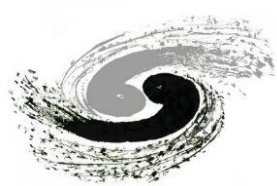


Full simulation studies of $H \rightarrow \gamma\gamma$ with SiW and Crystal ECAL options

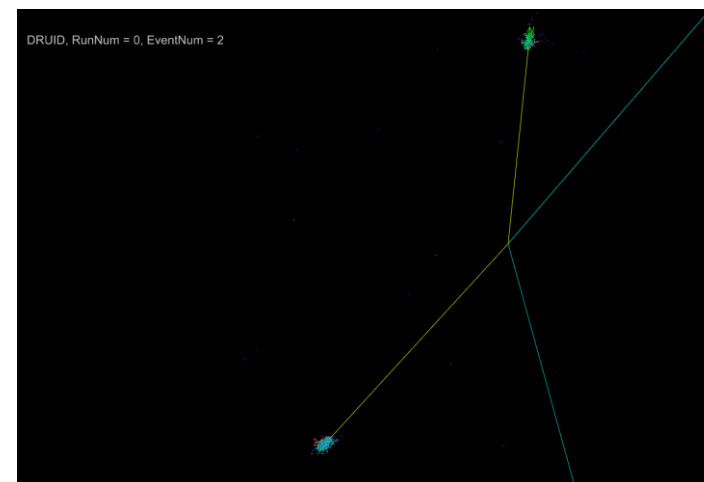
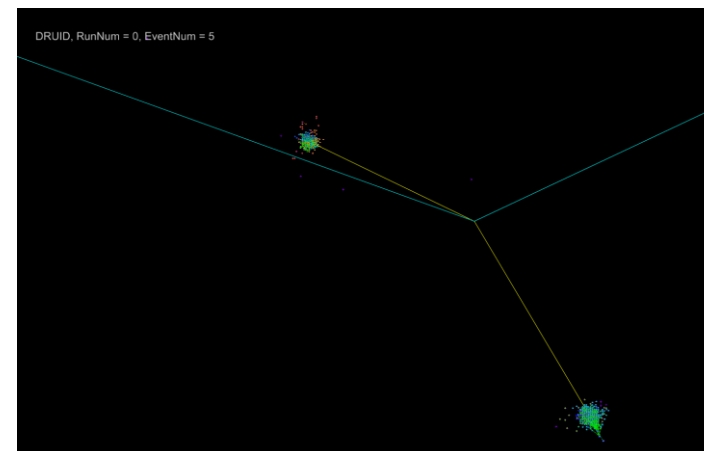
Yong Liu, Zhiyu Zhao

Apr. 7, 2021

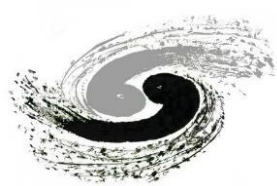


General: full simulation setup

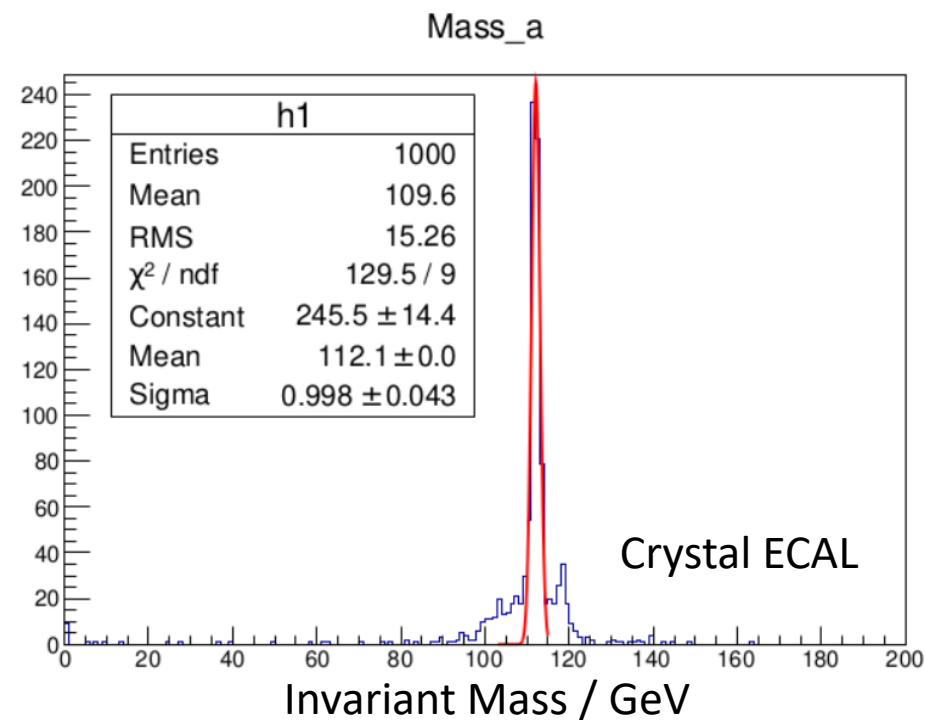
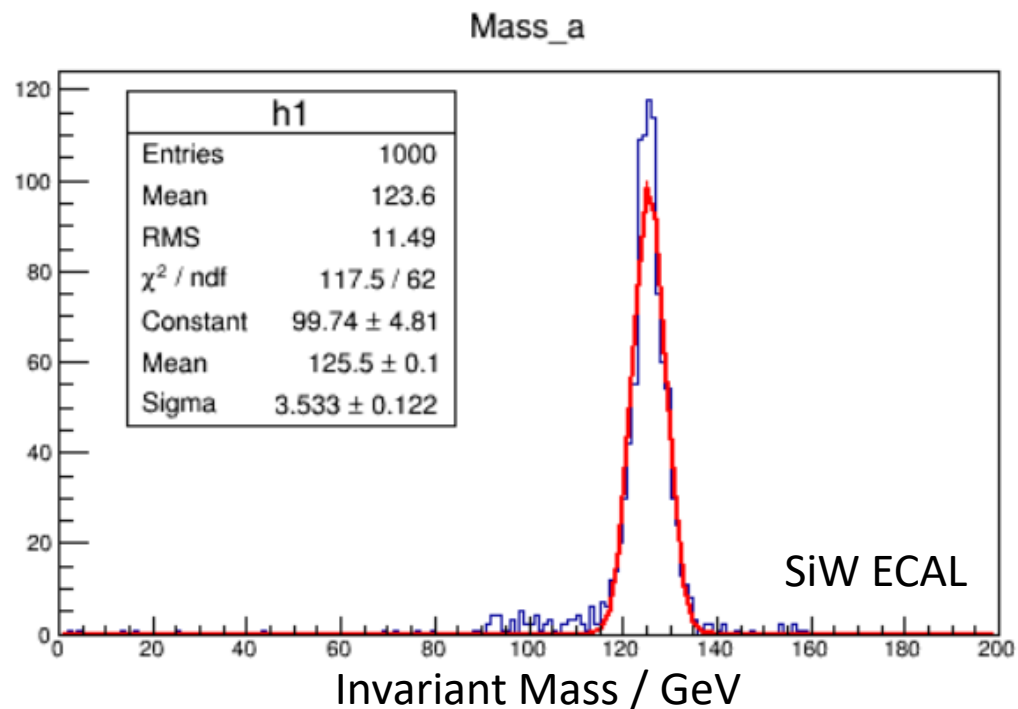
- Motivation
 - Check the performance with only photons in the final state with a crystal calorimeter
- Physics benchmark
 - $ZH(Z \rightarrow \nu\nu, H \rightarrow \gamma\gamma)$ at 240 GeV
 - Using the generator events without ISR photons
 - 1000 events in full simulation
- In CEPCsoft
 - With CEPC_v4 geometry
 - ECAL options:
 - SiW: silicon pads (1 cm^2)
 - Crystal: cubes (1 cm^3); replaced SiW ECAL
- Parameters in ArborPFA
 - “Default” paras tuned for SiW ECAL



2 photons in $ZH(Z \rightarrow \nu\nu, H \rightarrow \gamma\gamma)$:
event display with Druid

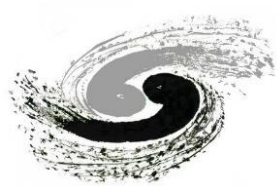


Full simulation of $H \rightarrow \gamma\gamma$: first results (1)

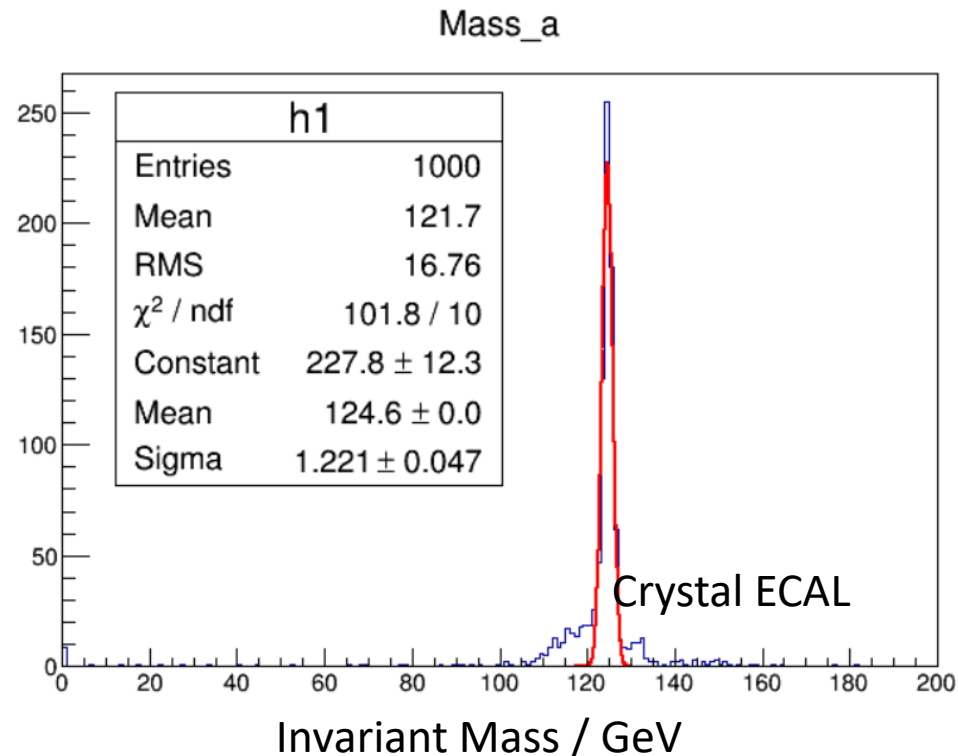
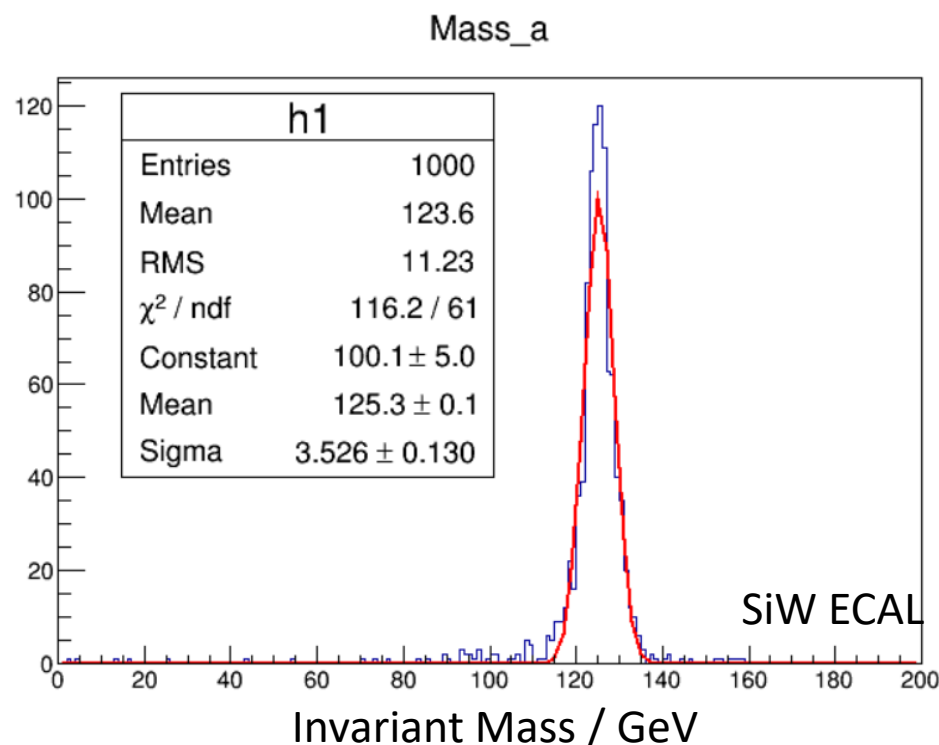


- Calibration constant
 - Crystal: constant=1.0, not well tuned
- Energy threshold
 - Crystal ECAL: 1.0 MeV; SiW ECAL: 50keV (default); HCAL: 0.12 (GeV?; to be sorted out)

Structures in the invariant mass to be understood



Full simulation of $H \rightarrow \gamma\gamma$: first results (2)



- Calibration constant
 - Constant= ~ 1.1 , tuned for crystal ECAL
- Energy threshold
 - 50keV for all calorimeters: crystal ECAL, SiW ECAL and HCAL (need further discussions)

Structures in the invariant mass to be understood