Boson Mass Resolution in the Higgs Boson Invisible Decay

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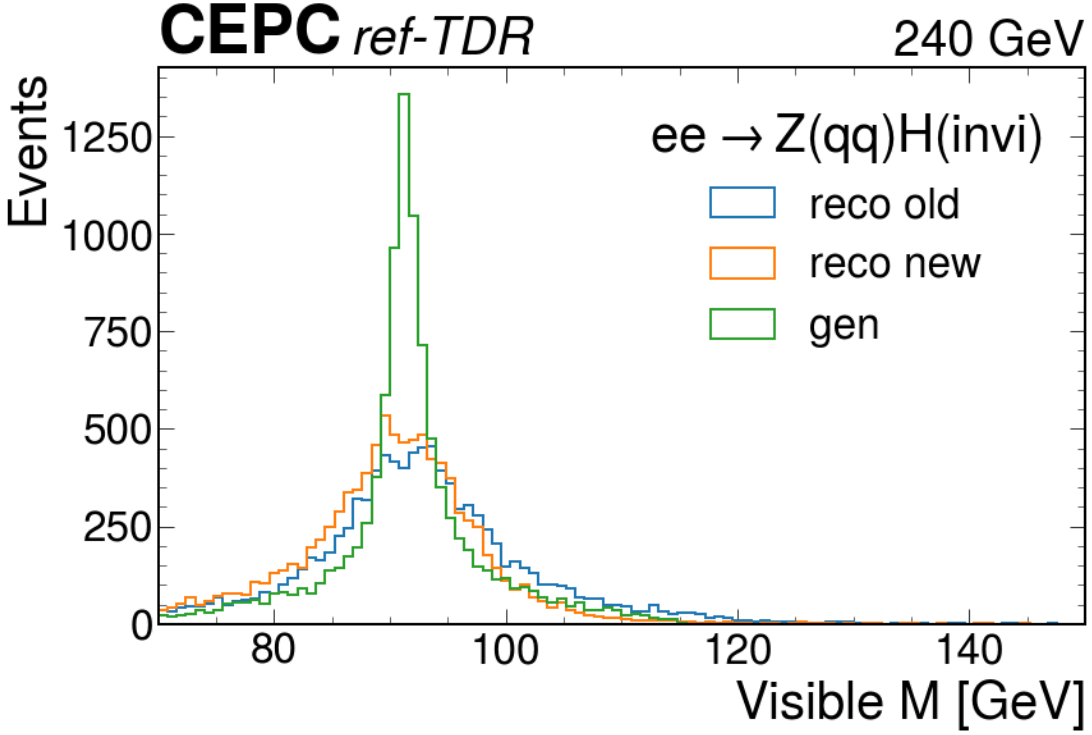
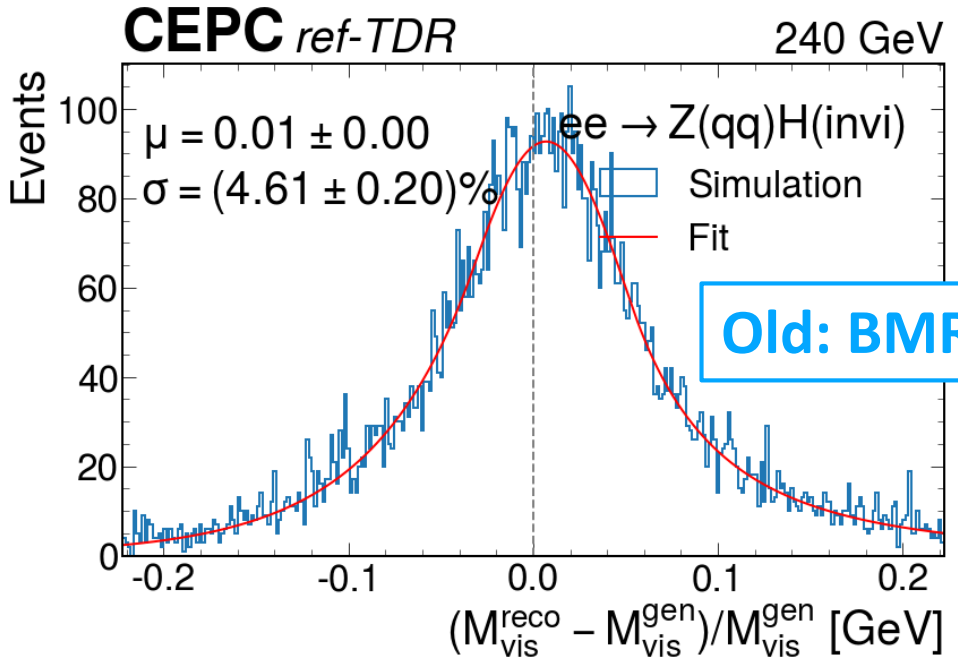
Feb. 19th, 2025

BMR(Z→qq)

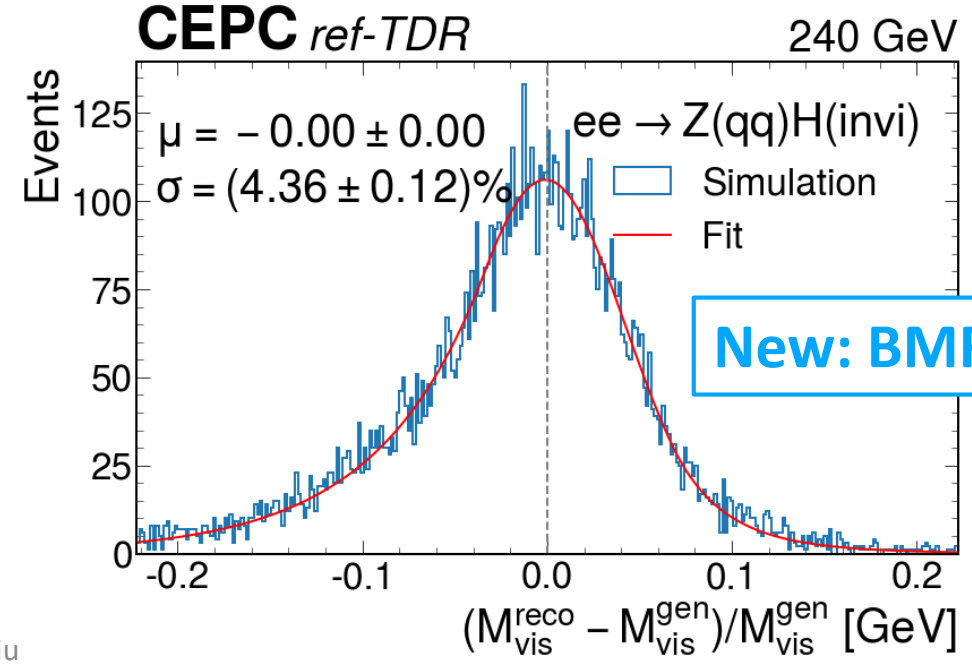




Old: CEPCSW25.1.2

New: CEPCSW25.1.2 + updates on e reconstruction + updates on track-cluster matching: new branch

Old: BMR=4.61%

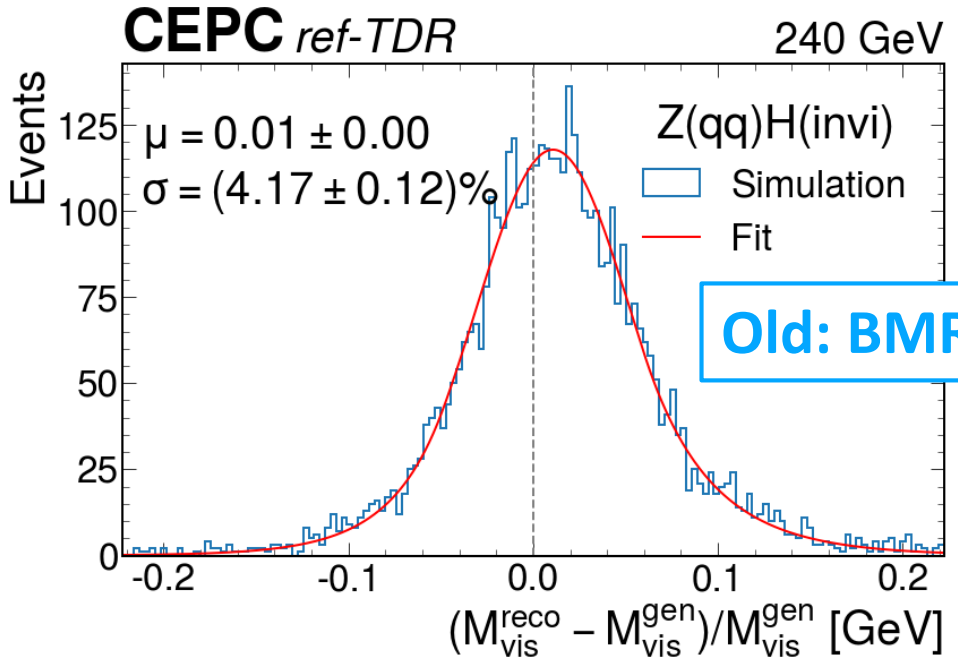


New: BMR=4.36%

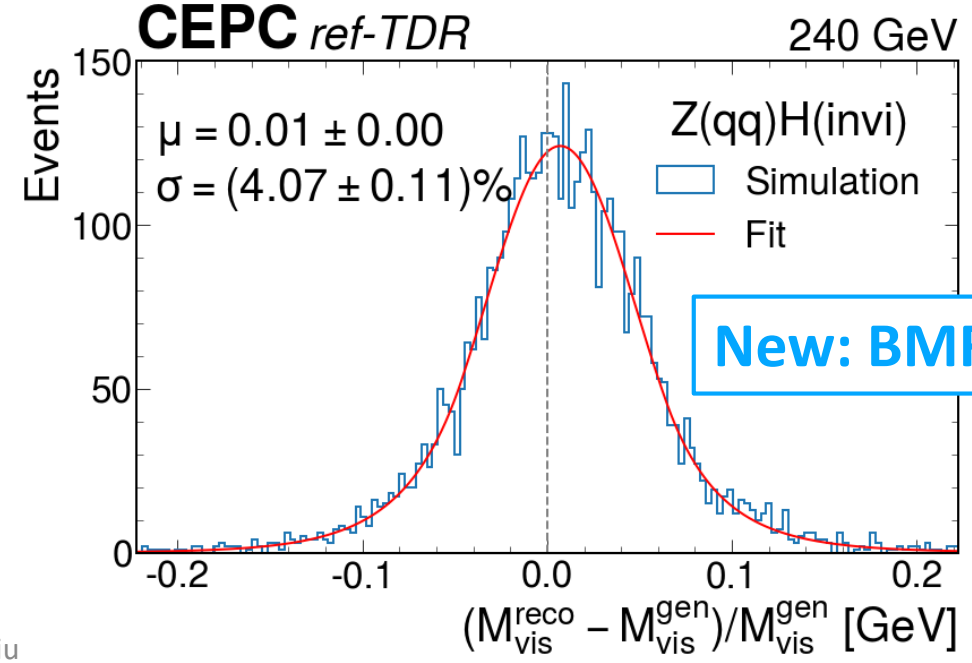
BMR(Z→qq)

Event cleaning:

- E_ISR < 1 GeV
- |cos(θjet1)|<0.85, |cos(θjet2)|<0.85



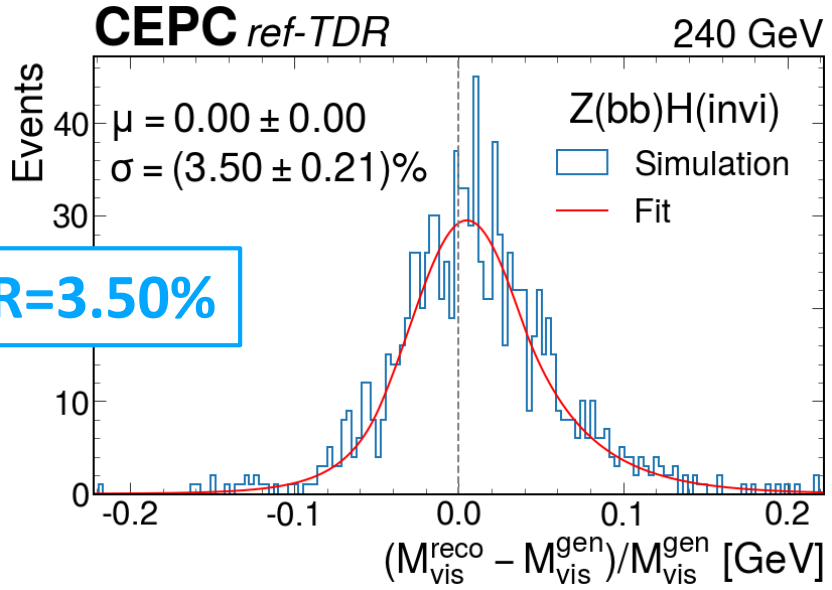
Old: BMR=4.17%



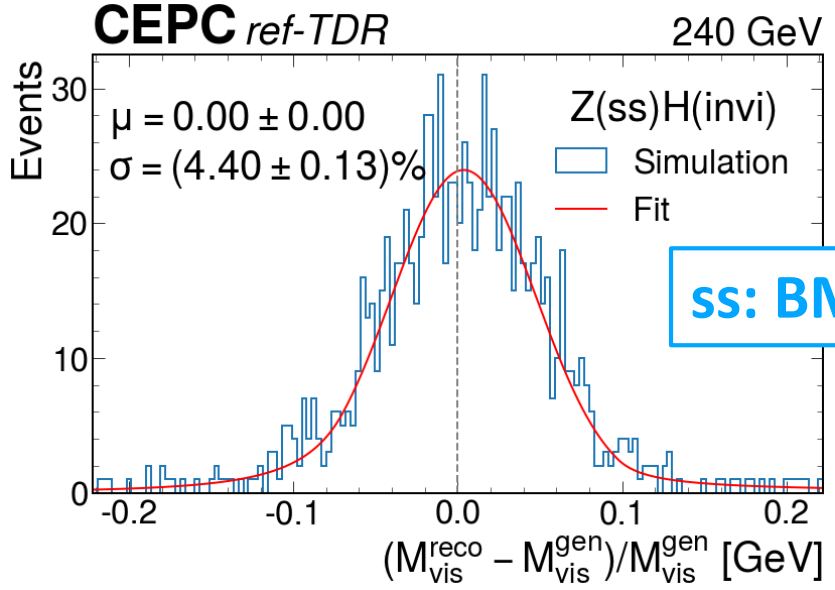
New: BMR=4.07%

BMR(Z→qq) in different flavors

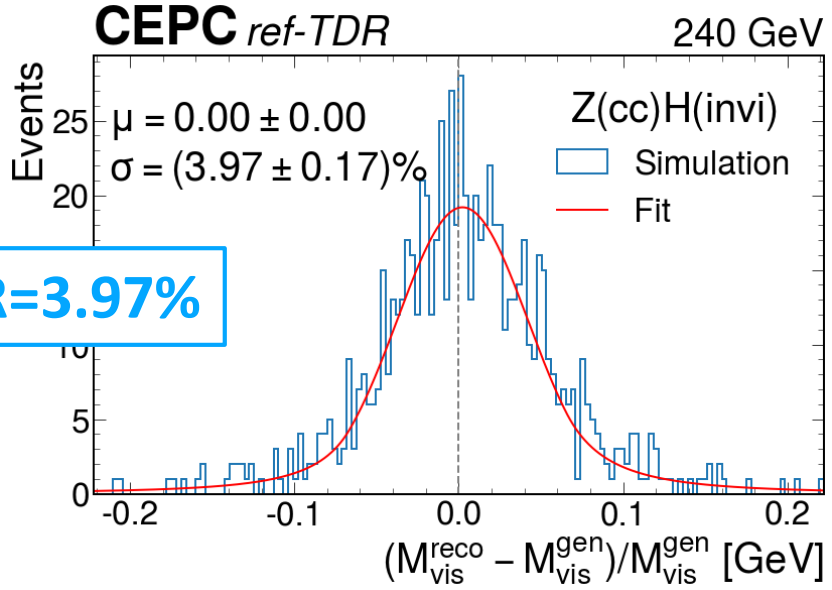
With cleaning



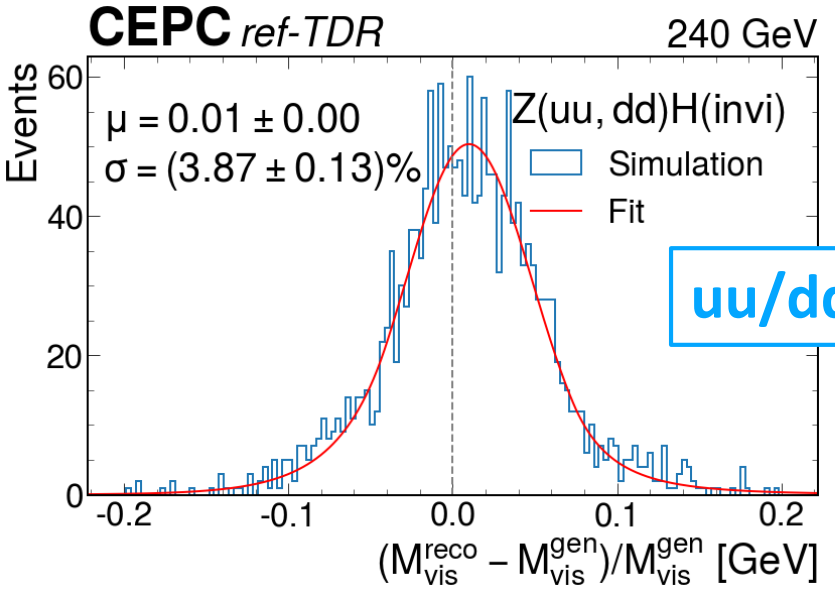
bb: BMR=3.50%



ss: BMR=4.40%

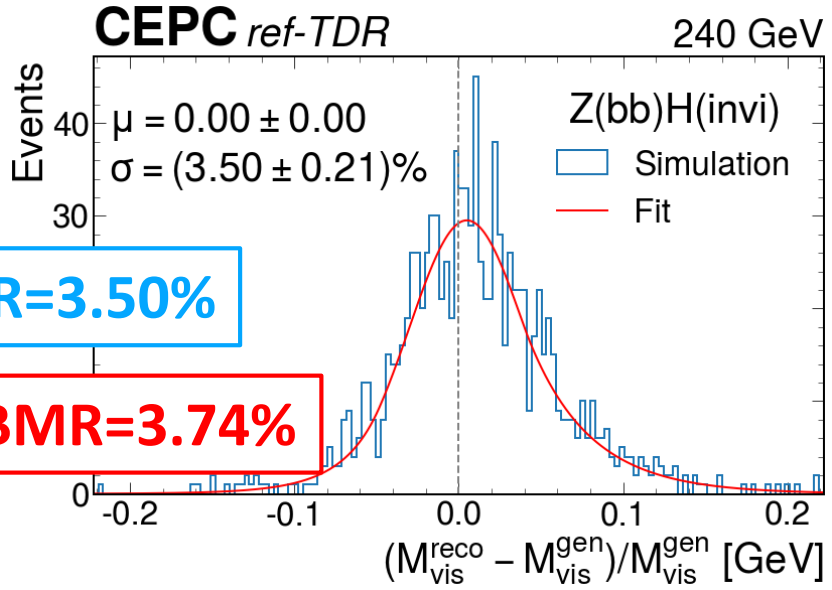


cc: BMR=3.97%



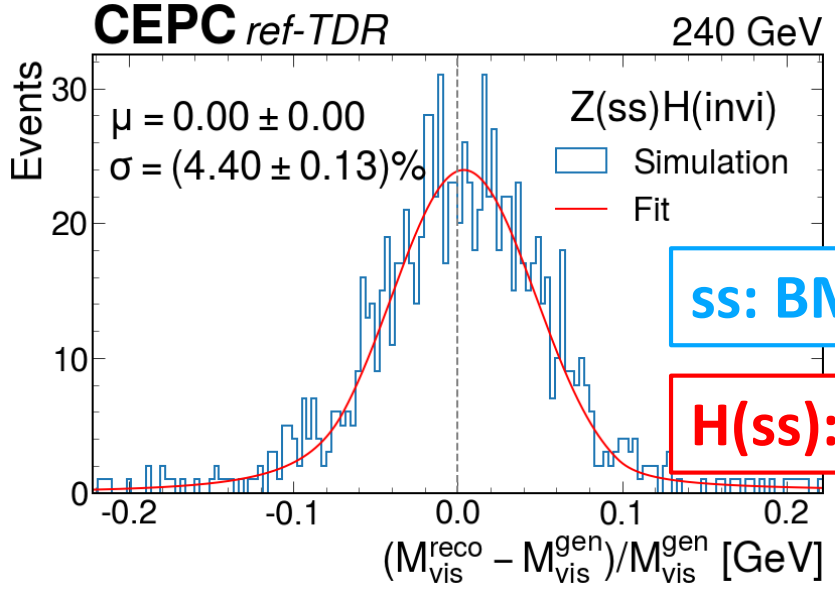
uu/dd: BMR=3.87%

BMR(Z→qq) in different flavors



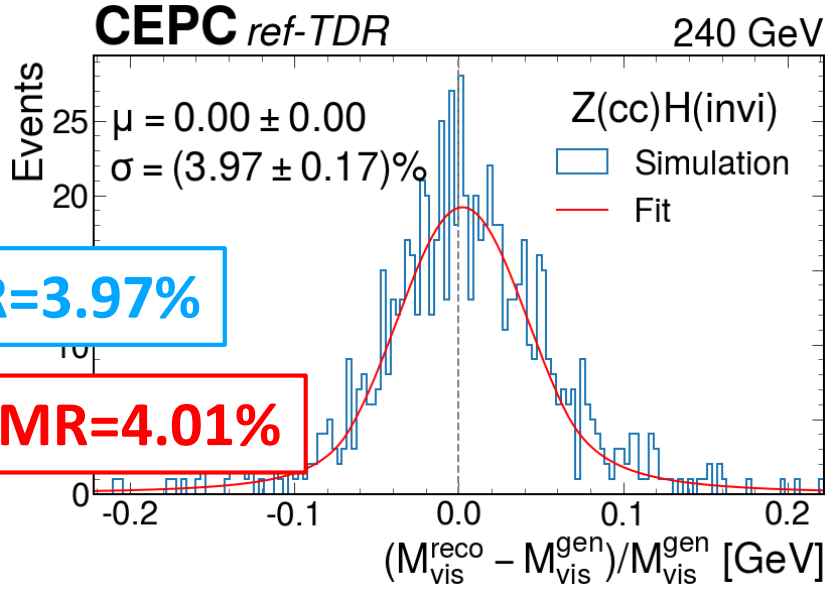
bb: BMR=3.50%

H(bb): BMR=3.74%



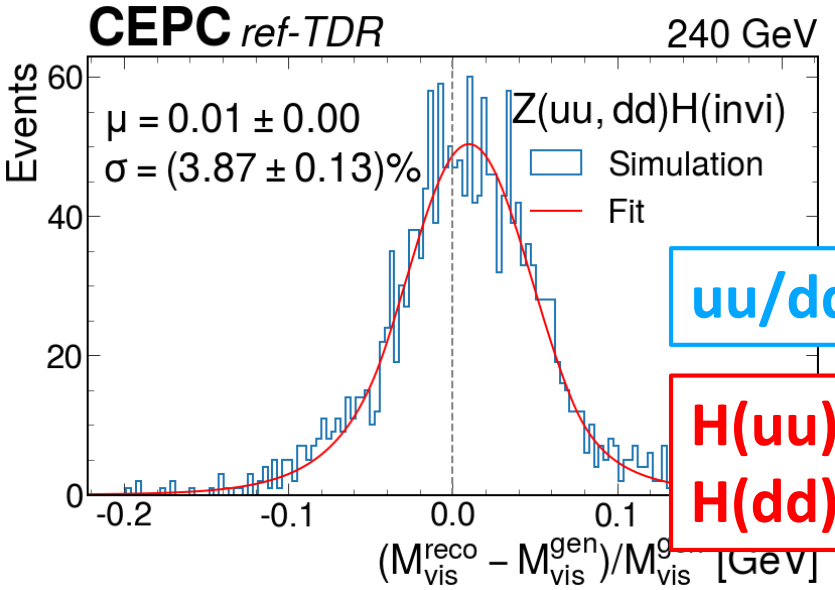
ss: BMR=4.40%

H(ss): BMR=4.40%



cc: BMR=3.97%

H(cc): BMR=4.01%



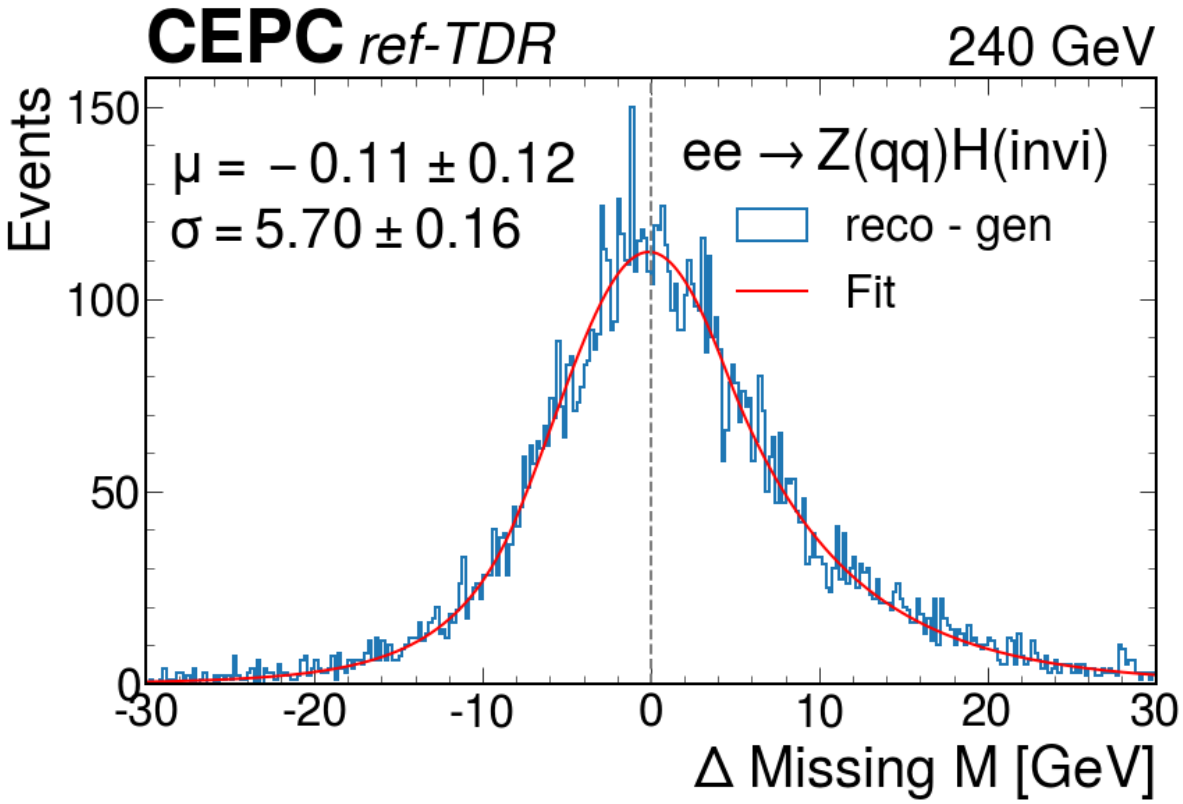
uu/dd: BMR=3.87%

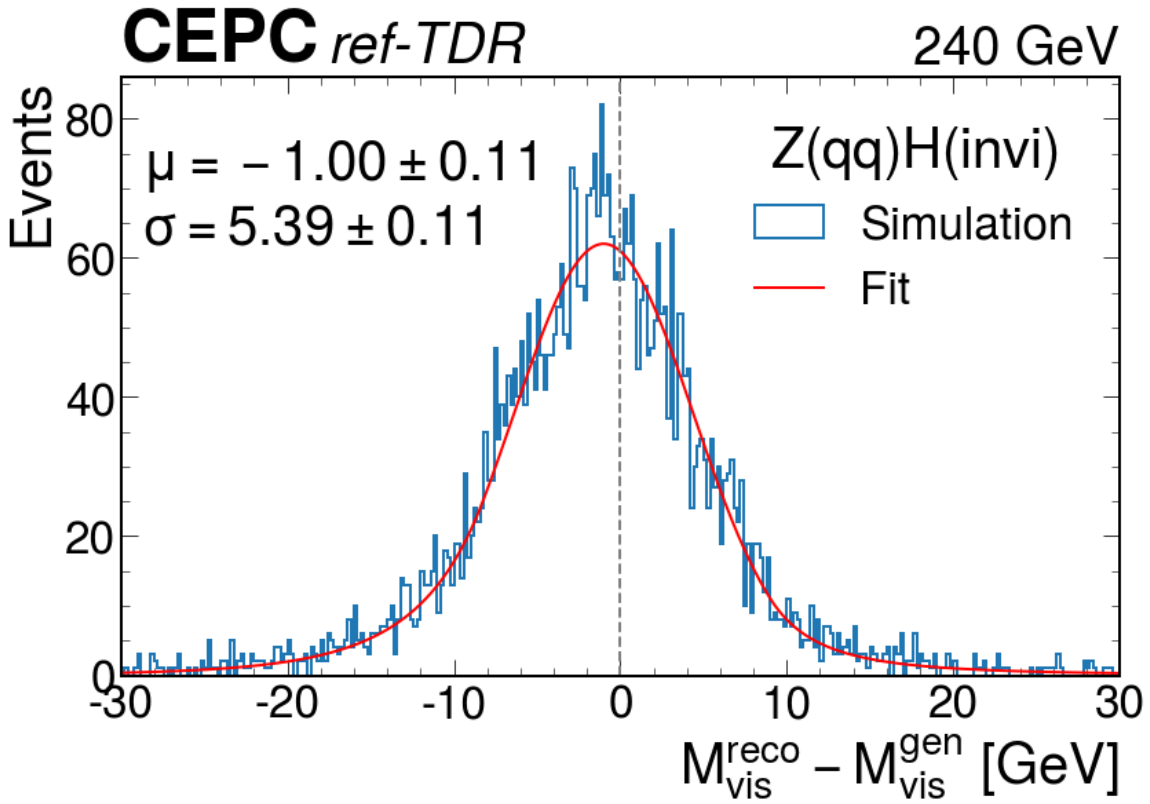
H(uu): BMR=3.77%

H(dd): BMR=3.95%

BMR(H→invisible)

- $p^{vis} = \sum_i^{PFO} p_i$
- $p^{mis} = p^{tot} - p^{vis}$, $p^{tot} = (0, 0, 0, 240\ \mathrm{GeV})$



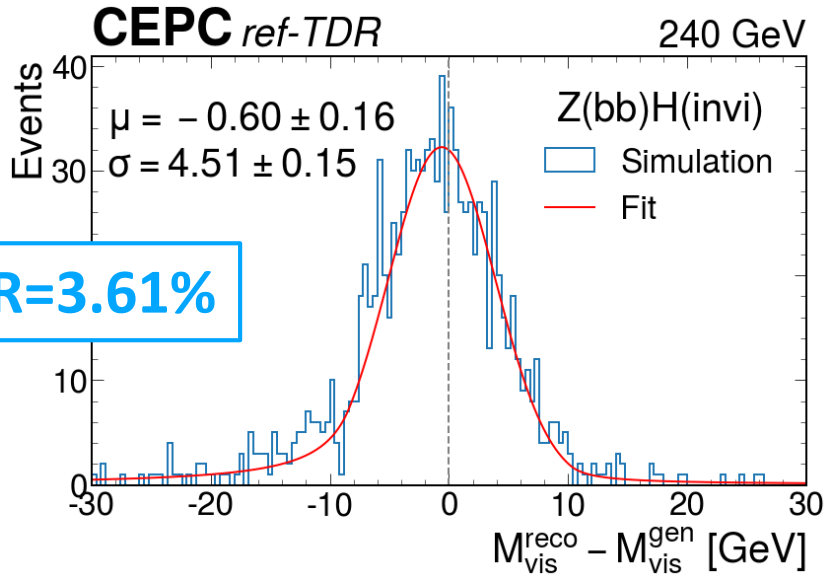


W/o cleaning: BMR=4.56%

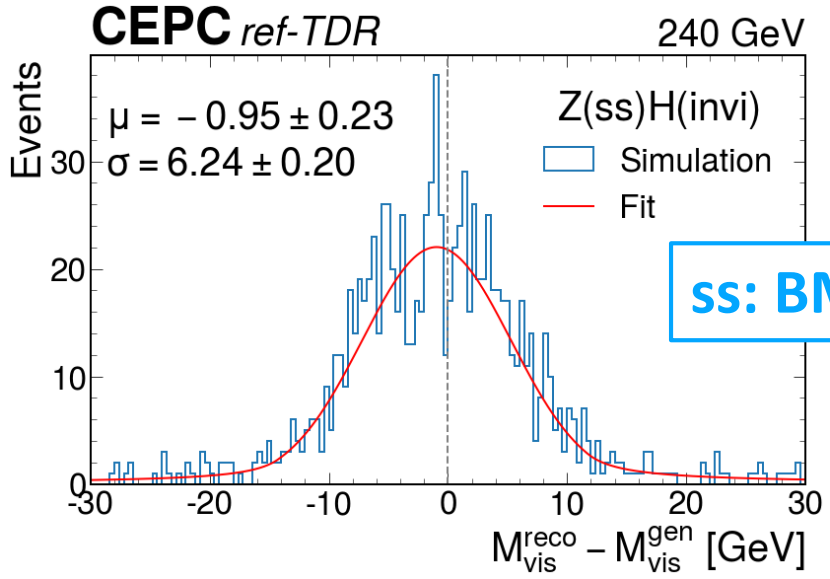
With cleaning: BMR=4.31%

BMR(H→invisible) in different flavors

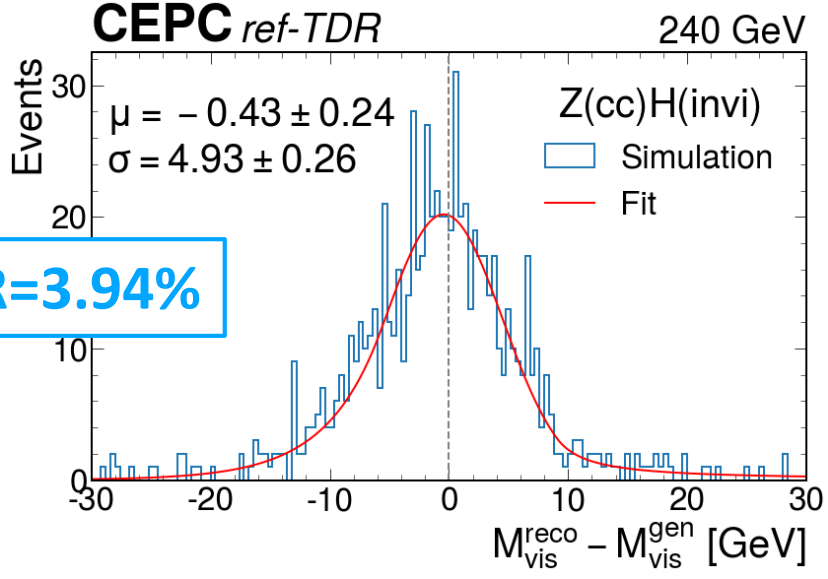
With cleaning



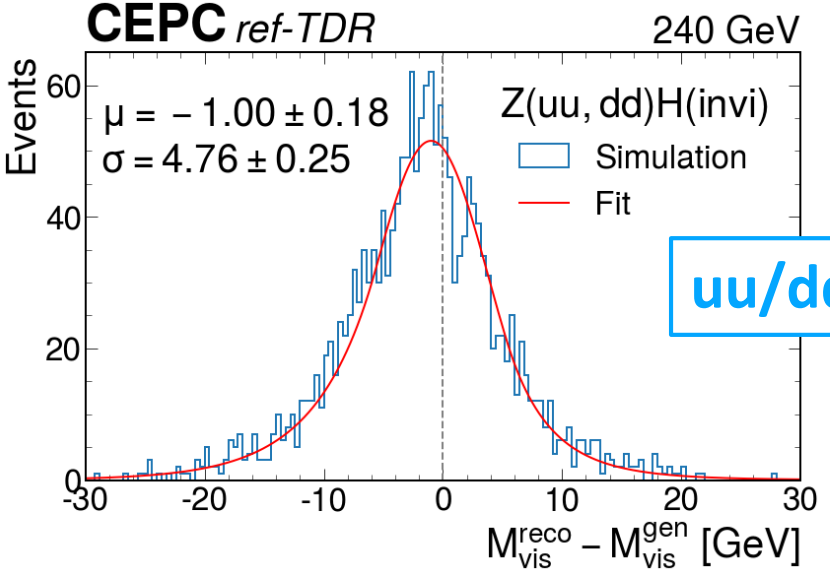
bb: BMR=3.61%



ss: BMR=4.99%



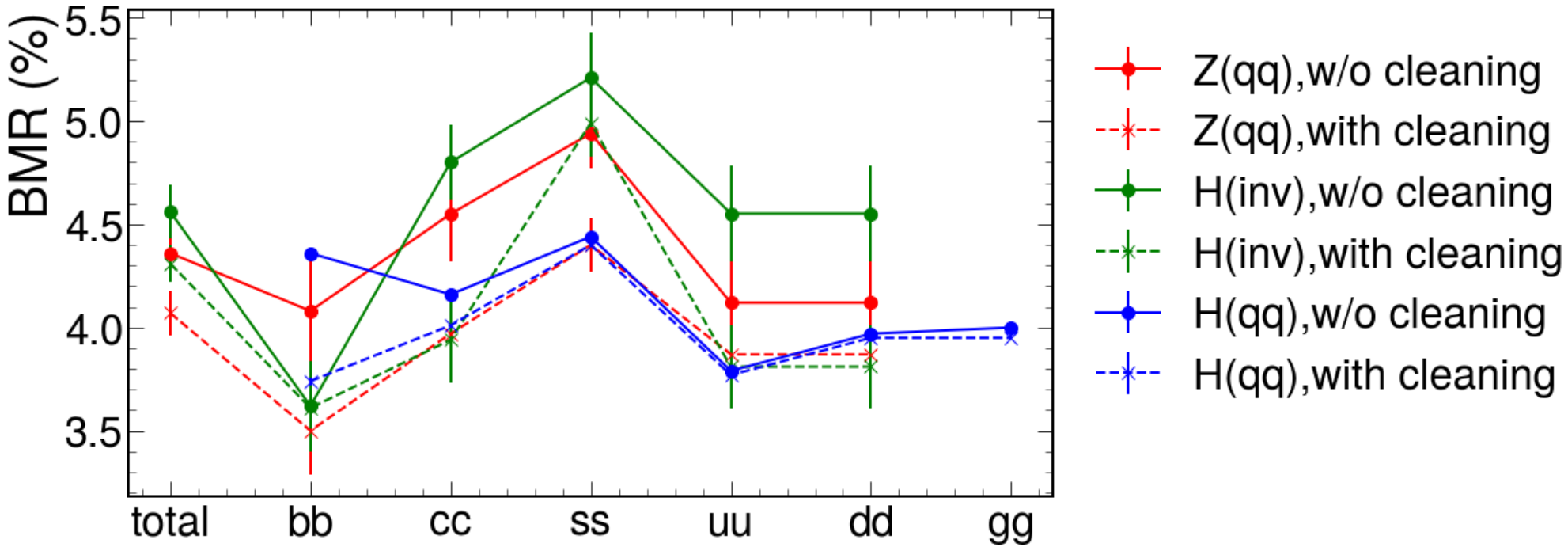
cc: BMR=3.94%



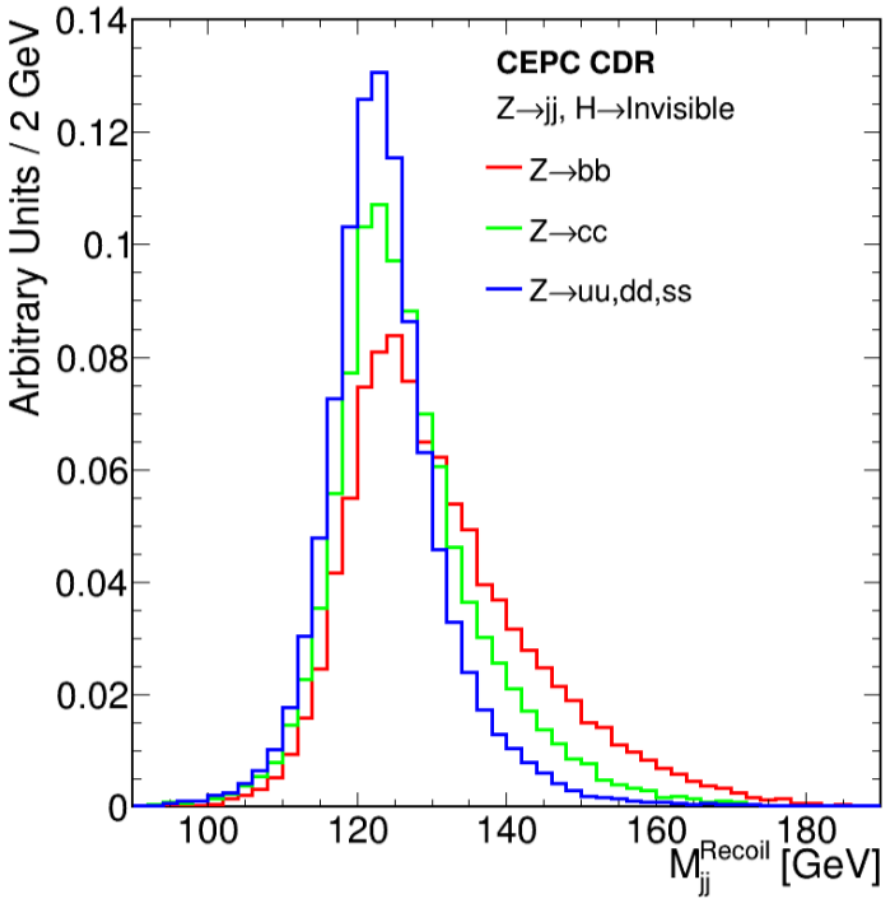
uu/dd: BMR=3.81%

BMR(H→invisible) in different flavors

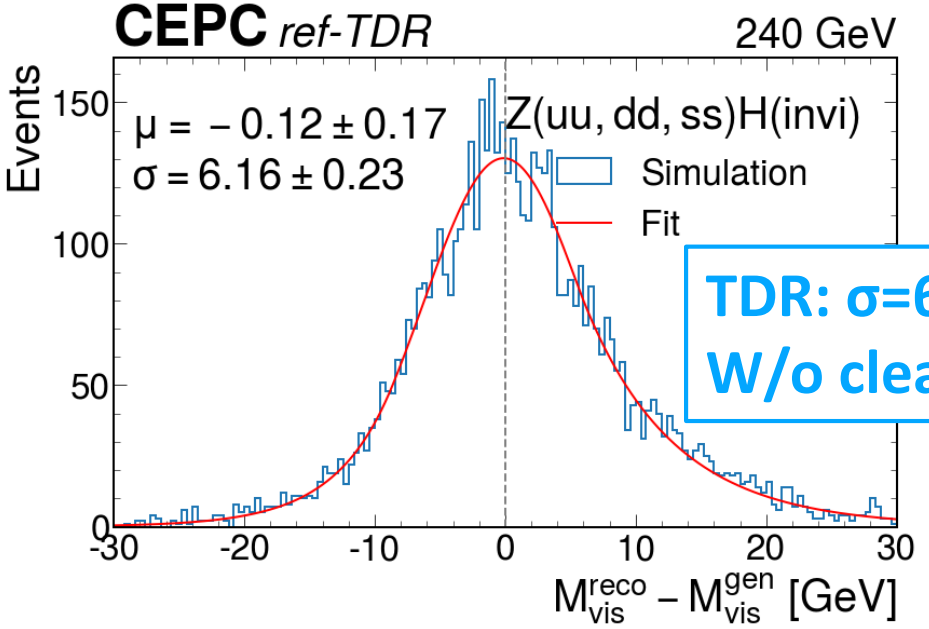
BMR (%)		total	bb	cc	ss	uu	dd	gg
H(qq)	no cleaning		4.36	4.16	4.44	3.79	3.97	4.00
	cleaning		3.74	4.01	4.40	3.77	3.95	3.95
Z(qq)	no cleaning	4.36	4.08	4.55	4.94	4.12		
	cleaning	4.07	3.50	3.97	4.40	3.87		
H(inv) from Z(qq)	no cleaning	4.56	3.62	4.80	5.21	4.552		
	cleaning	4.31	3.61	3.94	4.99	3.81		



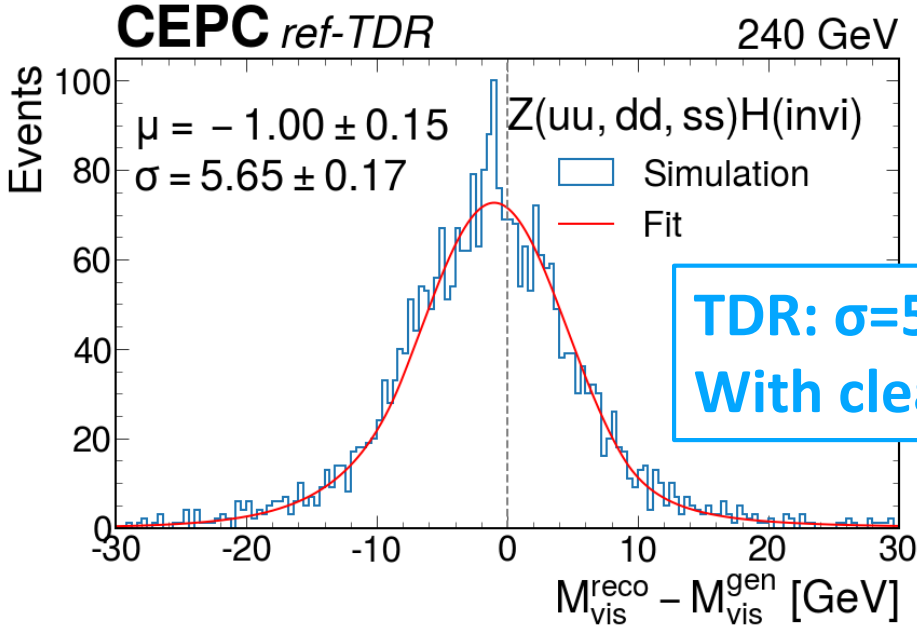
BMR(H→invisible): compare to CDR



CDR: σ=6 GeV in Z(uu,dd,ss)H(inv)

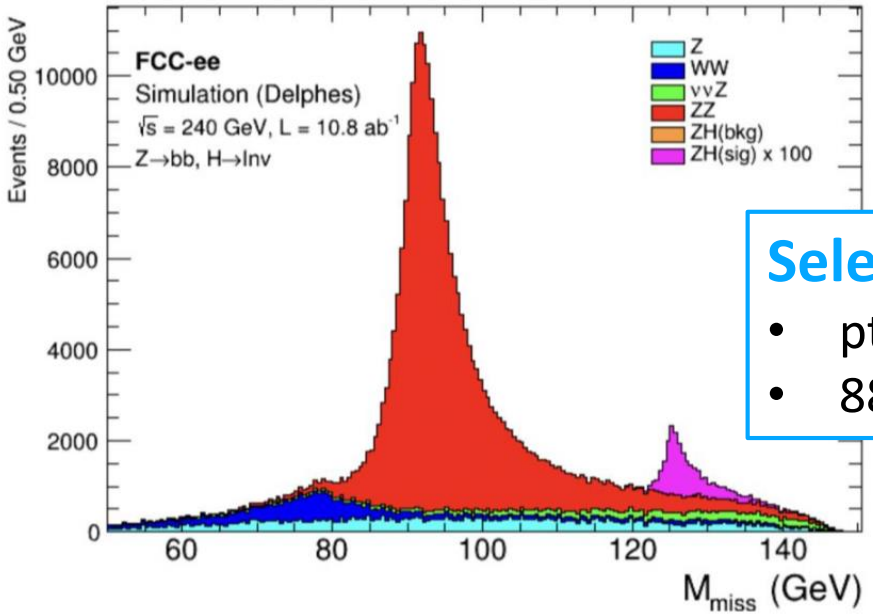


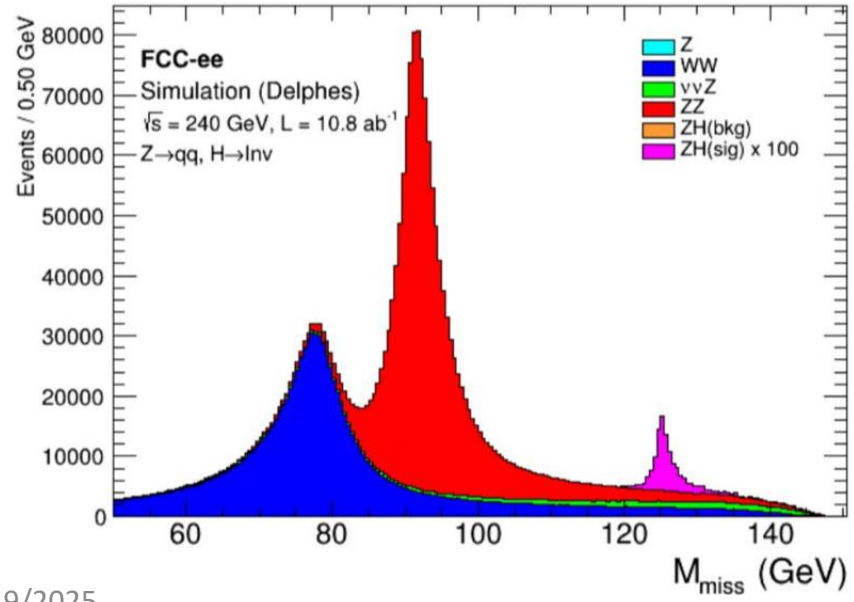
TDR: σ=6.16 GeV
W/o cleaning



TDR: σ=5.65 GeV
With cleaning

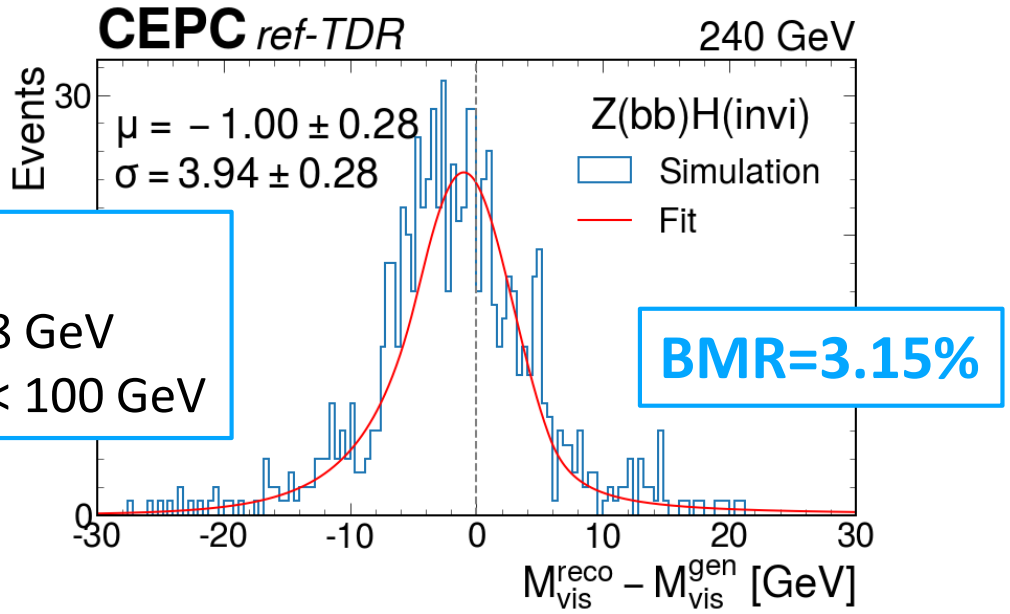
BMR(H→invisible): compare to FCCee



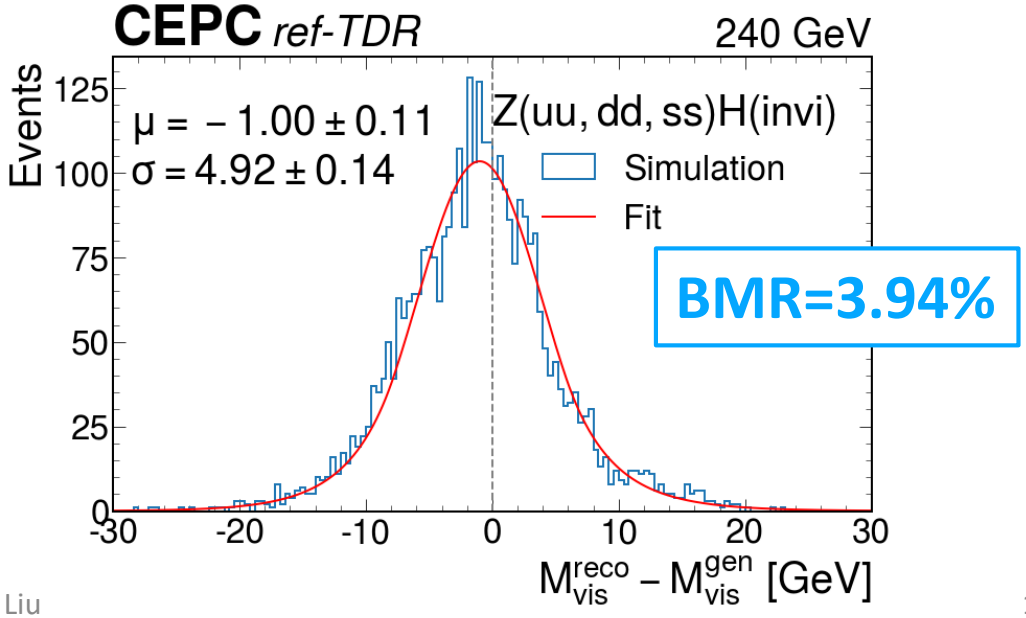


Selection:

- pt_miss > 18 GeV
- 88 < M_vis < 100 GeV

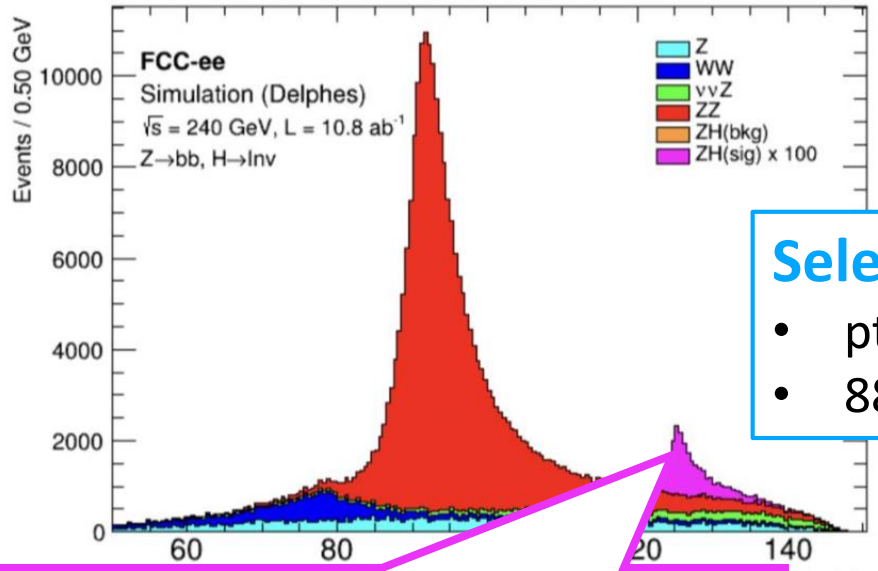


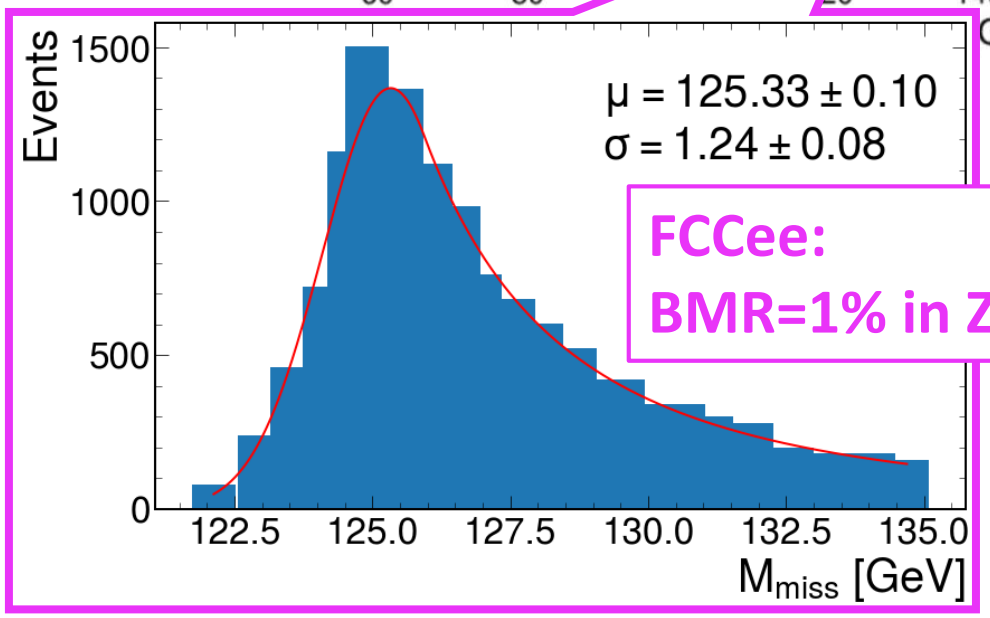
BMR=3.15%



BMR=3.94%

BMR(H→invisible): compare to FCCee

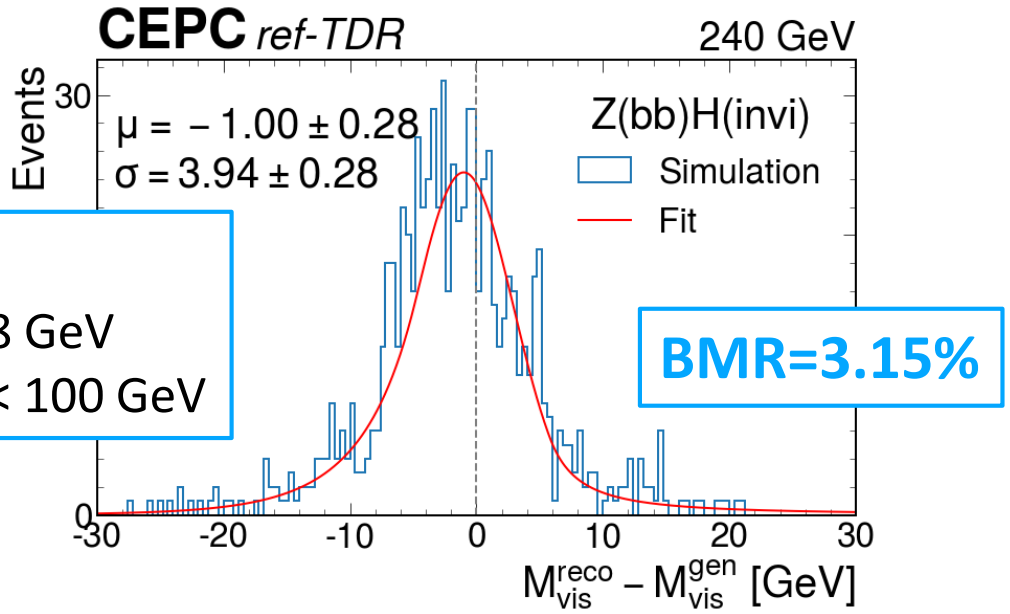




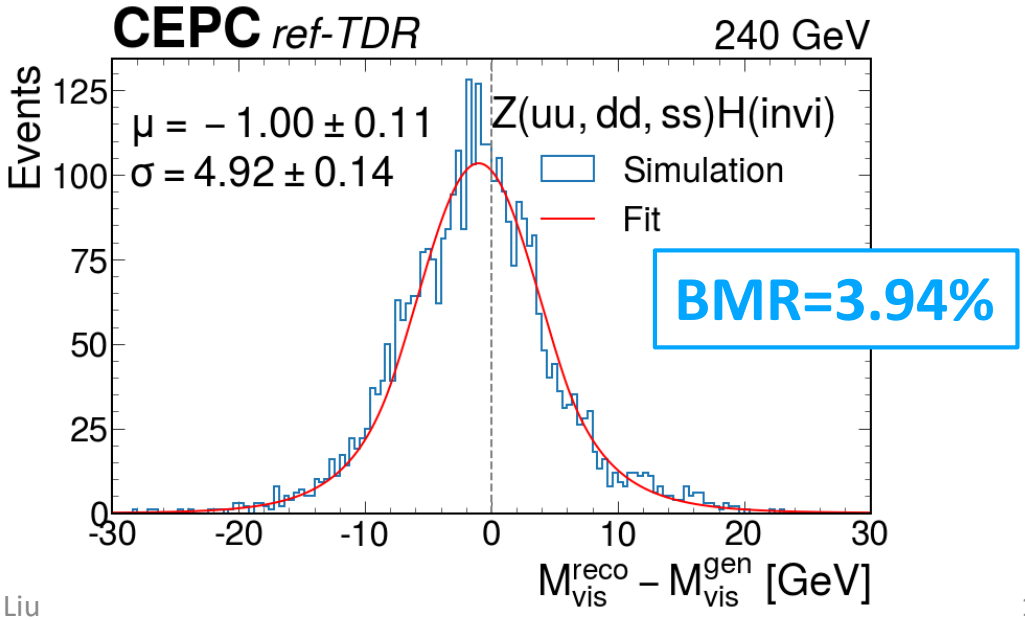
Selection:

- pt_miss > 18 GeV
- 88 < M_vis < 100 GeV

FCCee:
BMR=1% in Z(bb)H(inv)



BMR=3.15%



BMR=3.94%