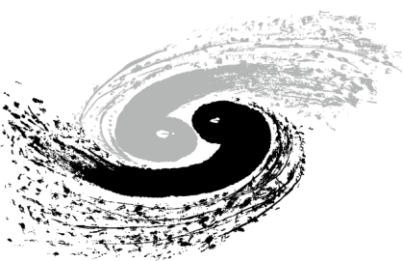
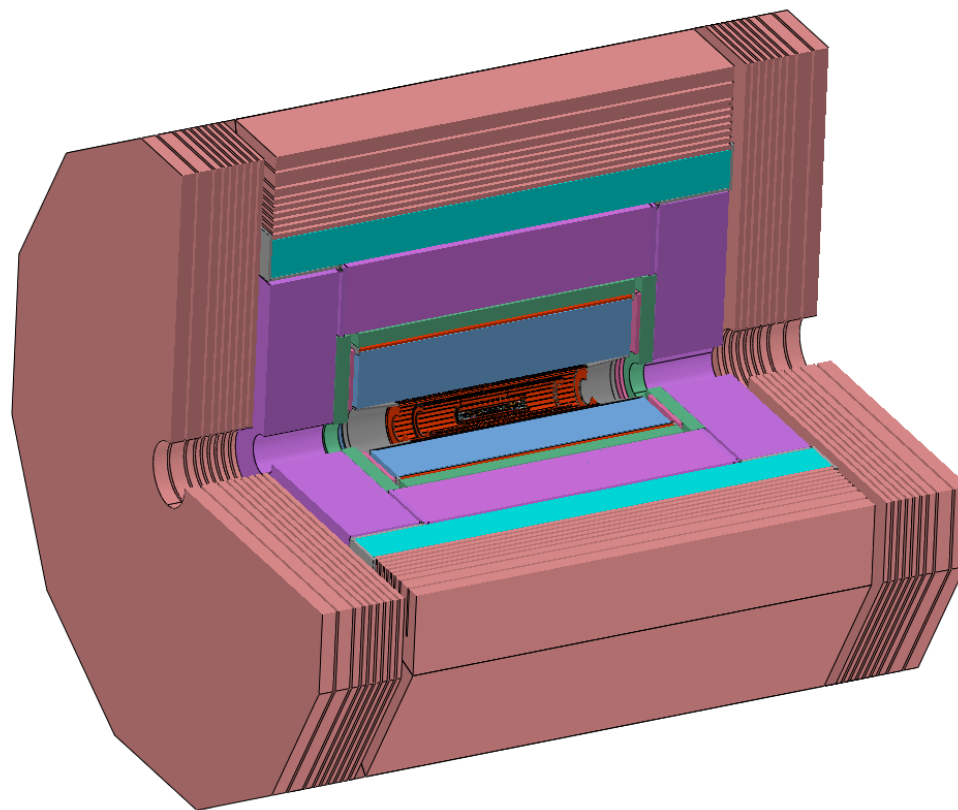


Update on $D \rightarrow hh\pi^0$ decays @ CEPC

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Jinfei Wu, Shi Wang

30 June 2025

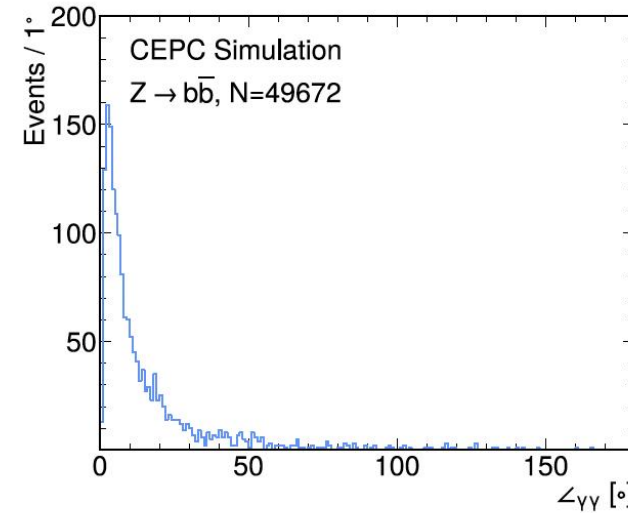
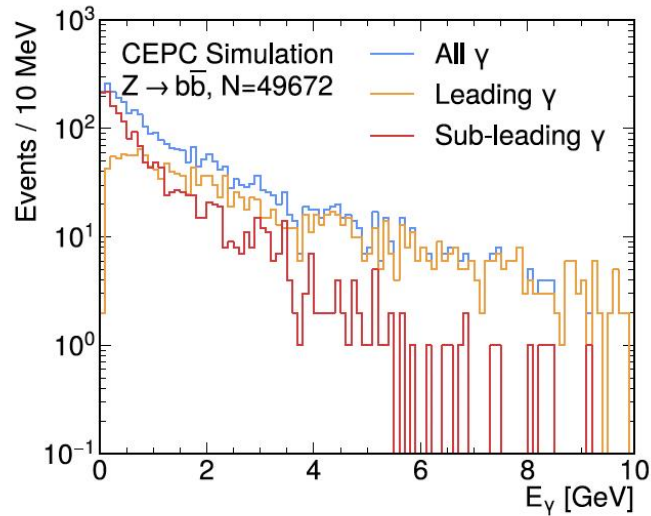


Reconstruct $D \rightarrow hh\pi^0$ decays at CEPC detector

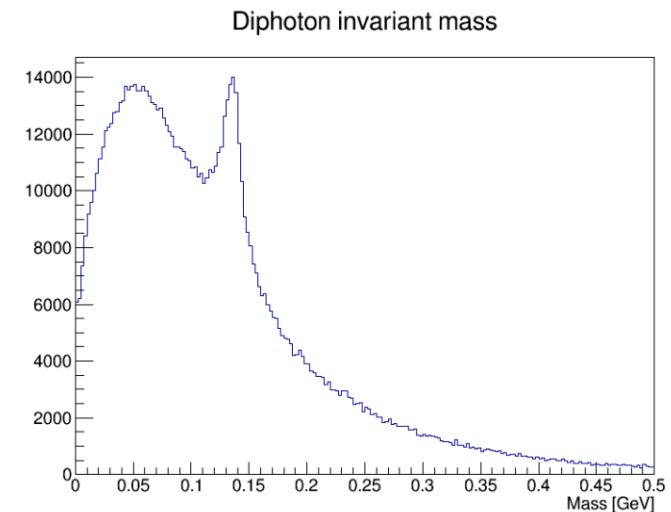
- MC sample produced from $e^+e^- \rightarrow Z \rightarrow b\bar{b}$ at $\sqrt{s} = 91.2$ GeV
 - /cefs/higgs/zhangkl/Production/25036/E91.2_eebb/Reco/rec_E91.2_eebb_*.root
 - The version of CEPCSW is tdr.25.3.2
- Test with 160k collisions
 - Number of truth D^0 : 211231
 - Number of truth $D^0 \rightarrow K^-\pi^+\pi^0$: 23842
 - Number of truth $D^0 \rightarrow \pi^-\pi^+\pi^0$: 3215

Step 1: π^0 reconstruction

- Truth distribution of γ energy and open angle between 2 γ 's

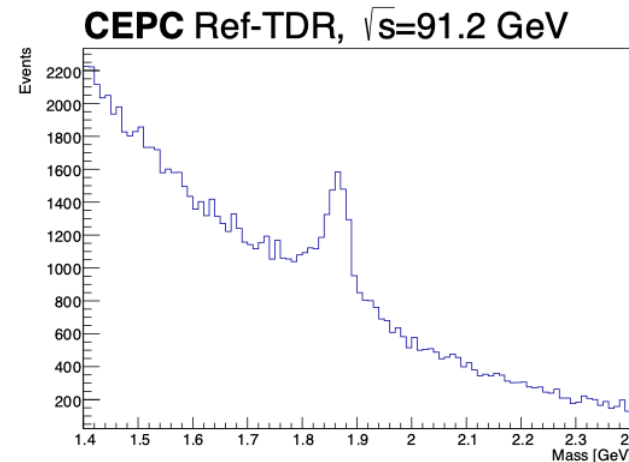


- Select one γ in PFOs with $E > 0.5$ GeV, then combine a second γ within 10 degrees of open angle
 - Select diphoton between 0.12 and 0.15 GeV as π^0 s

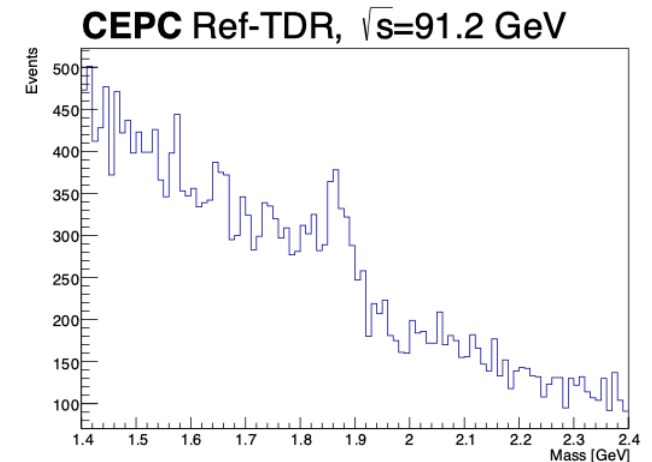


Step 2: combining π^0 with two other tracks

- Two tracks:
 - Select one K(pi) track and one pi track from PFOs using PID information
 - Combine them with π^0 candidates
- Constrain PFO objects with
 - Momentum of charged K and π tracks > 0.5 GeV
 - Angle between charged K and π tracks < 20 degree
 - Angle between K and diphoton momentum direction < 20 degree
- No vertex used
- No Truth information used



Kpipi0



pipipi0

Step 3: fits and Dalitz plot

- Clear D0 peak
 - Purity $\sim 30\%$, eff $\sim 20\%$
- Clear K* and rho resonance structures in Dalitz plot
- Nuisance asymmetries not considered, systematics not considered

