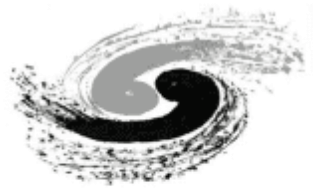


Performances of Missing Information under New CEPCSW Release



Geliang Liu



中國科學院高能物理研究所
Institute of High Energy Physics
Chinese Academy of Sciences

Geliang Liu (刘格良)

Mar. 7th, 2025

3/7/2025

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New CEPCSW release

➤ Compare the new CEPCSW release with the old one

- New release: 25.3.1, https://code.ihep.ac.cn/cepc/CEPCSW/-/tree/tdr25.3.1?ref_type=tags
- Old release: 25.1.2 + updates from Fangyi, https://code.ihep.ac.cn/glliu/CEPCSW/-/tree/CyberPFA-5.0.2-dev?ref_type=heads

➤ To be checked

- Visible and missing information
 - Visible 4-momentum: $p^{\text{vis}} = \sum_i^{\text{PFO}} p_i$
 - Missing 4-momentum: $p^{\text{mis}} = p^{\text{tot}} - p^{\text{vis}}$, $p^{\text{tot}} = (0, 0, 0, 240 \text{ GeV})$
- BMR for $Z \rightarrow qq$ and missing mass

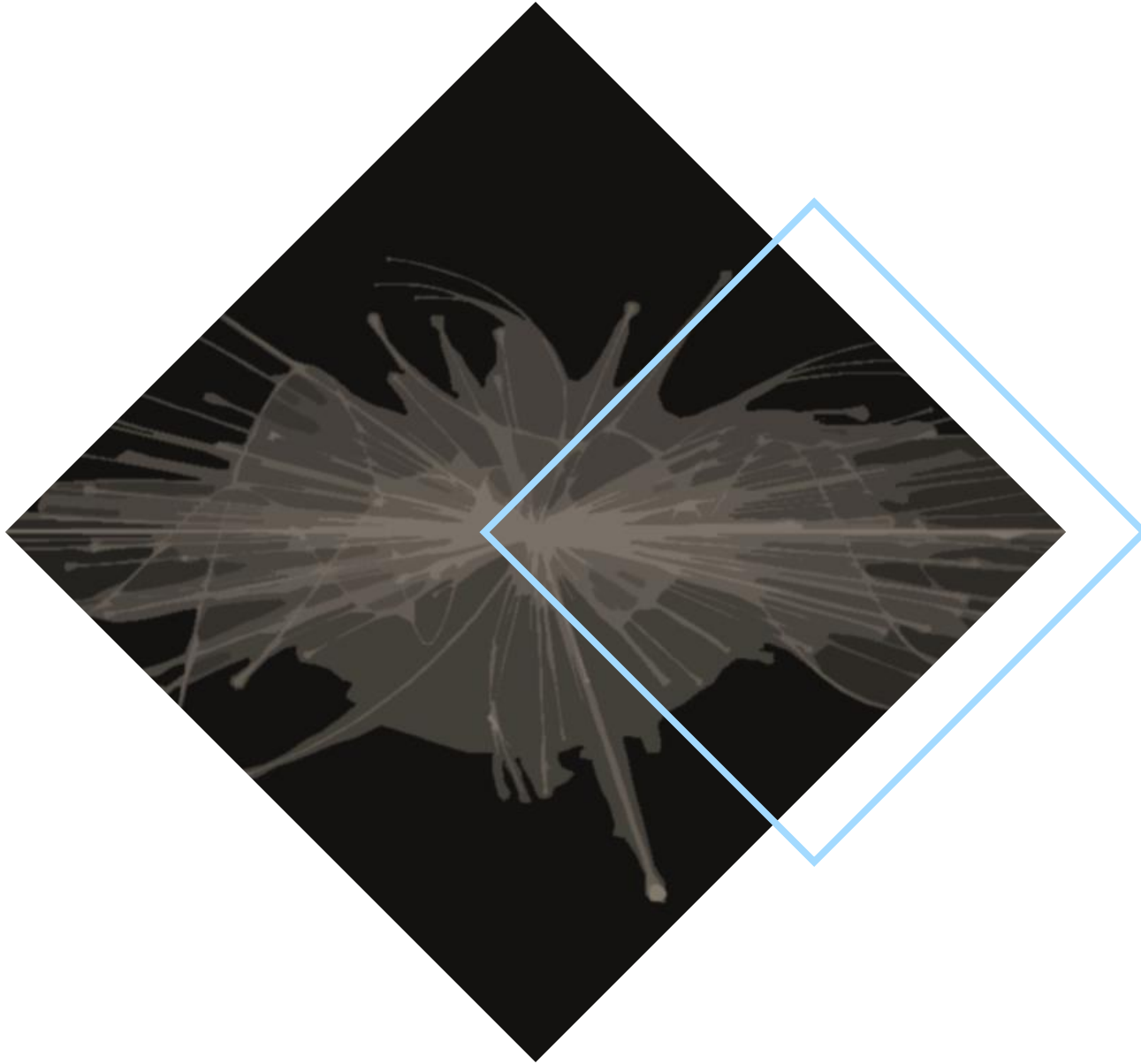
Samples

➤ New samples produced under 25.3.1

- /cefs/higgs/liugeliang/CEPC/202503/Production/Hinvi
- $Z(\rightarrow ee/\mu\mu/qq)H(\rightarrow ZZ^*\rightarrow 4\nu)$
- 100k for each final state

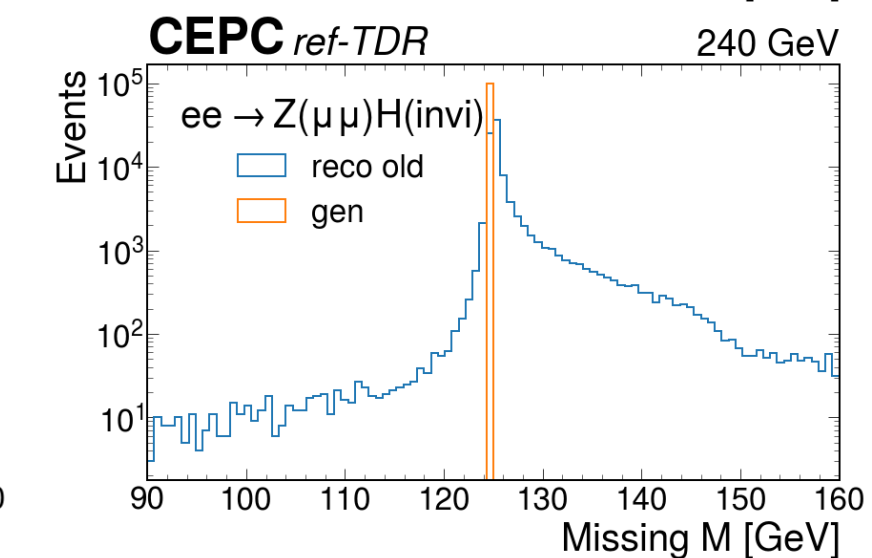
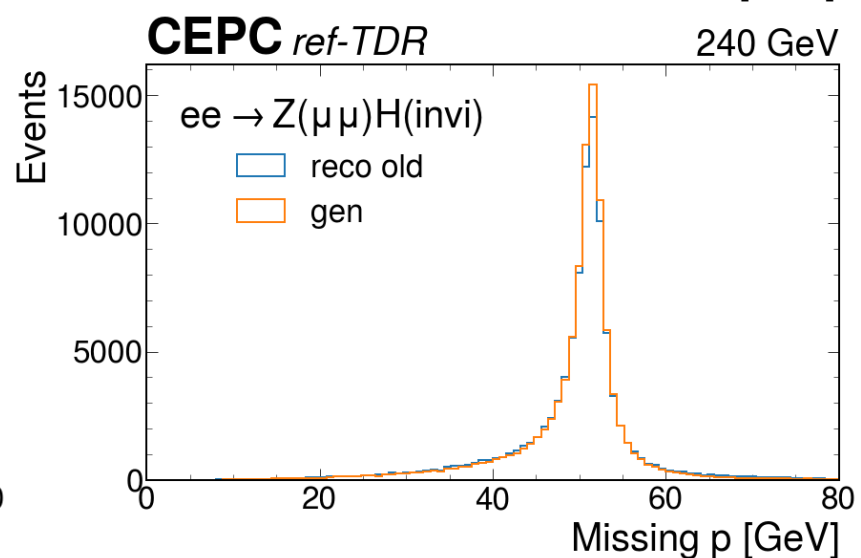
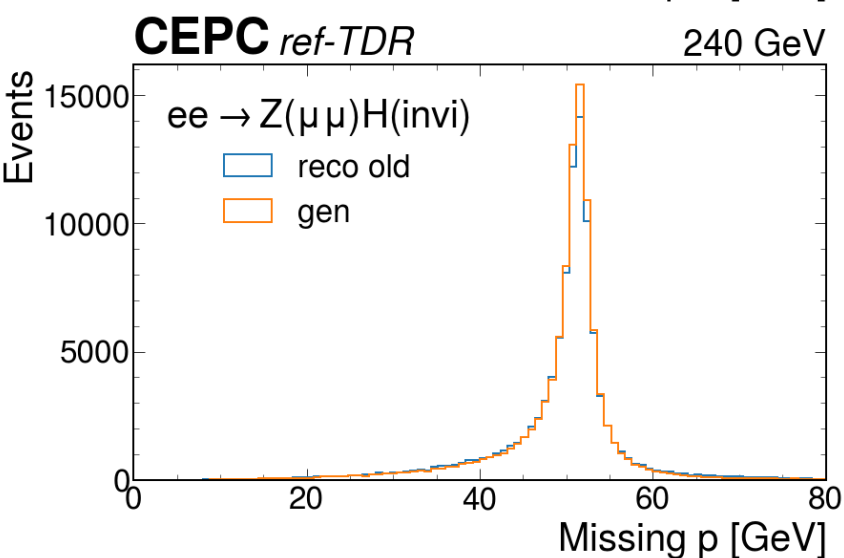
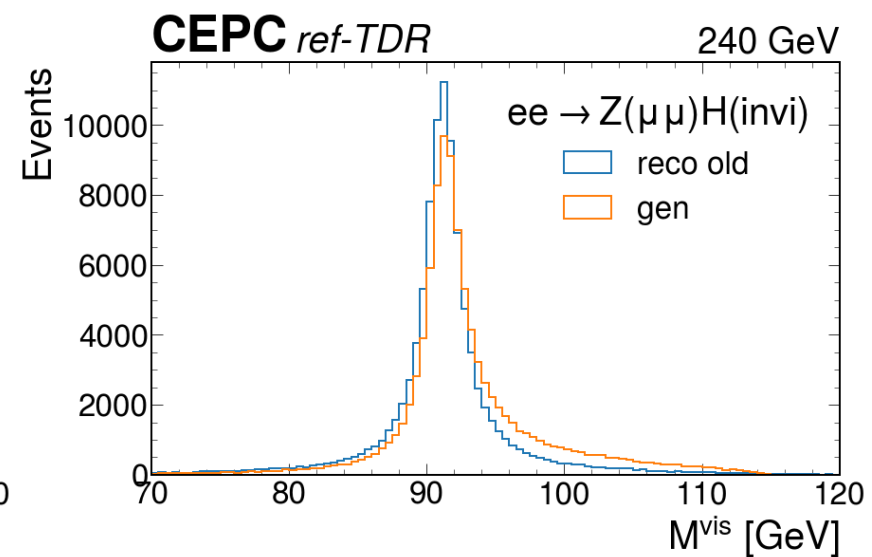
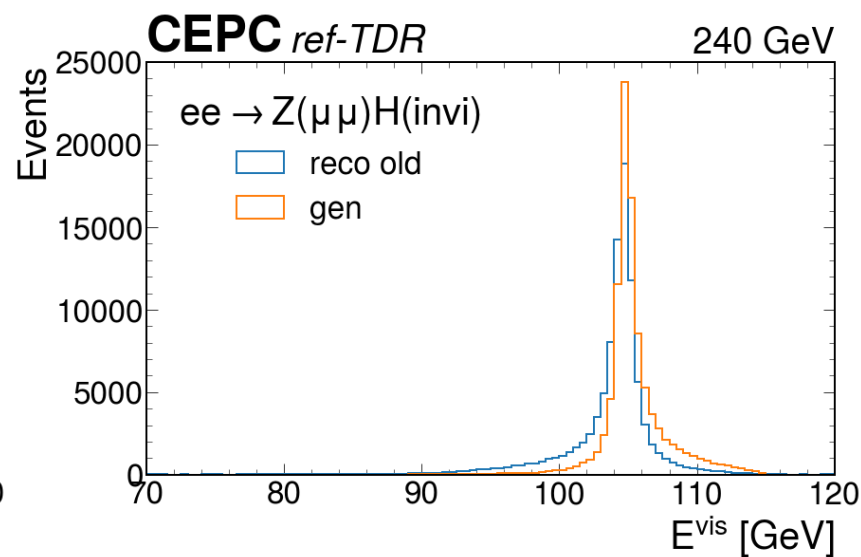
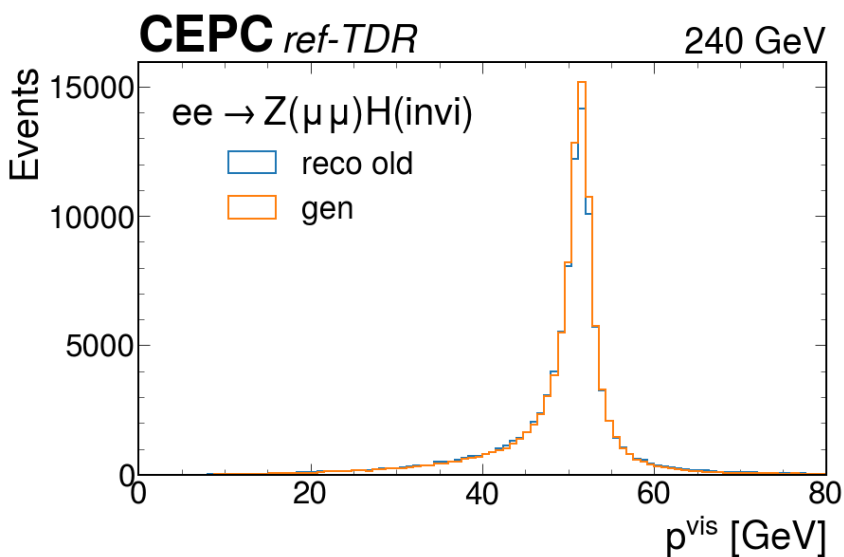
➤ Compared with old samples

- /cefs/higgs/liugeliang/CEPC/202501/Production/Hinvi



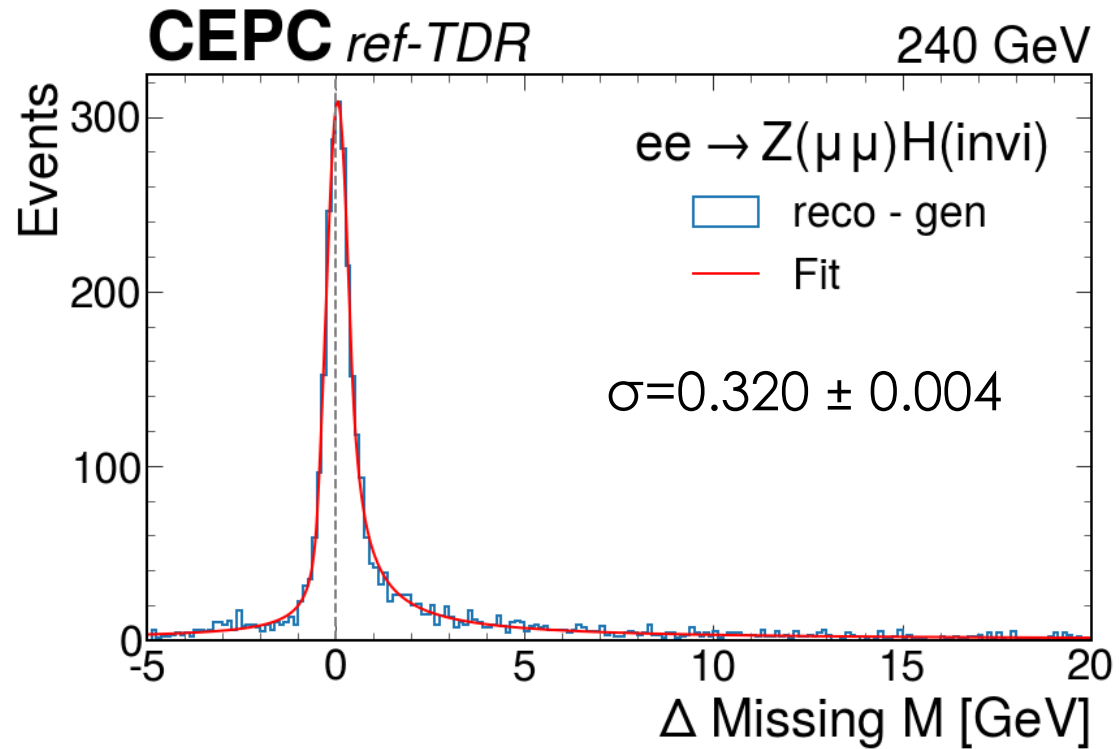
**Visible and
missing
information**

$Z(\mu\mu)H(\text{invisible})$

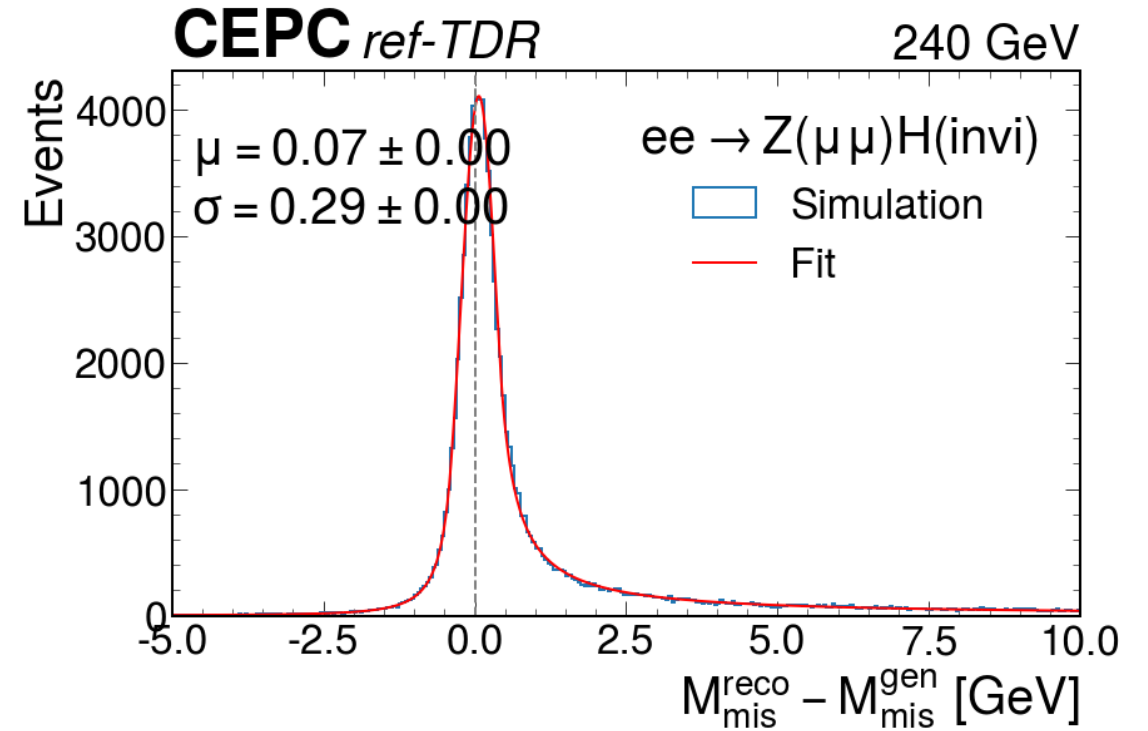


$Z(\mu\mu)H(\text{invisible})$: missing mass resolution

Old

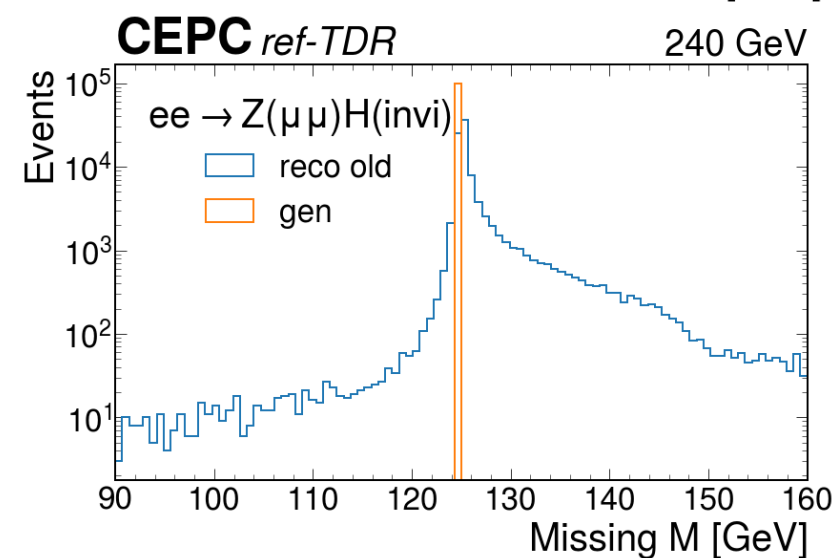
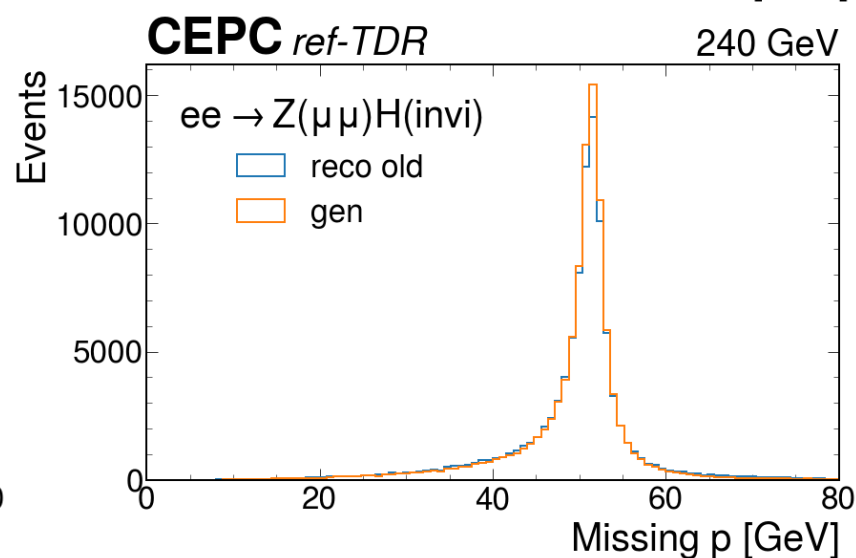
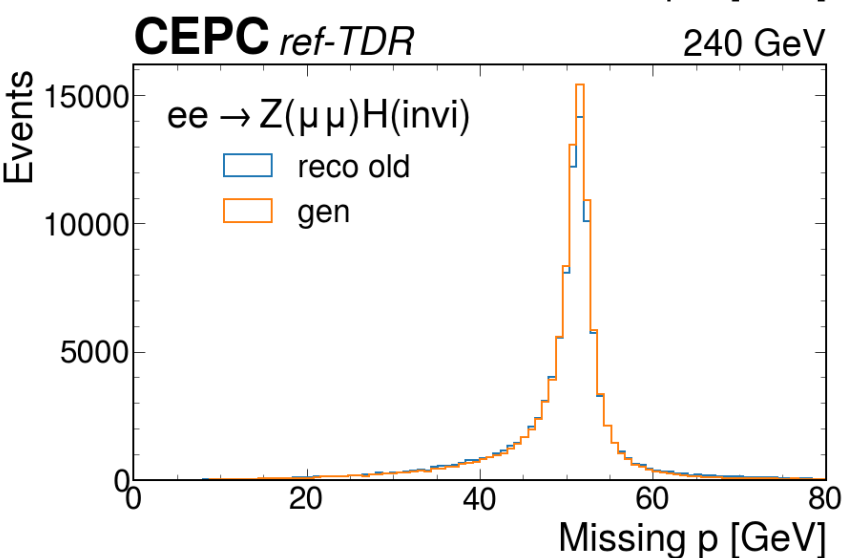
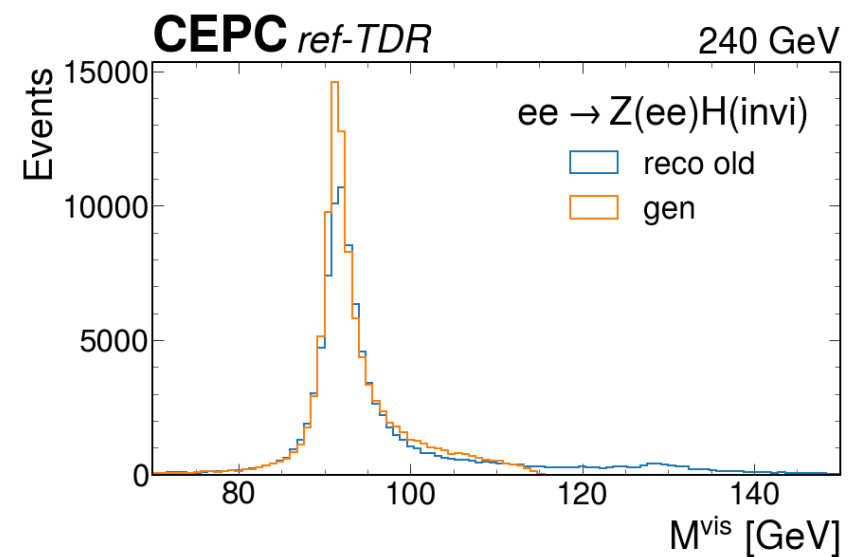
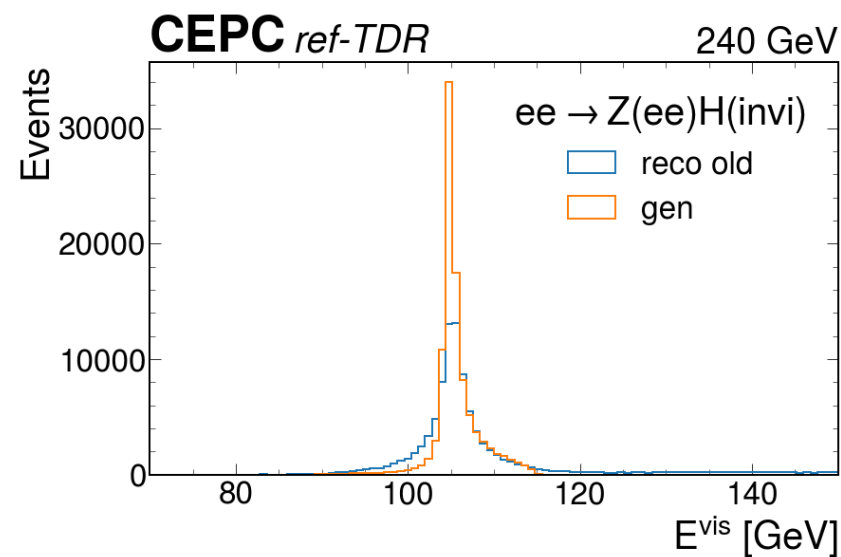
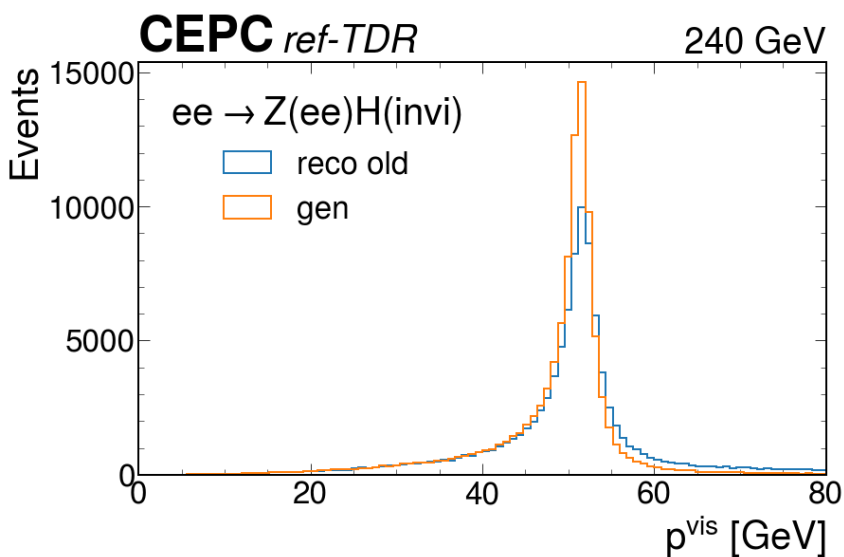


New



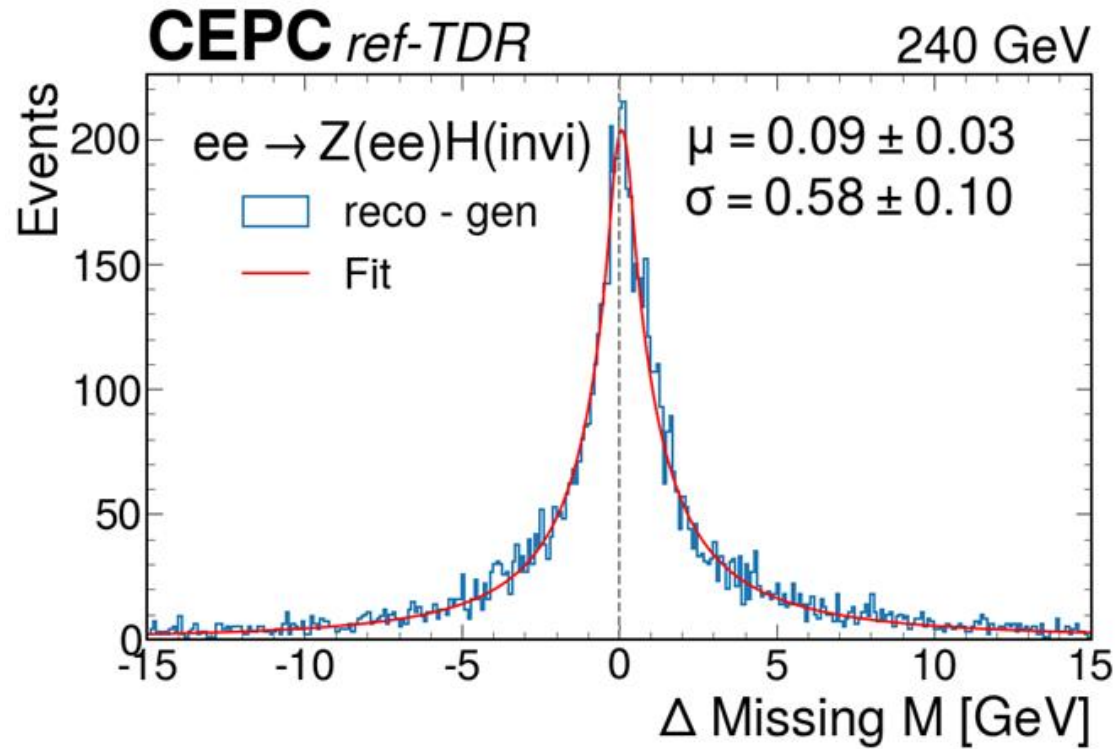
- Resolution gets better.

Z(ee)H(invisible)

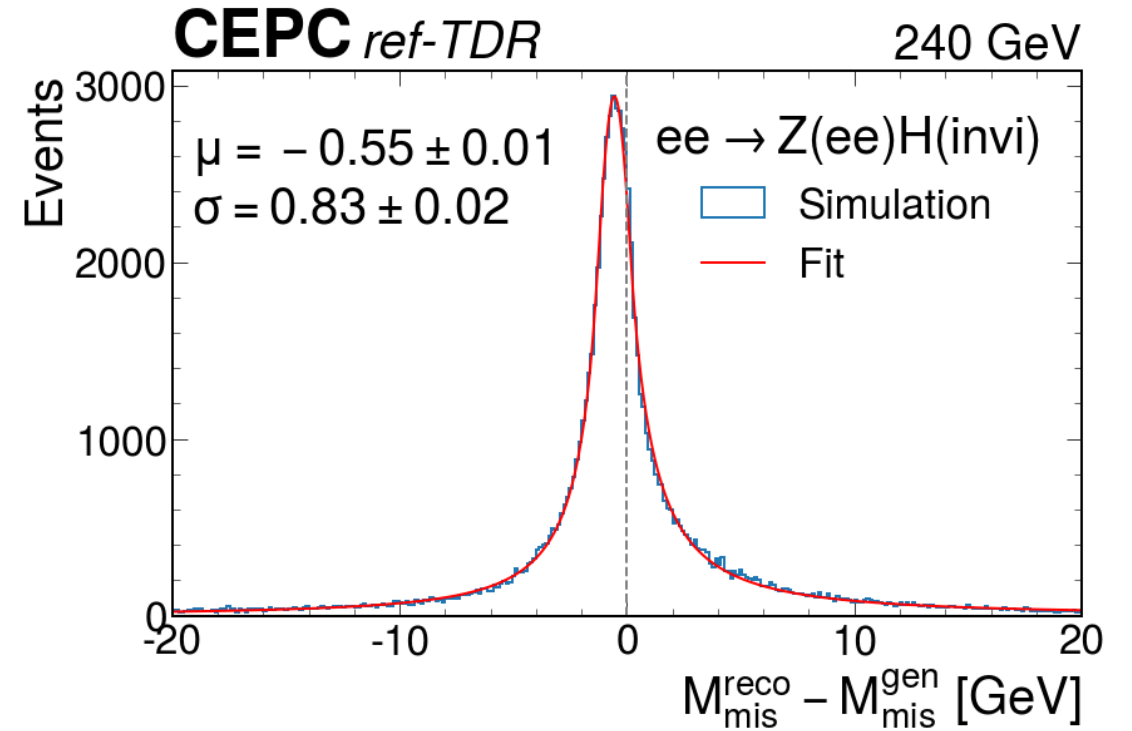


Z(ee)H(invisible): missing mass resolution

Old

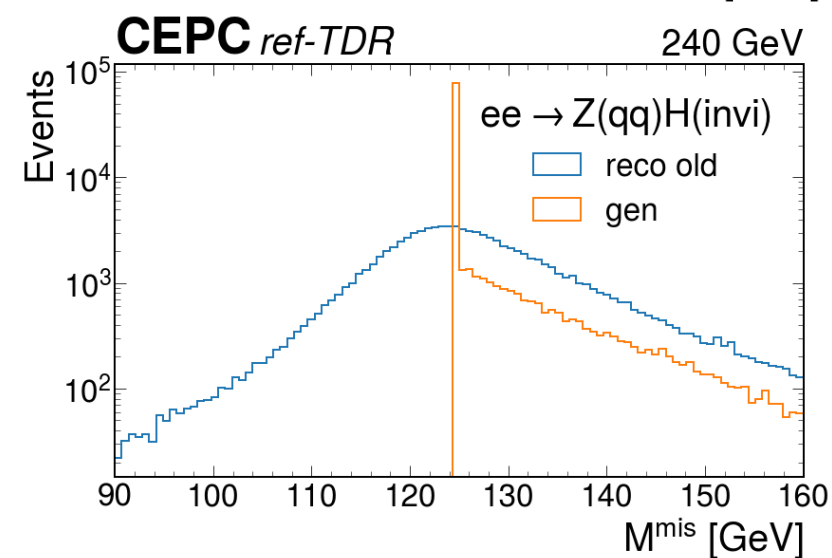
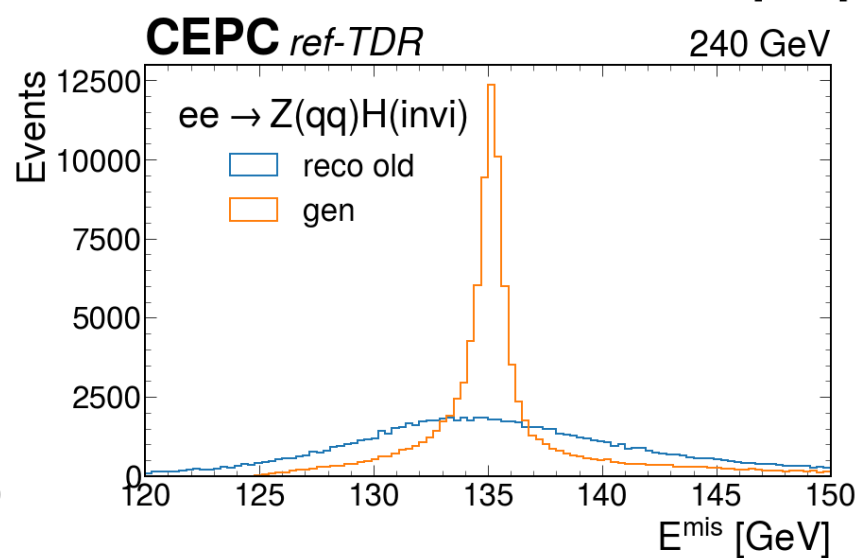
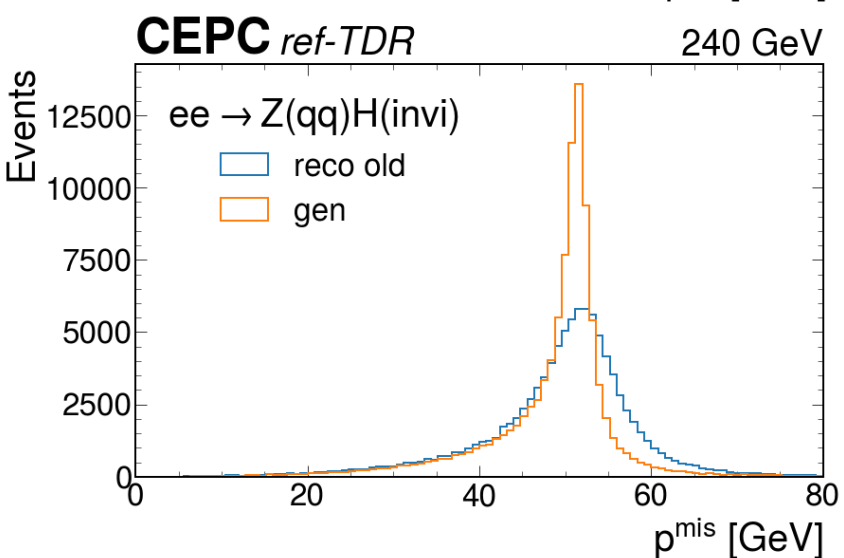
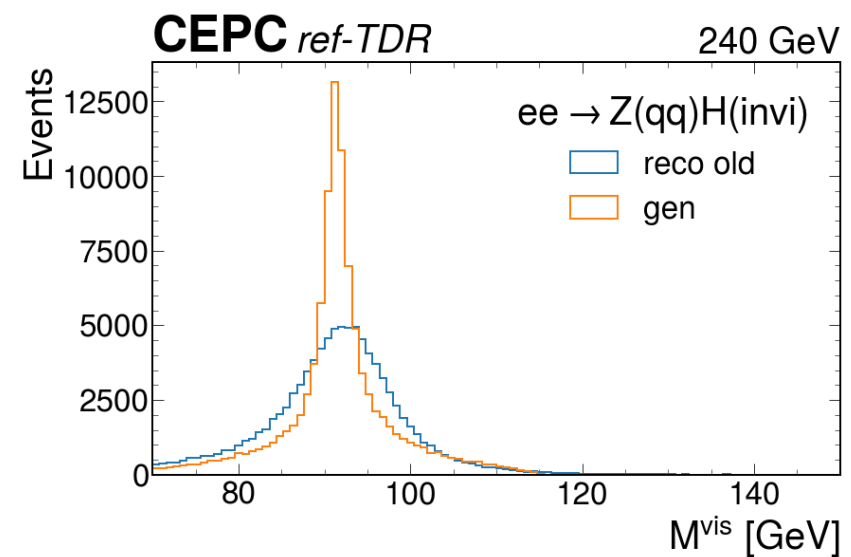
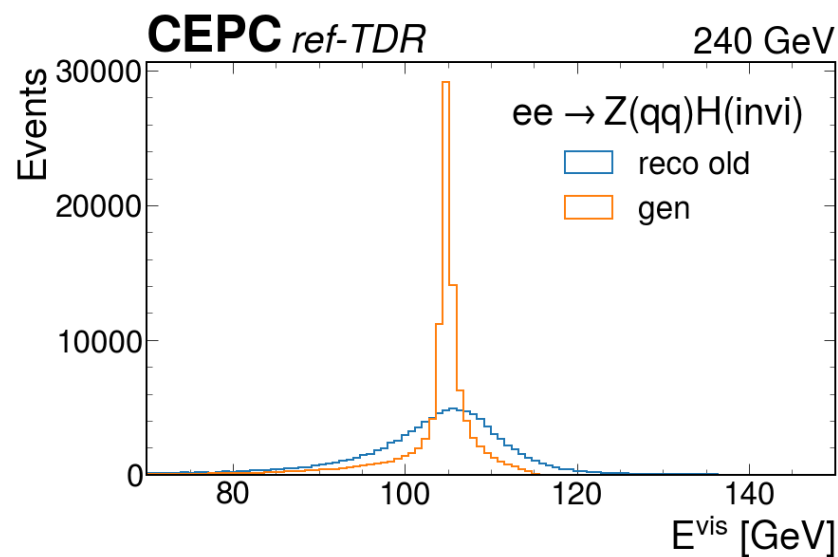
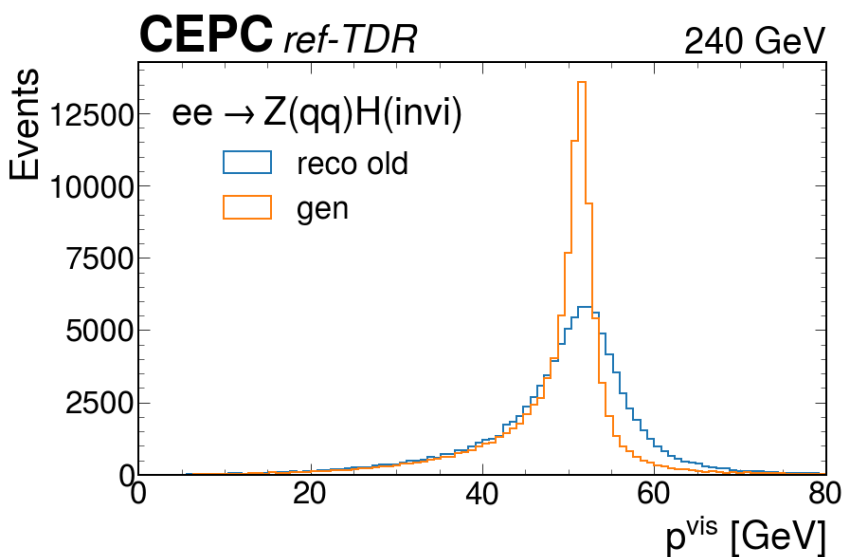


New



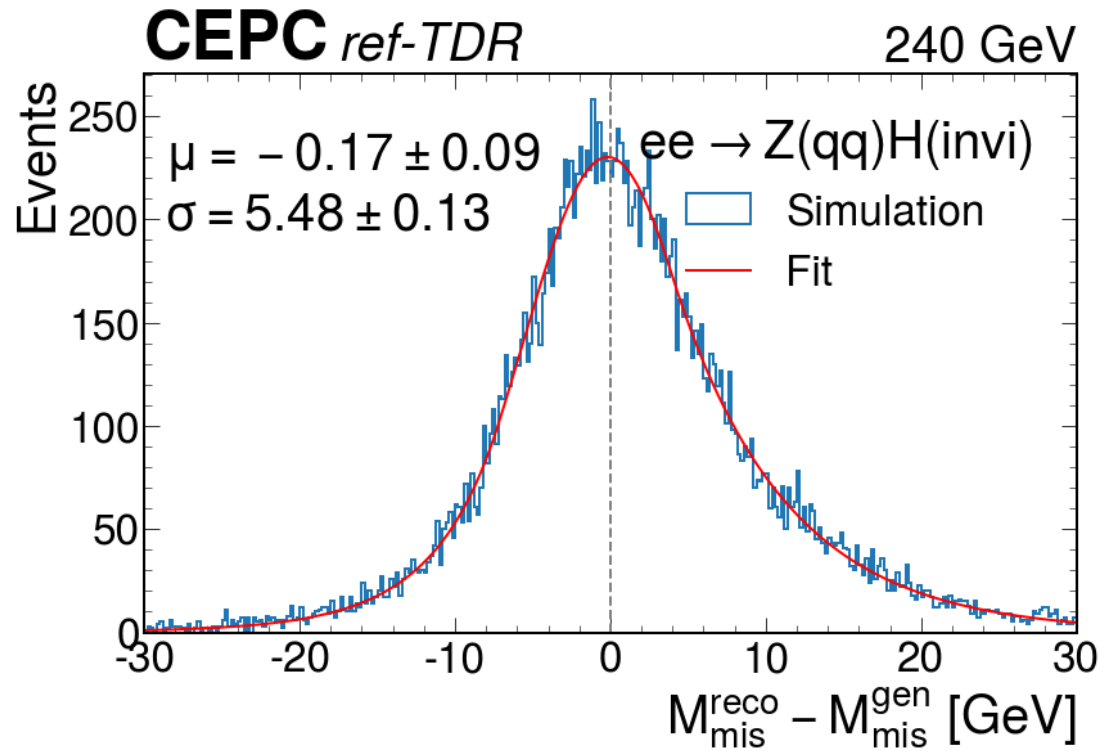
- Resolution gets worse.
- Scale more shifted.

$Z(qq)H(\text{invisible})$

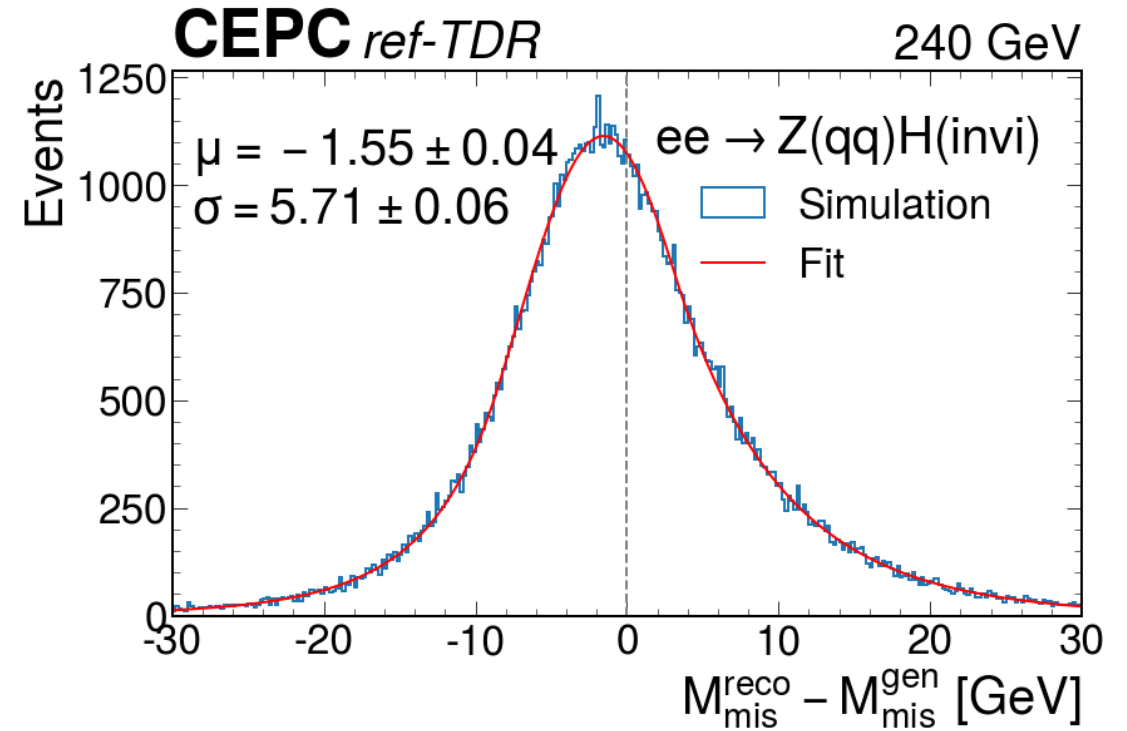


$Z(qq)H(\text{invisible})$: missing mass resolution

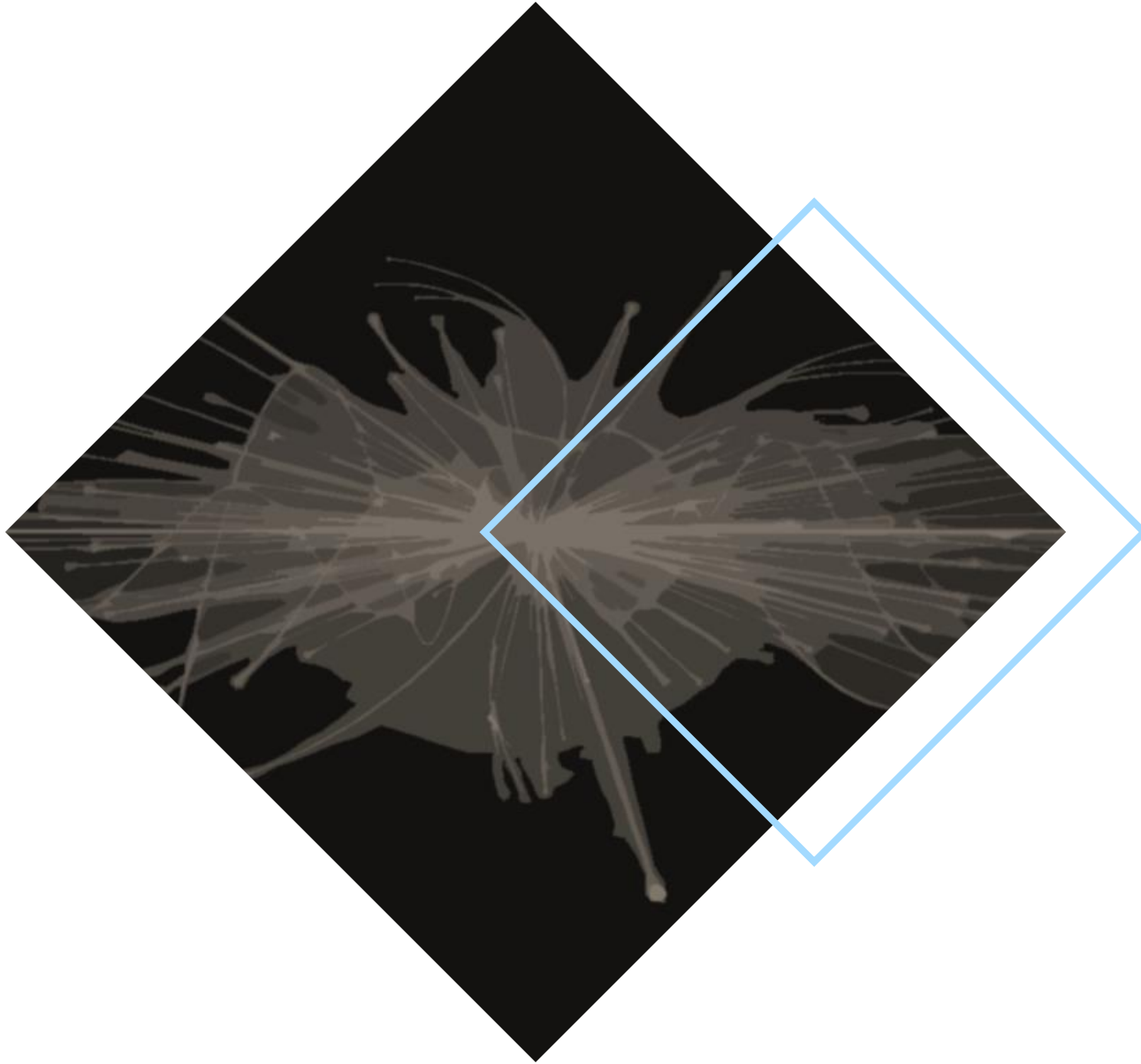
Old



New



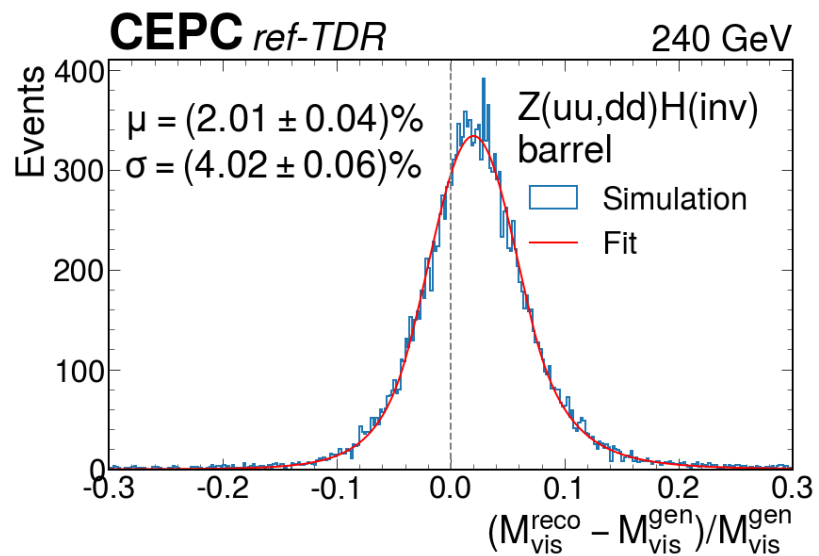
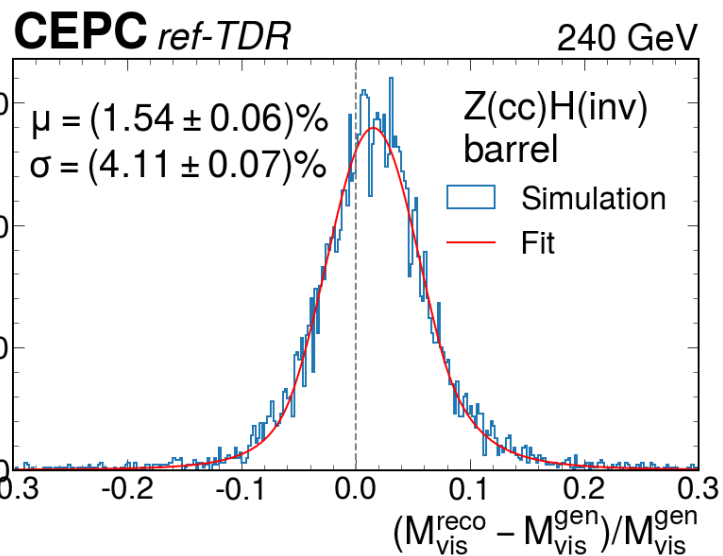
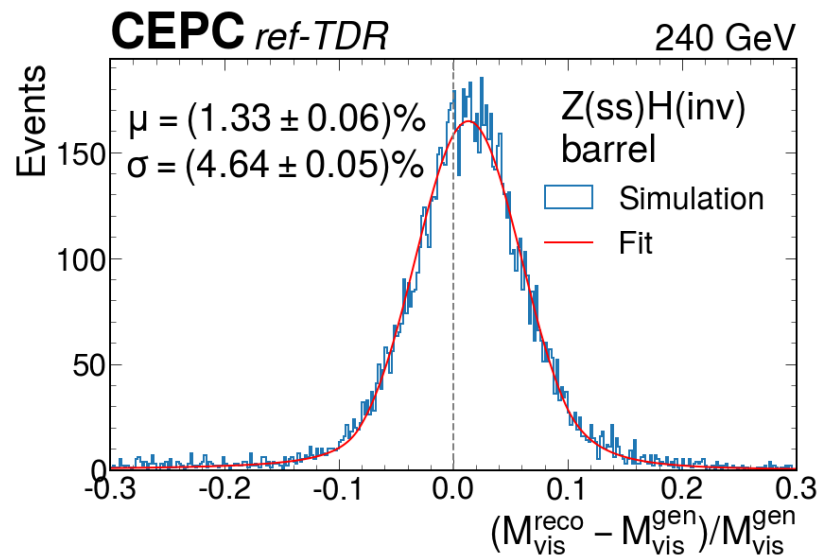
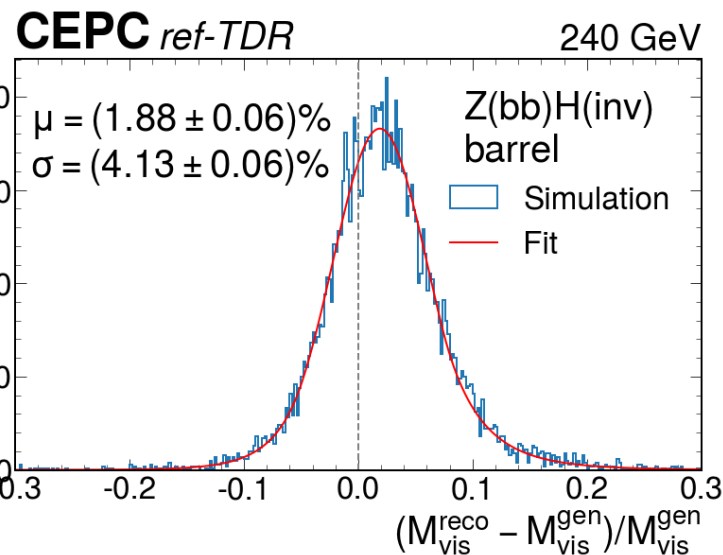
- Resolution gets worse.
- Scale more shifted.



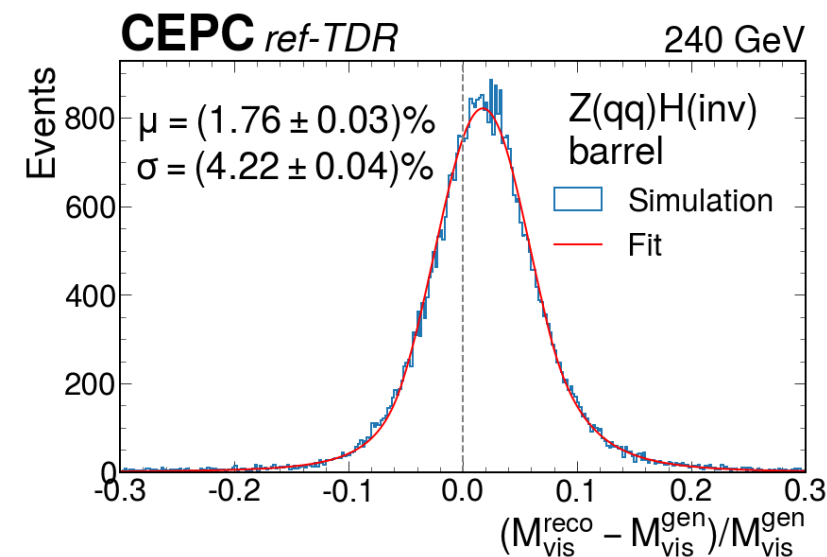
**Boson mass
resolution**

BMR($Z \rightarrow qq$)

- Cleaning applied. both jets in barrel regions.



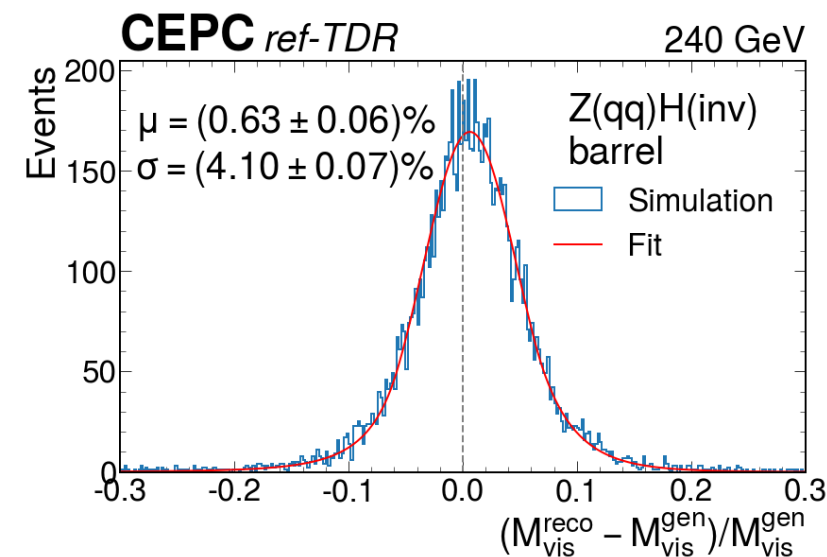
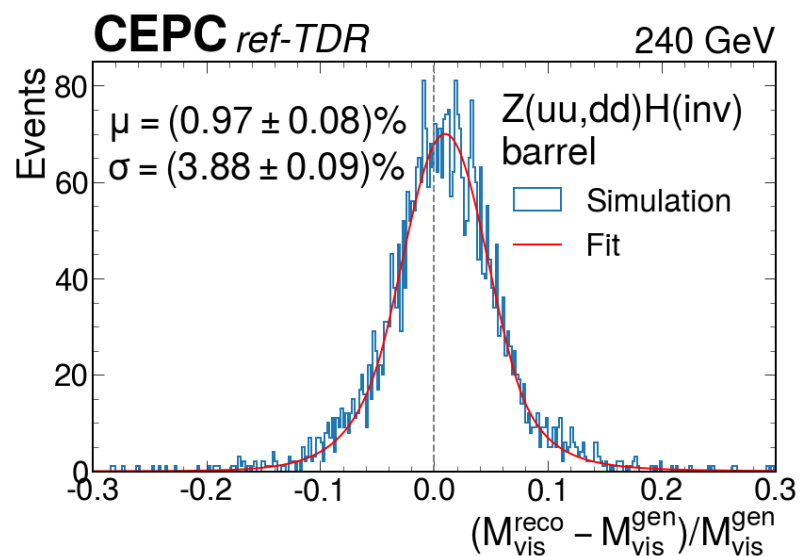
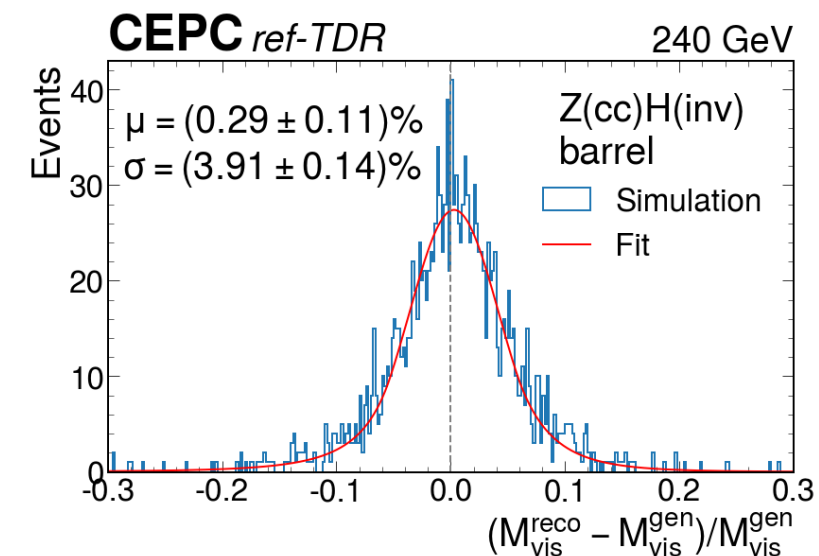
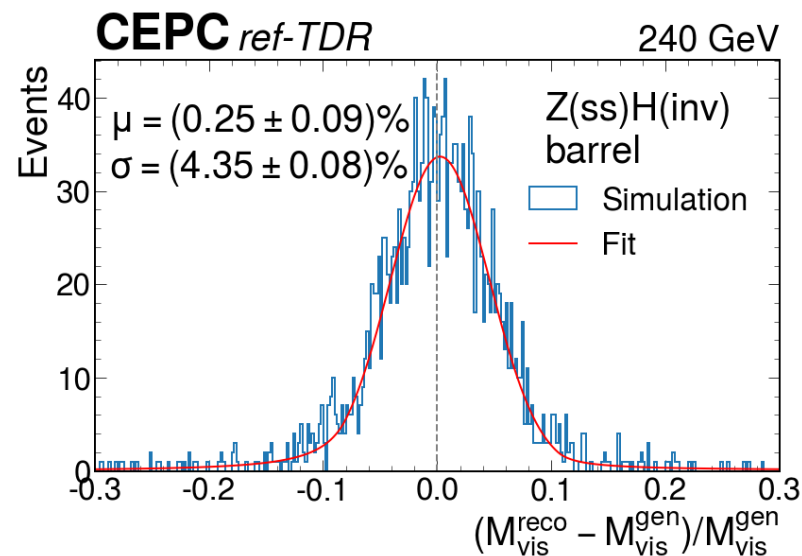
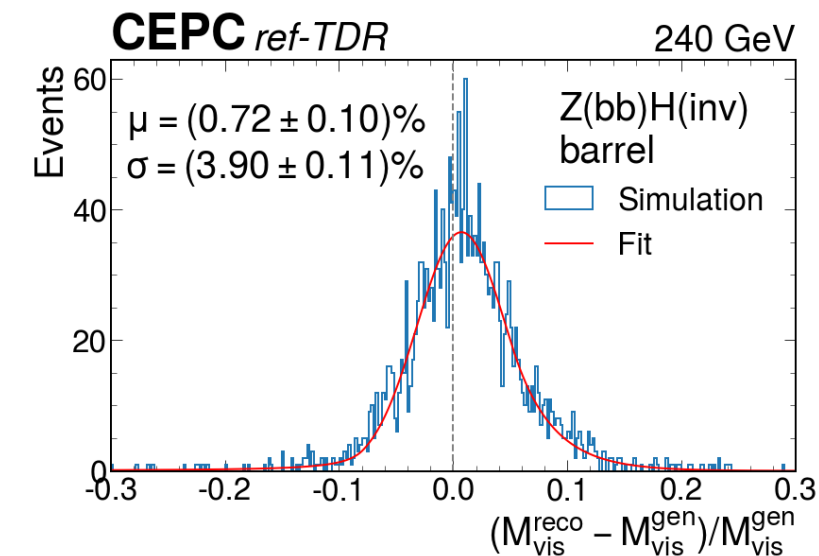
New



BMR($Z \rightarrow qq$)

- Cleaning applied. both jets in barrel regions.

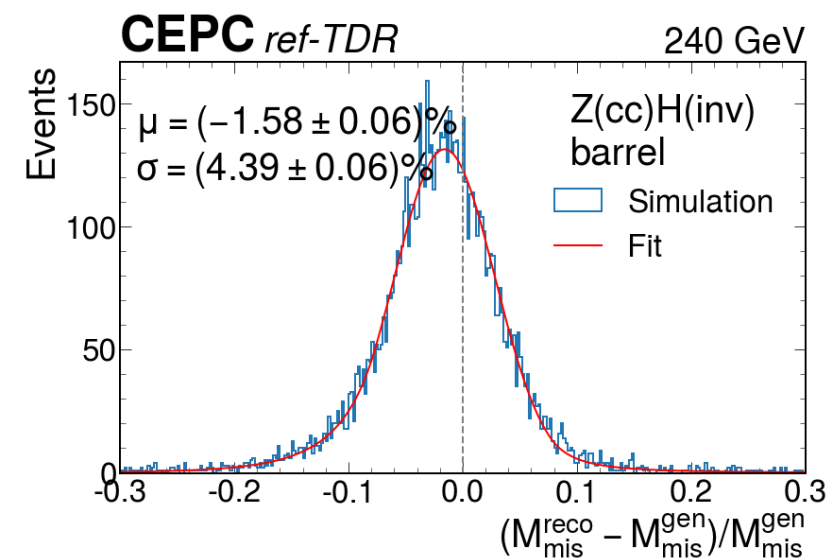
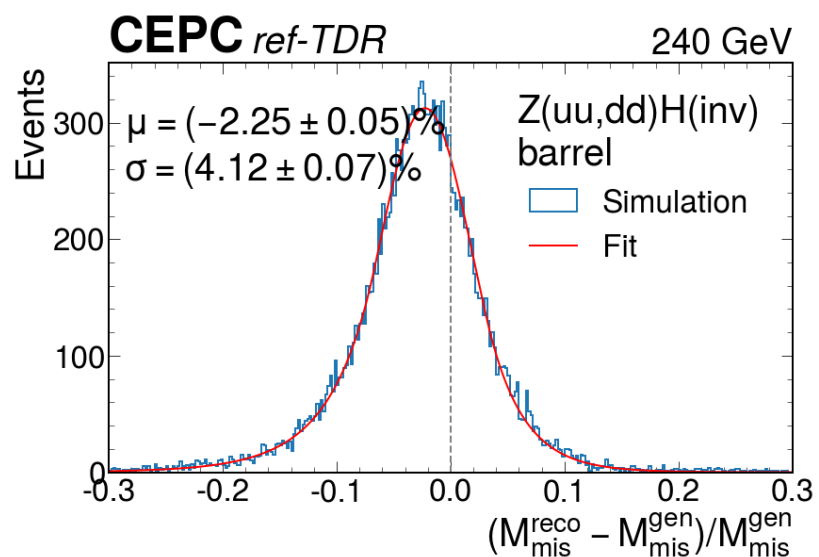
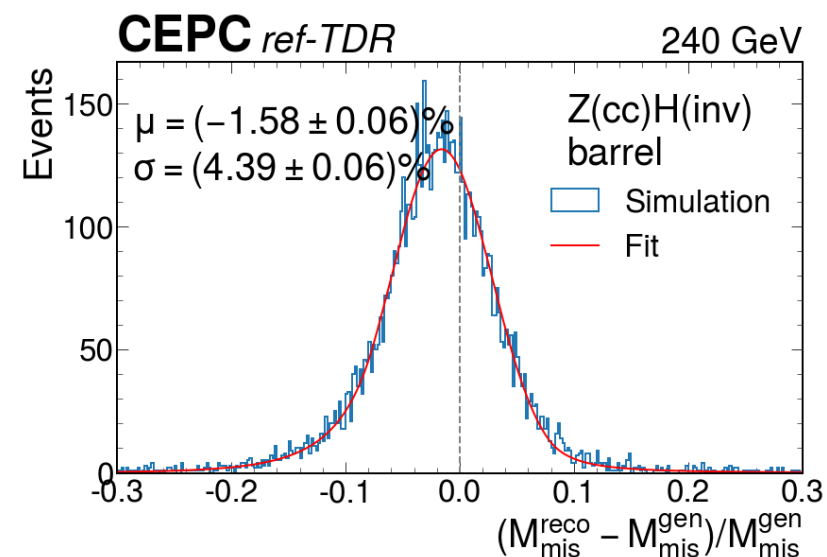
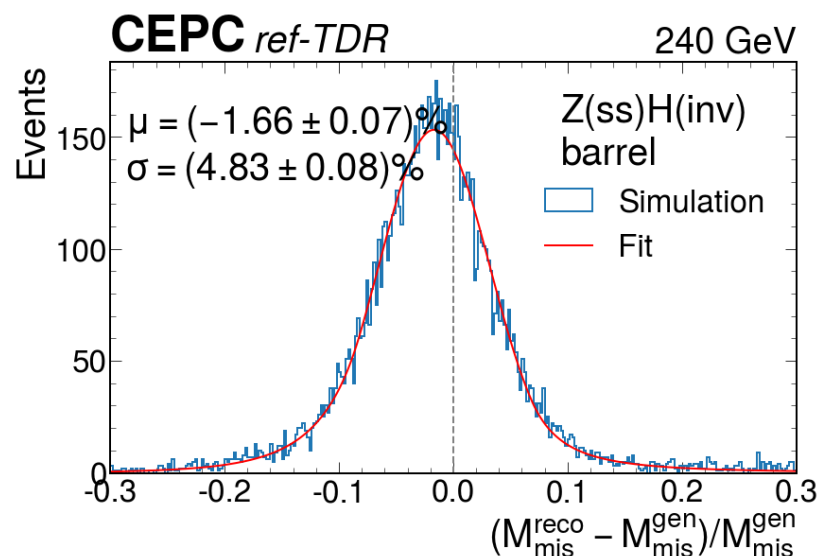
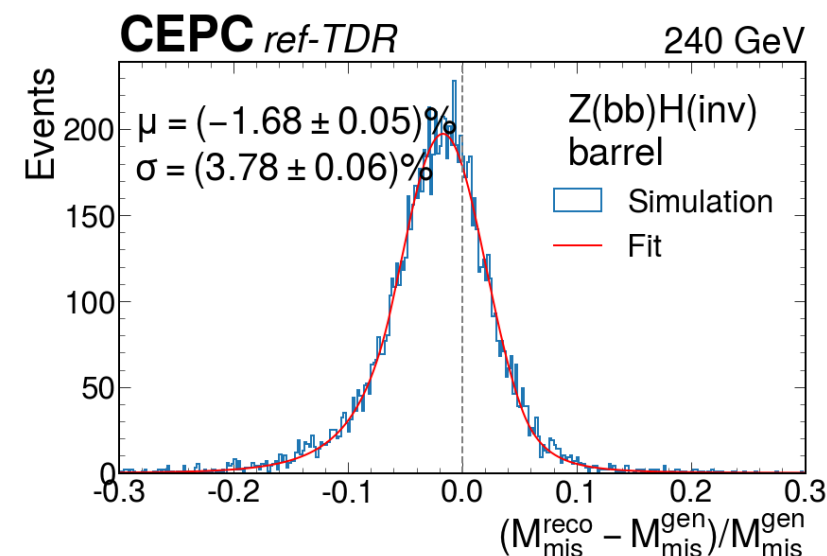
Old



BMR($H \rightarrow$ invisible)

- Cleaning applied. both jets in barrel regions.

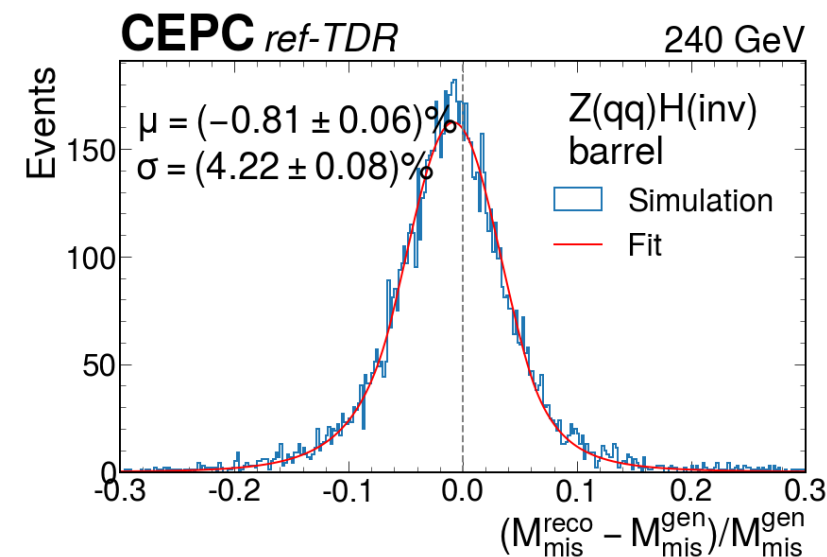
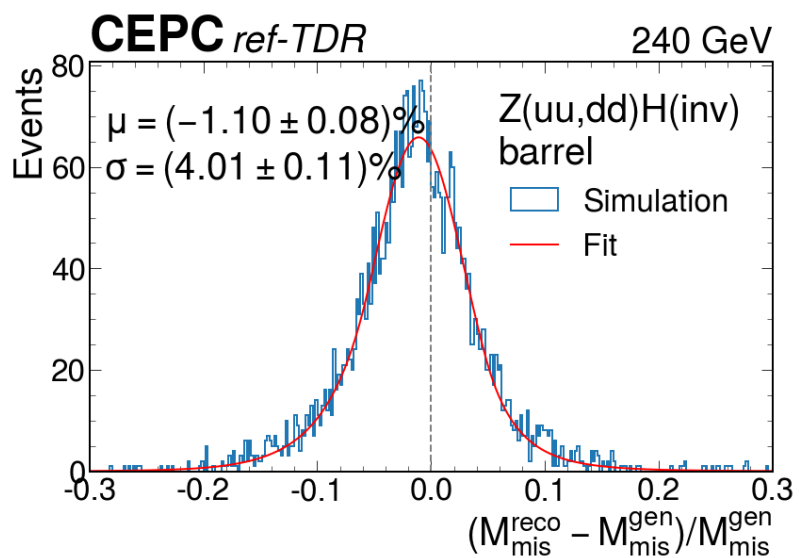
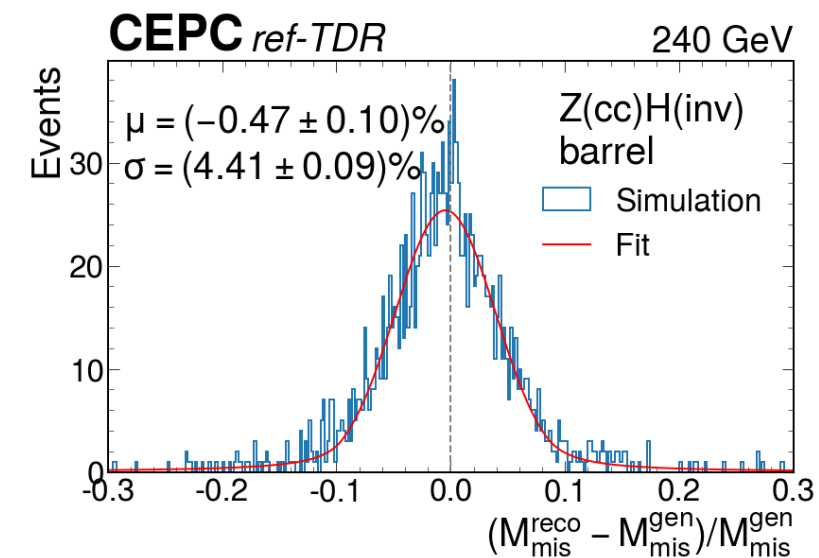
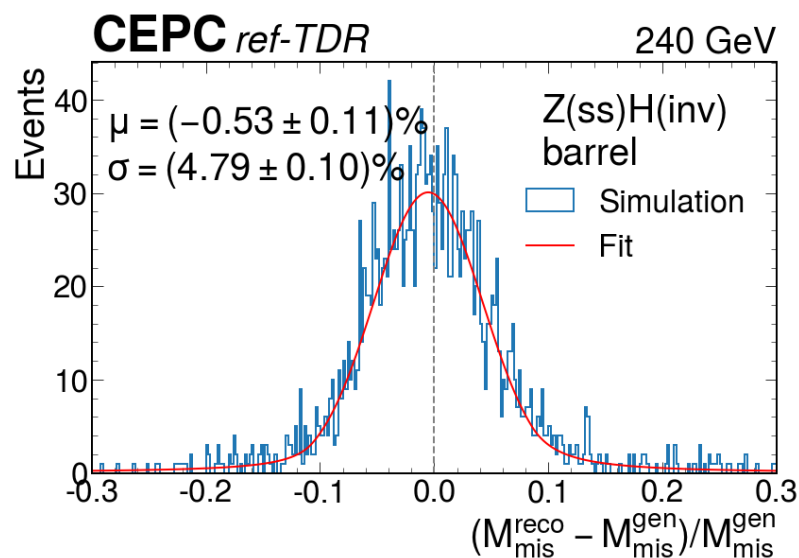
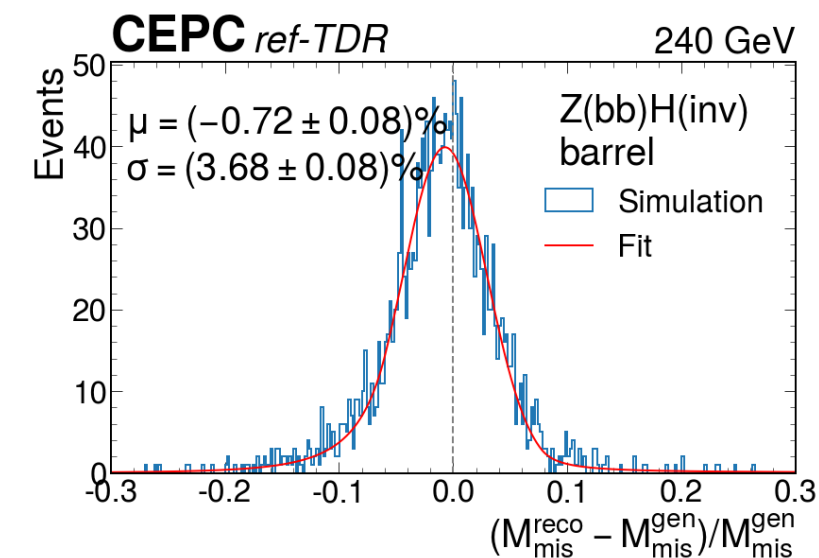
New



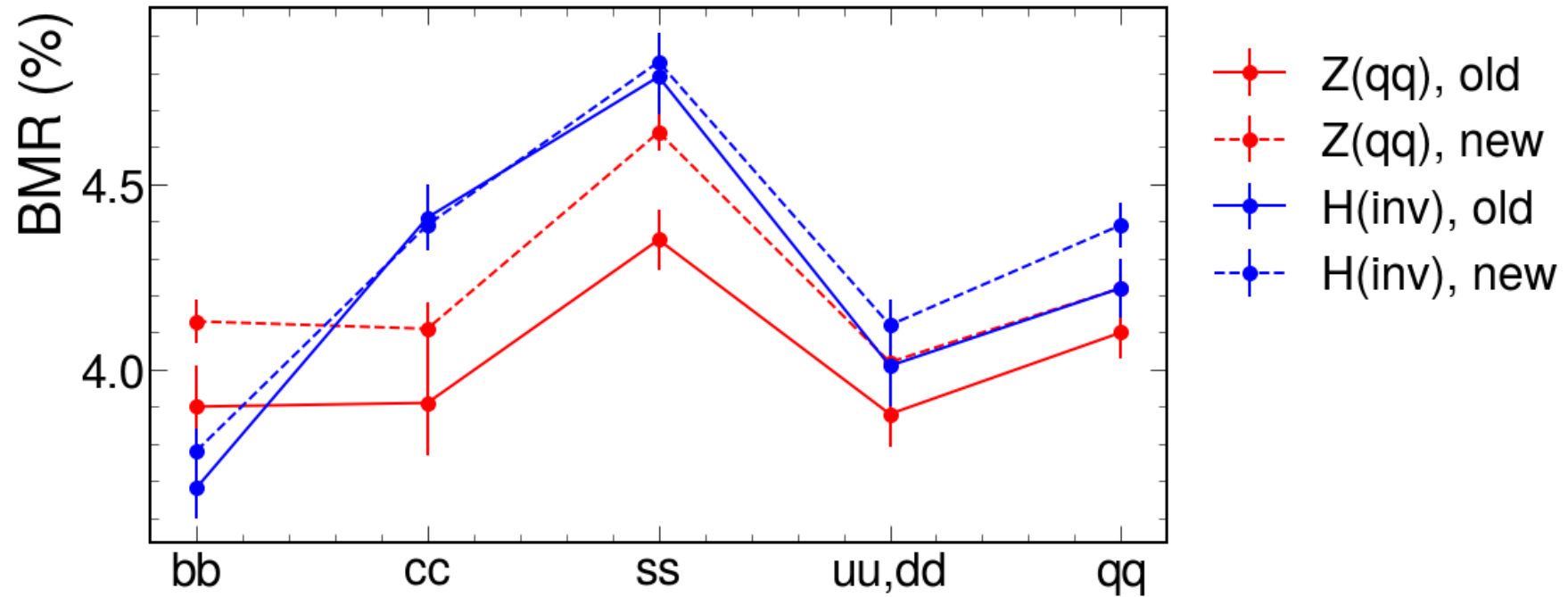
BMR($H \rightarrow \text{invisible}$)

- Cleaning applied. both jets in barrel regions.

Old



Summary



- BMR for Z(qq) and reconstructing H(invisible) from Z(qq) get worse in general.
- Expected? Since the ECAL granularity is changed from 10 mm to 15 mm?
- Compare with BMR for H(qq) from Xiaotian?