# Calorimeter digitalization in CEPCSW

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### Introduction

Migrate G2CDArbor(Marlin) to CEPCSW G2CDArborAlg.

<u>Git: https://github.com/cepc/CEPCSW/pull/10</u>

Use following samples to test the code migration.

- Particle gun: 0~100 GeV single photon, 10k events.
- ZH process: ee  $\rightarrow$  ZH  $\rightarrow \nu \nu \gamma \gamma$ , ee  $\rightarrow$  ZH  $\rightarrow \nu \nu gg$ , 1k events separately.

Digitalization and reconstruction:

- Track: digitalized and reconstructed in Marlin. Read from LCIOInput.
- Calohit: G2CDArbor in Marlin/CEPCSW
- PFA: Pandora in CEPCSW.

# ECal digitalization

#### Photon energy resolution

• Fit  $E_{rec} - E_{MC}$  with gaussian, get mean value and width.



# ECal digitalization

#### $ee \rightarrow ZH \rightarrow \nu\nu\gamma\gamma$ process

#### Diphoton invariance mass



#### $ee \rightarrow ZH \rightarrow \nu \nu gg$ process

Plot the invariant mass of all visible particle.



A bit energy shift in Hcal. Might need new calibration. Resolution is larger than old result(5GeV).



# Conclusion

Code migration of G2CDArbor has been finished.

- Calorimeter hit reconstruction can be done in CEPCSW.
- Present results show great match with G2CDArbor in Marlin.

Existing problem: energy shift.

- Calibration constants in Pandora are set to 1 (EcalToEMGeVCali etc.)
- 2 Ecal calibration constant in G2CDArbor.
- Some functions in PandoraPFA are still missing. (eg. Track association with kink/vertex/MC)