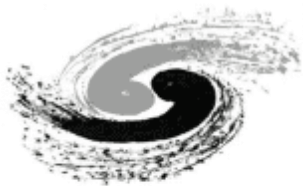


Performances in the 4- quark environment



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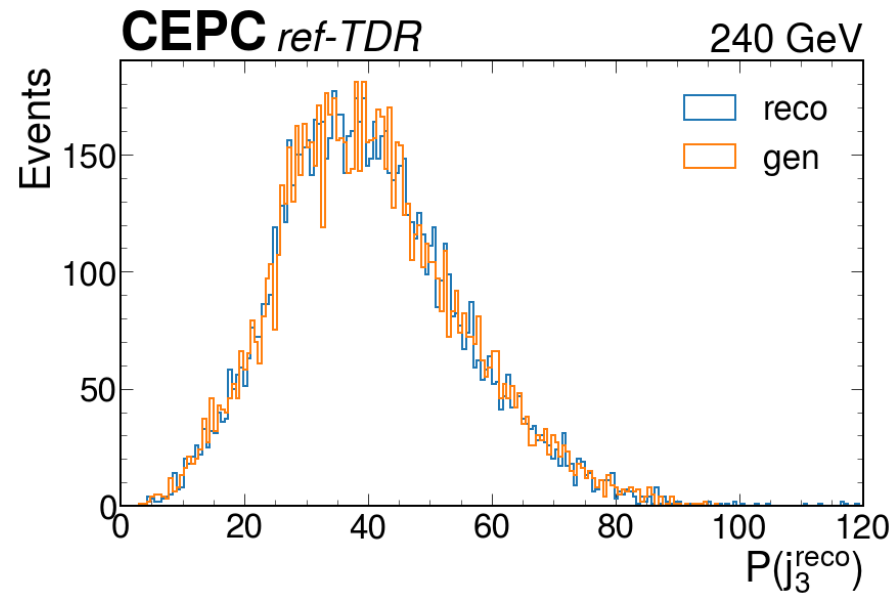
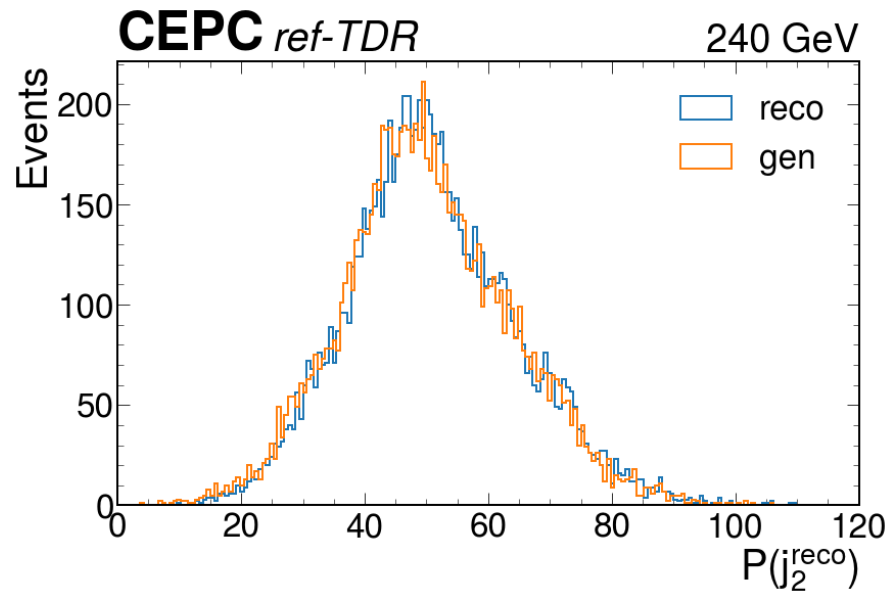
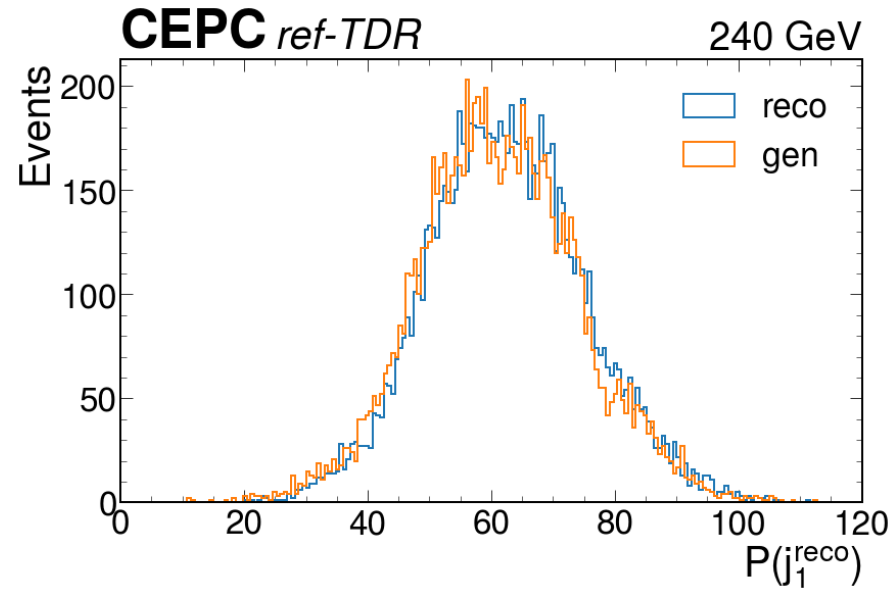
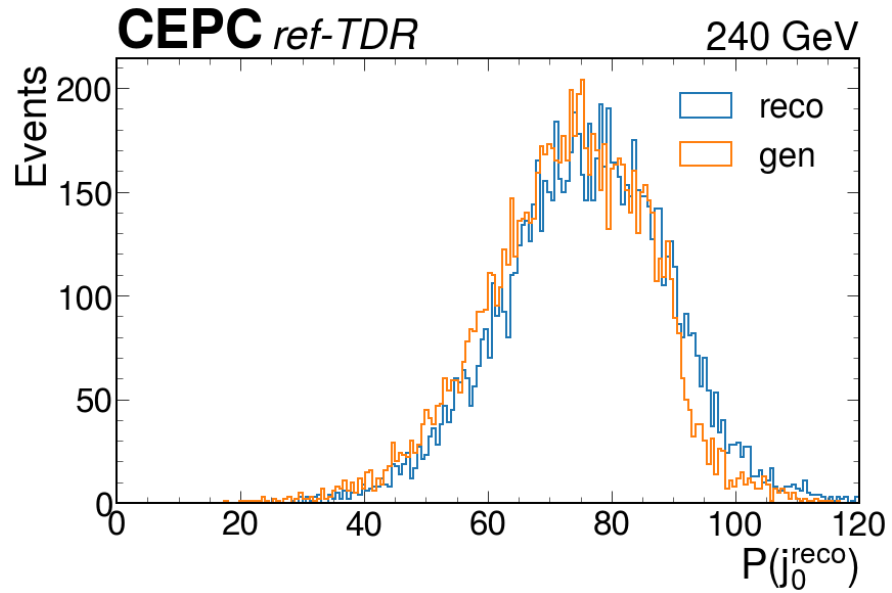
Samples

- Under the newest release: 25.3.4, available in the master branch
- $ee \rightarrow Z(qq)H(bb)$
- Location: /cefs/higgs/liugeliang/CEPC/202503/Production/Others/E240_qqHbb
 - Only use those produced today!
- 30k events

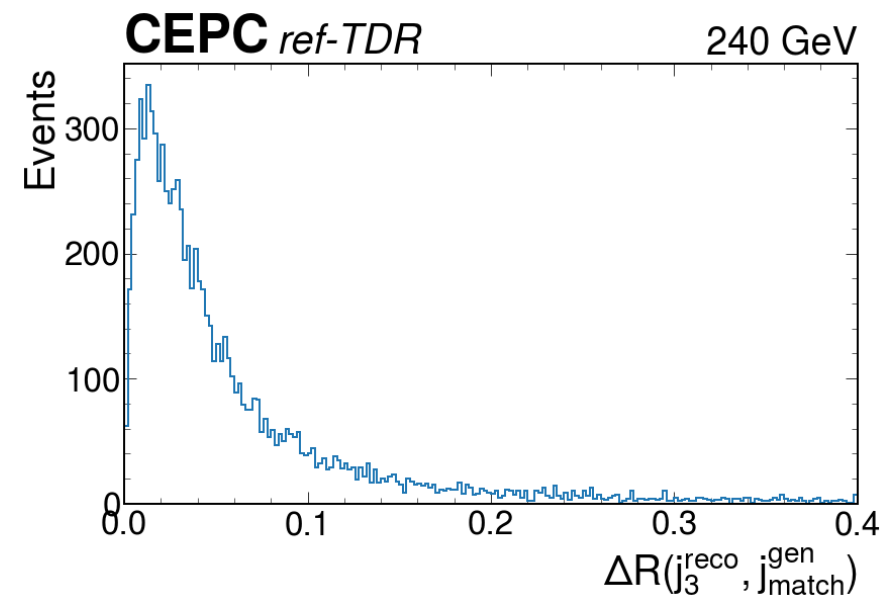
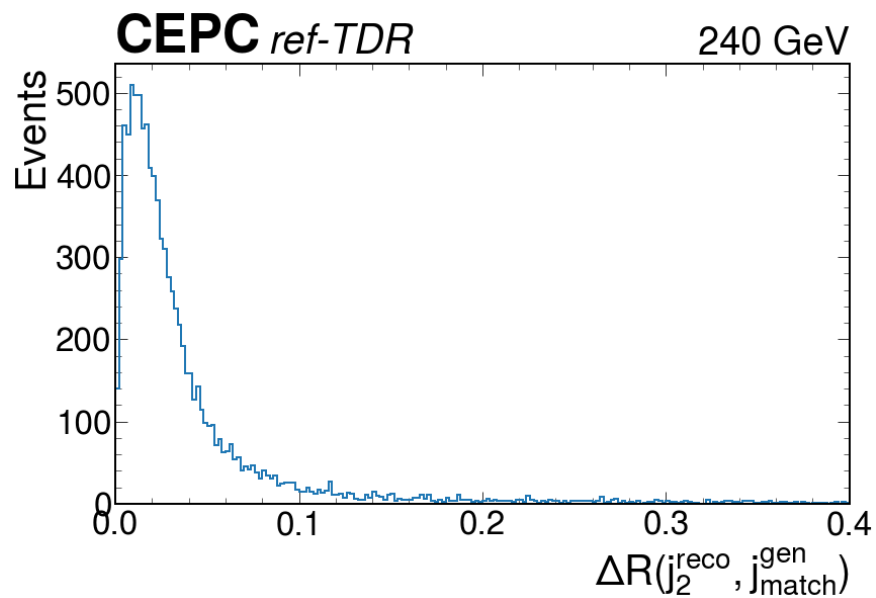
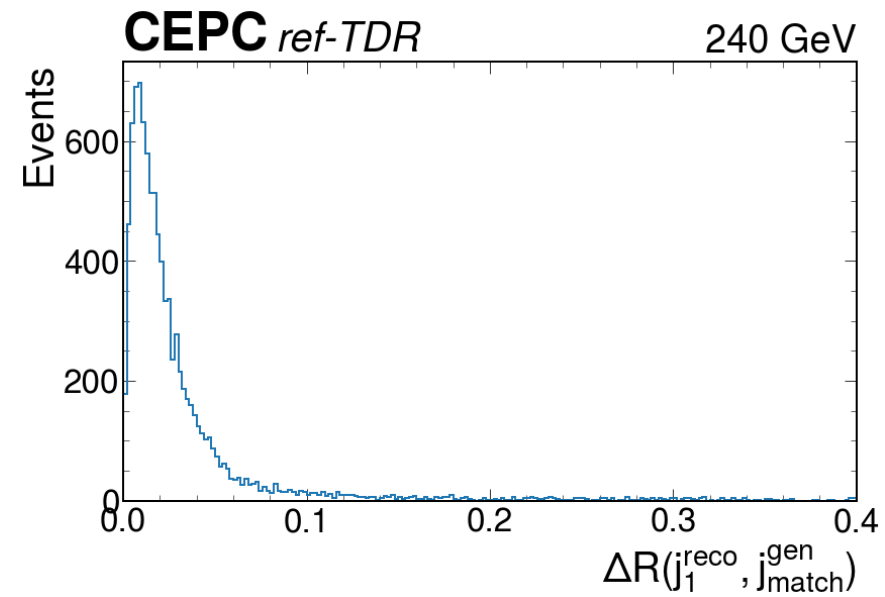
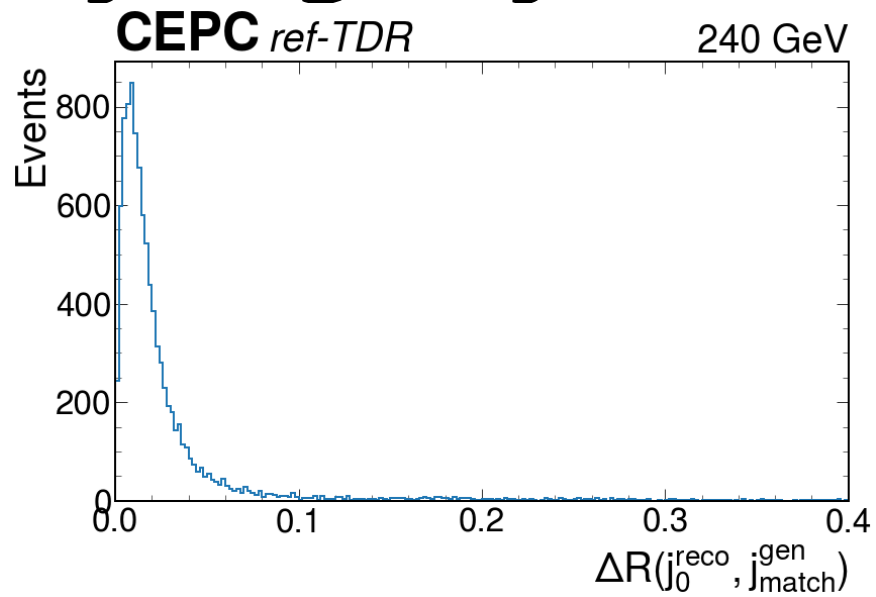
Selection

- **ee-kt algorithm, with Njet = 4**
 - Reco: clustered from all PFOs
 - Gen: clustered from all final-state, stable MC particles with $|\cos\theta| < 0.99$
- **Gen match**
 - Match reco jets and gen jets by ΔR : ordered by jet energy
- **Event cleaning**
 - $\sum P_T^V < 1 \text{ GeV}$
 - $\sum P_T^{YISR} < 1 \text{ GeV}$

Momentum



$\Delta R(\text{reco jet}, \text{gen jet})$



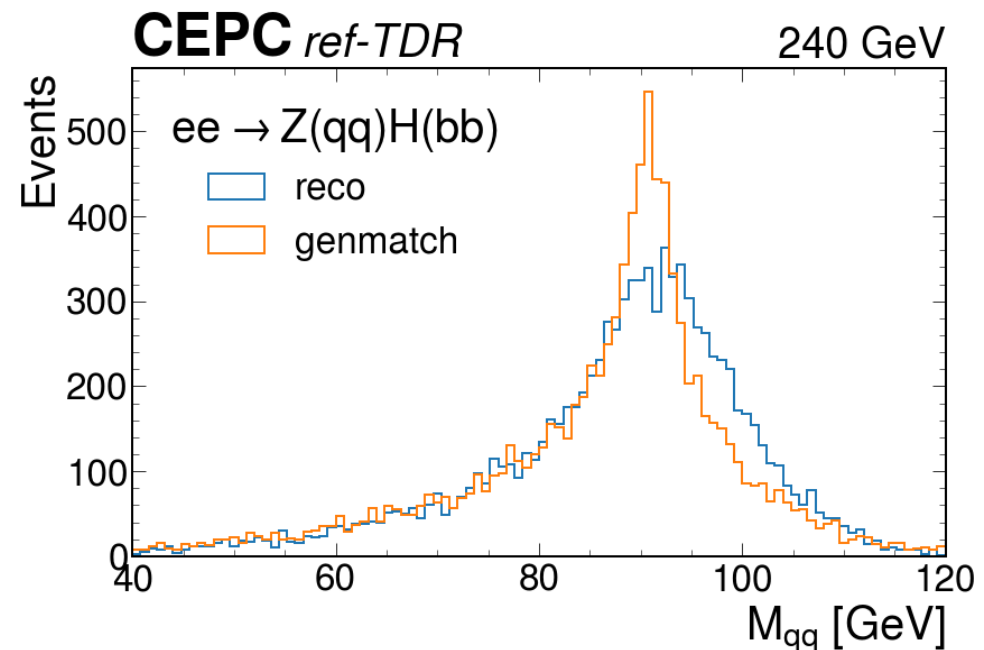
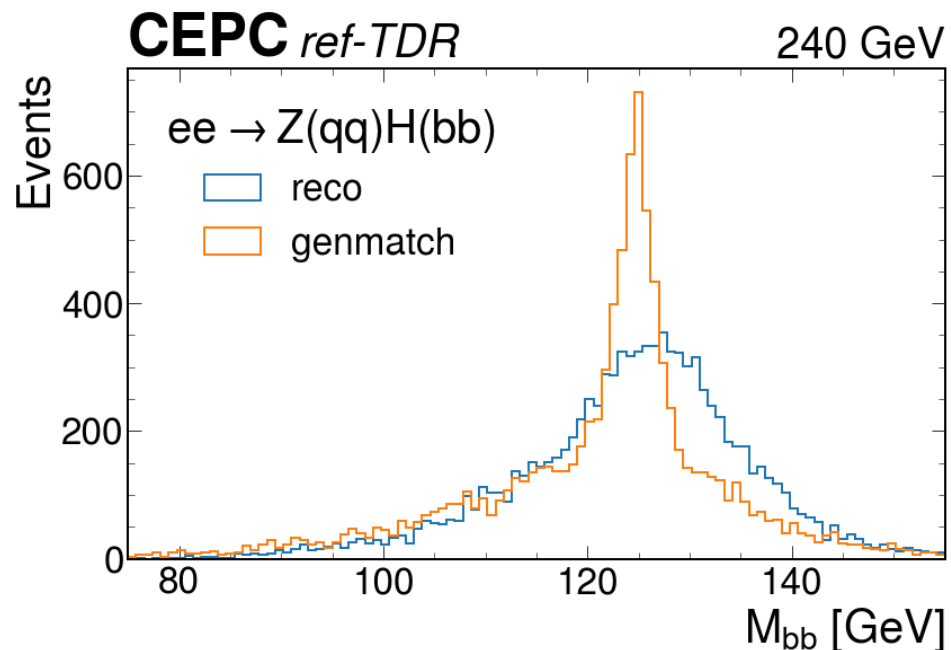
Boson mass resolution

Determine the two jets from Higgs boson:

- Iterate among any permutations of the four jets and choose the one with the lowest

$$\frac{(M_{bb} - M_H)^2}{\sigma_H^2} + \frac{(M_{qq} - M_Z)^2}{\sigma_Z^2}$$

- $M_H = 126.9$ GeV, $\sigma_H = 4.7$ GeV, from Xiaotian's studies on BMR with CEPCSW 25.3.1
- $M_Z = 91.43$ GeV, $\sigma_Z = 4.77$ GeV, from [my studies on BMR](#) with CEPCSW 25.3.1



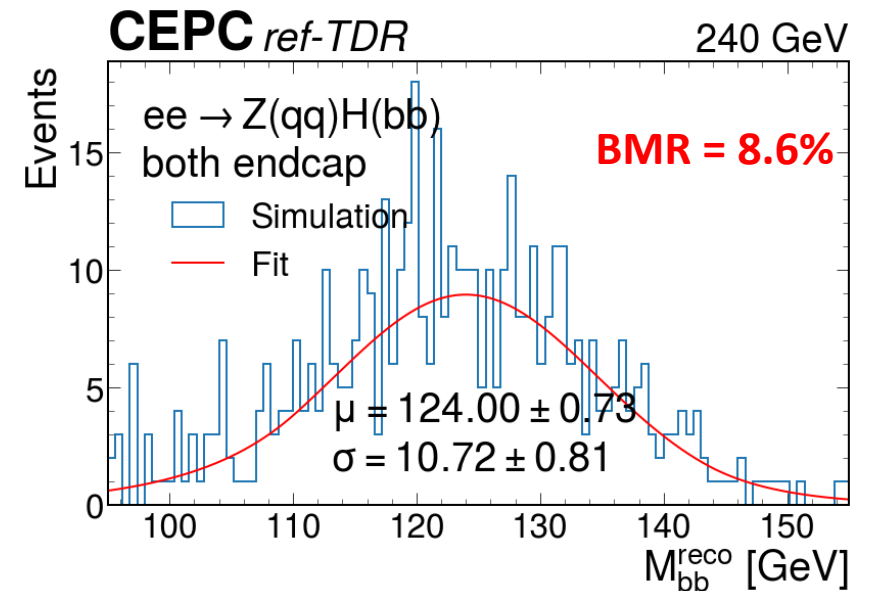
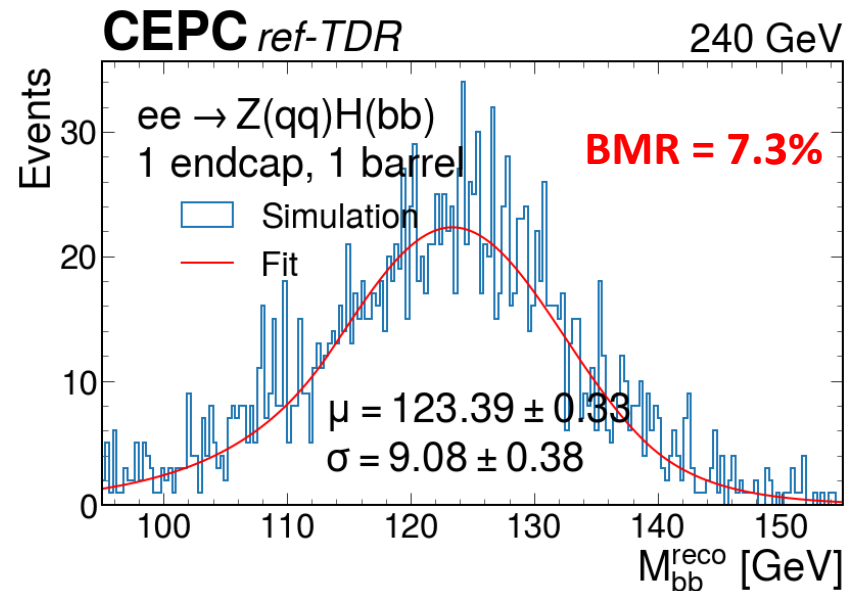
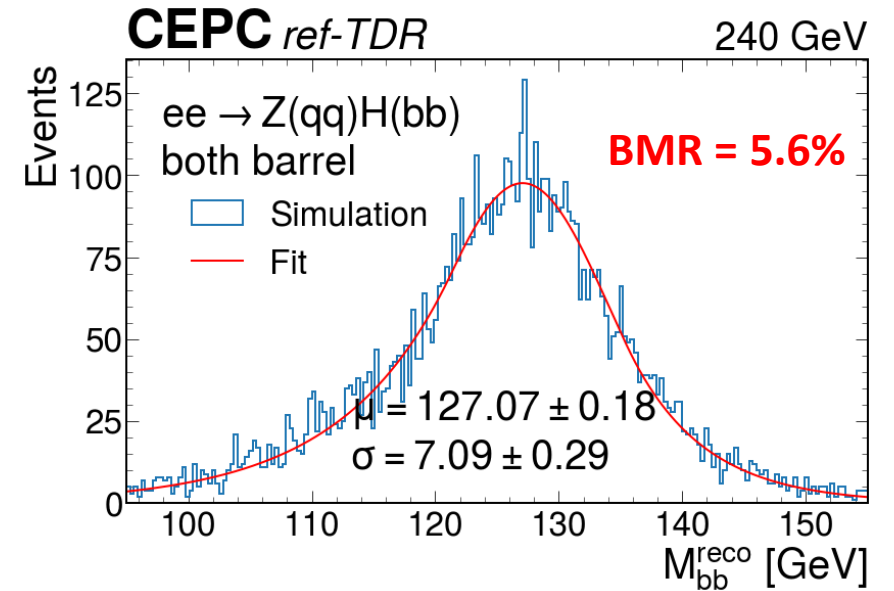
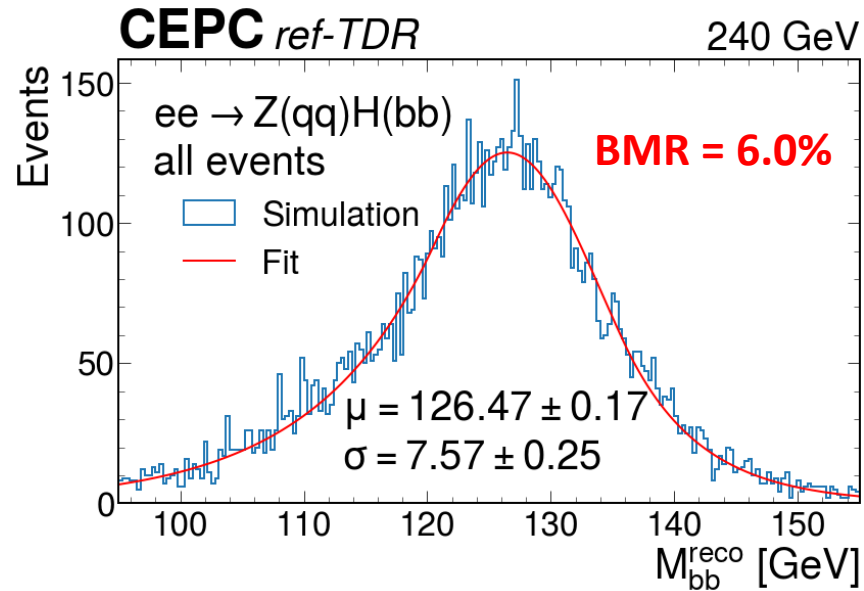
Boson mass resolution

Fit M_{bb}^{reco} with DCB

Separate based on barrel or endcap.

BMR larger than the results from nnHbb (~3.7%)

Expected: at least due to jet constituents migration



Boson mass resolution

W.r.t. to gen mass

Resolutions due to detector responses

BMR close to the 2-jet environment

