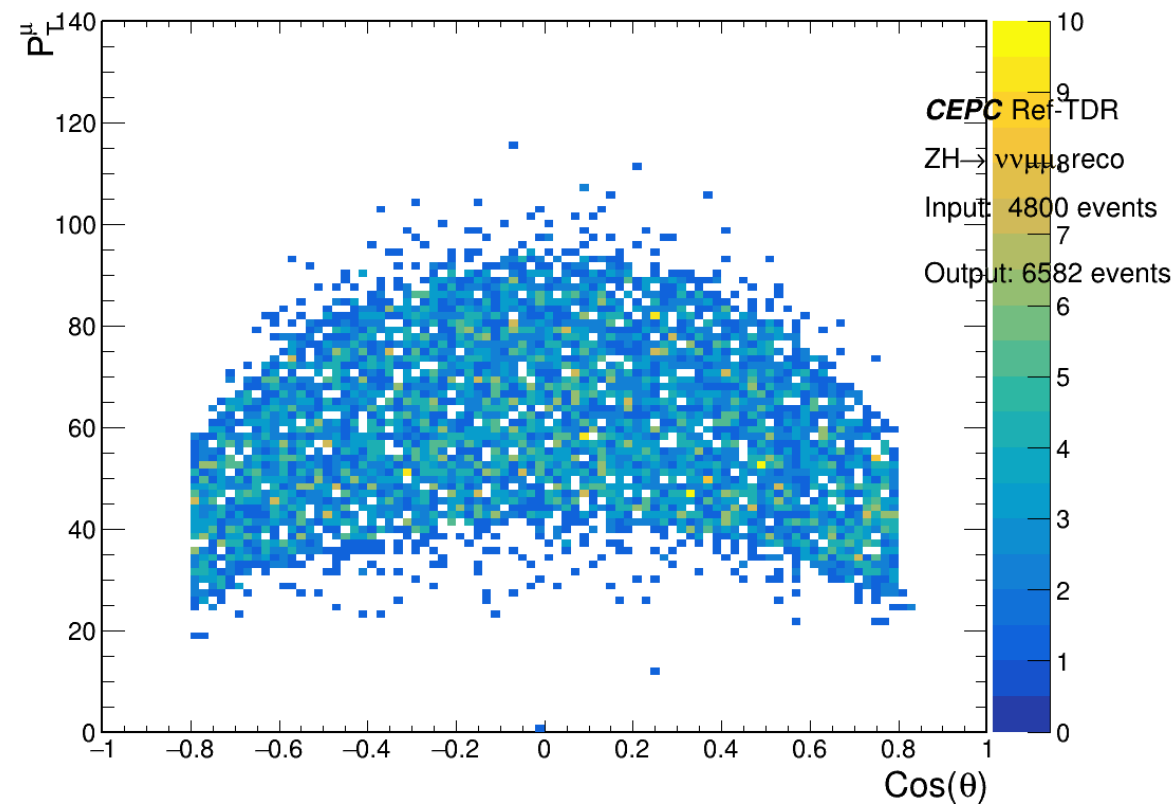
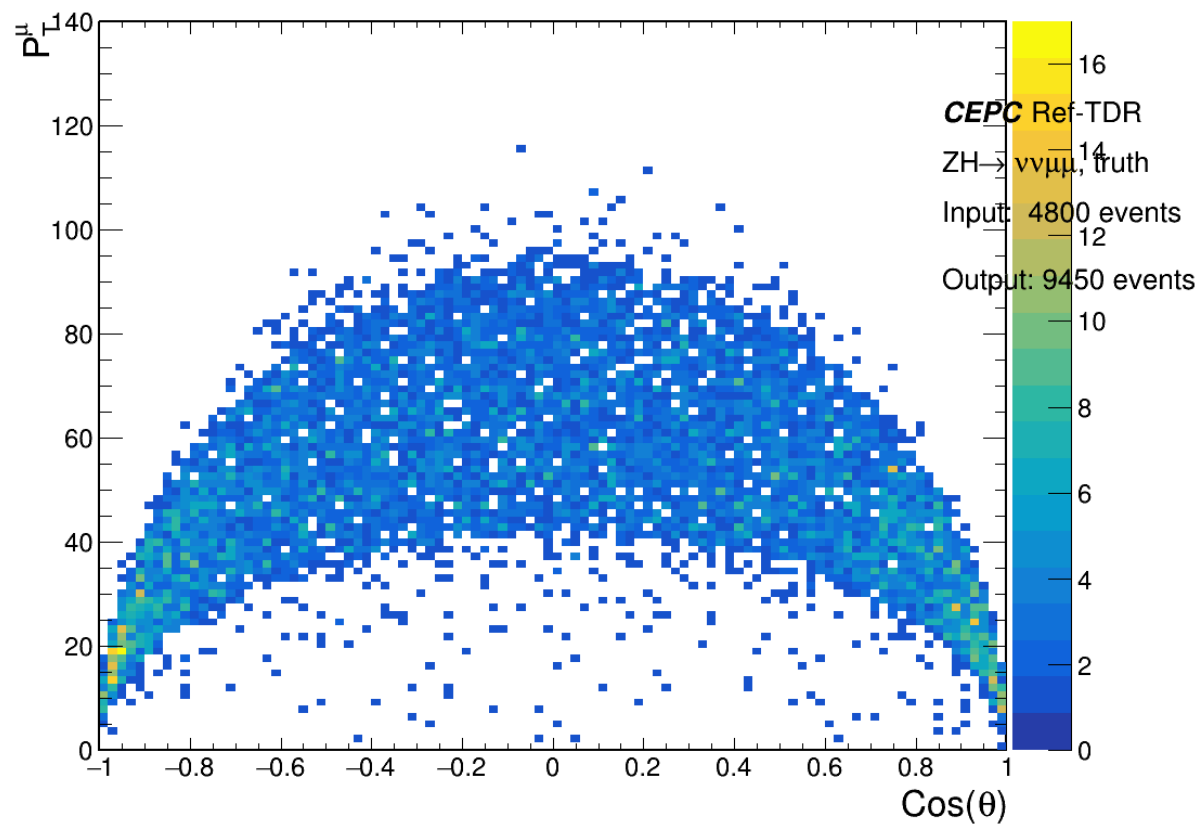
In DSCB fit:

- Sigma: 0.90 GeV
- Resolution: 0.72%

2D scattering:



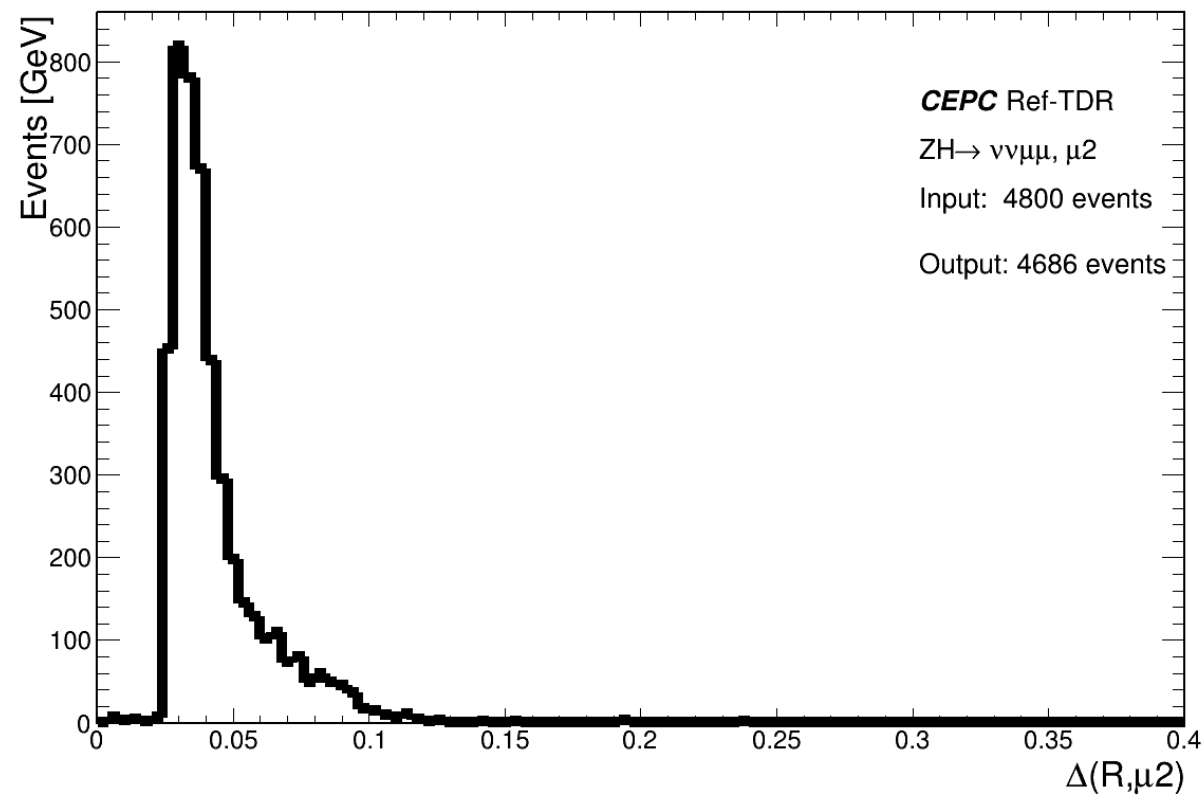
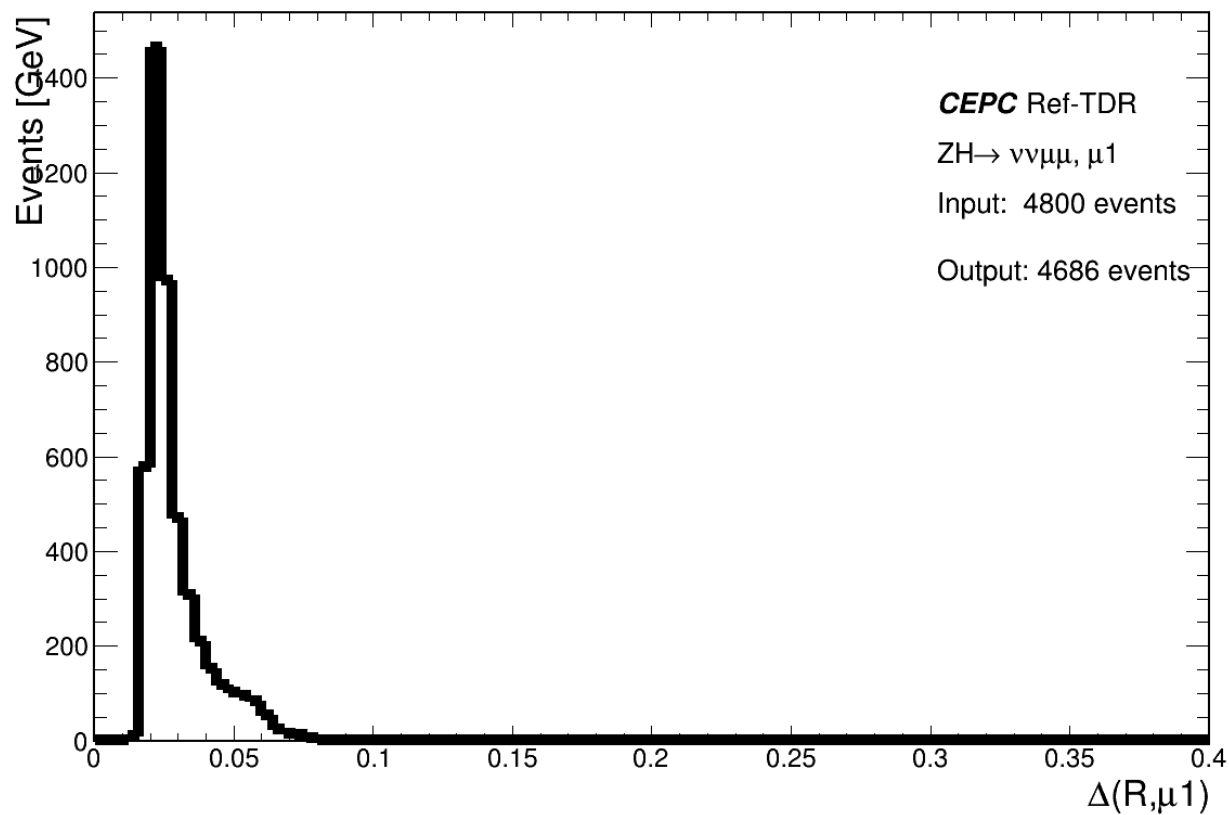
If drop $|\cos \theta_{truth}| < 0.8$ selection, Reco eff= 4072/4686= 86.9%. $\sim 86.8\%$
Dimuon reco do not rely on angular distribution.



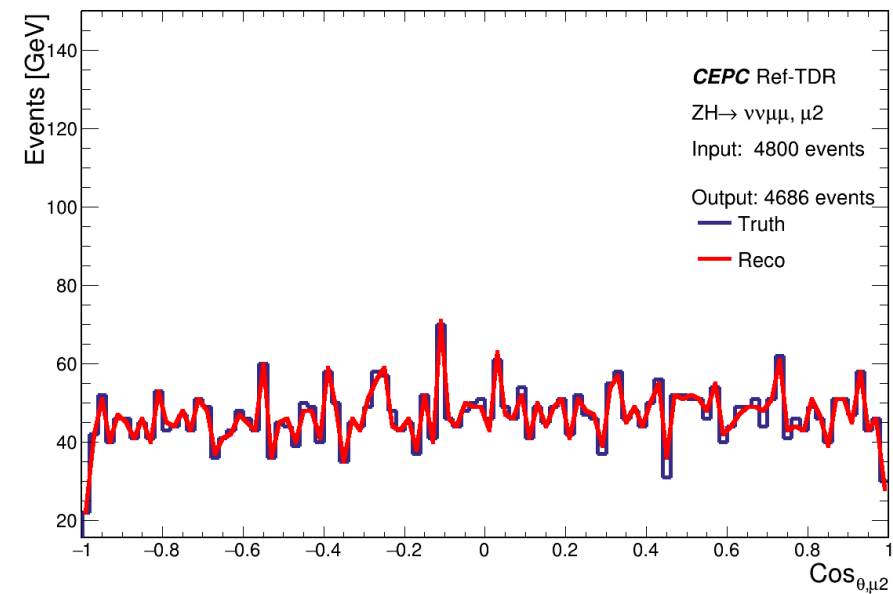
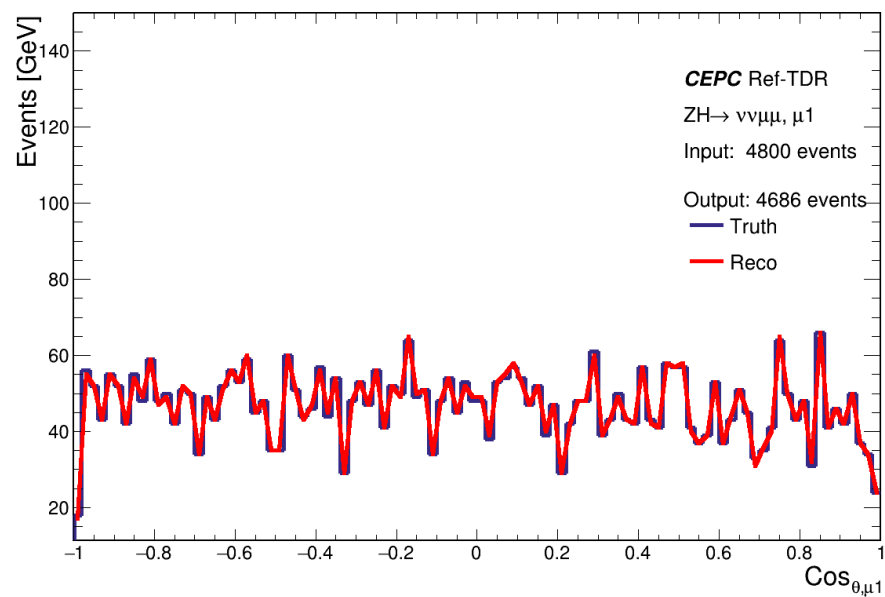
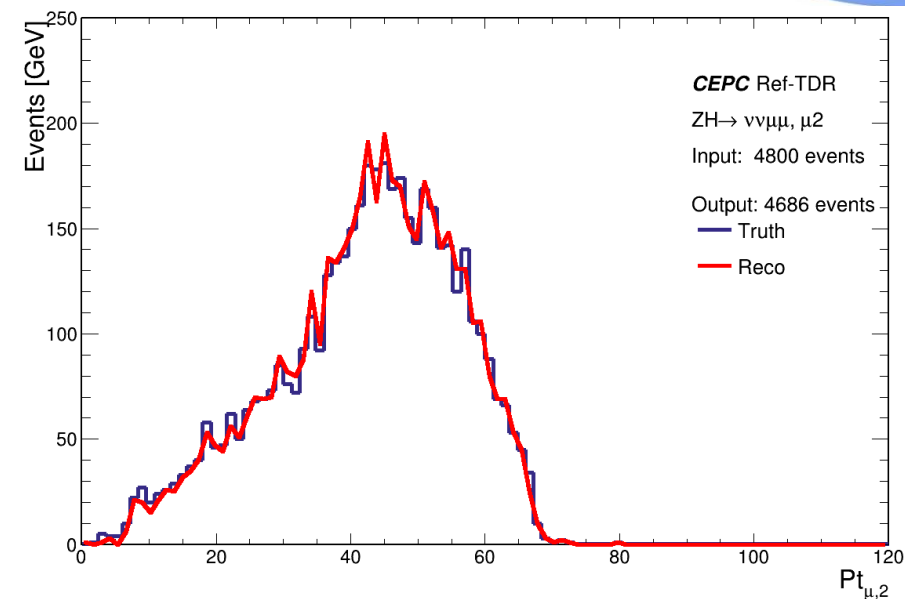
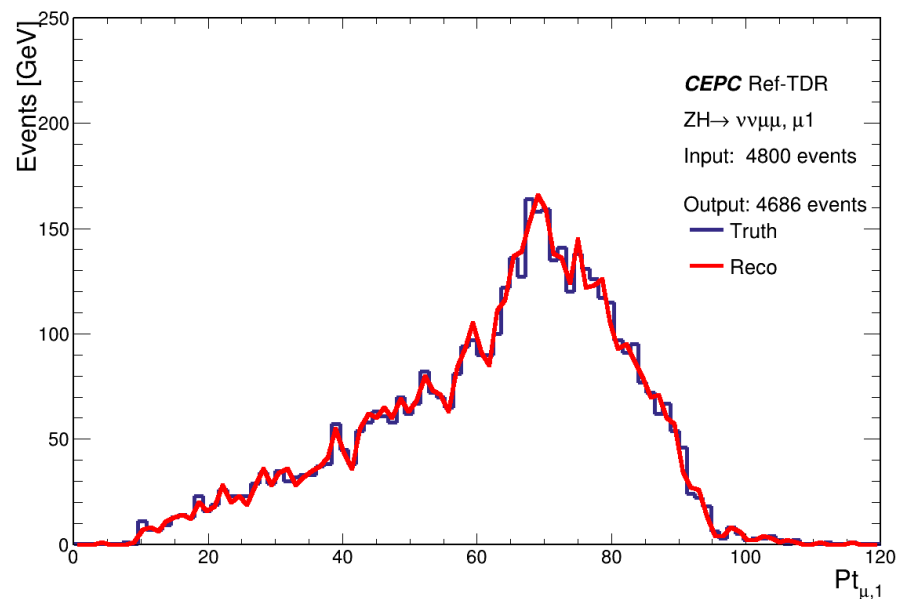
Dimuon Genmatch



Dr 0.4 well matched; **0.7%** events mismatched(both Dr>0.4)



Chi2 for those plots < 2%. Well matched.



Notes for dimuon

- Resolution expect 0.1% but current 0.7%
- Strange peak shape Why flat peak?
 - Current 4 momentum from PFO, the reference point is on Calorimeter, not vertex.
 - To do: Use Track momentums instead of PFOs;
- Long tail for $m_{\mu\mu_{reco}} < 120$
- Mis charge ratio: 0.8%
- Mis Dr0.4 match ratio: 0.7%
- PxPyPz issue already fixed(disappeared) in current 24.9.1.