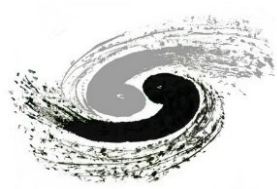


Brief status of reconstruction development of the crystal-bar ECAL

Yong Liu

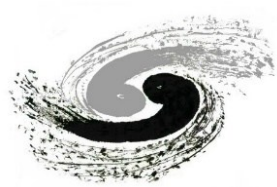
CEPC Calorimeter Software Weekly Meeting,

Nov. 11, 2020



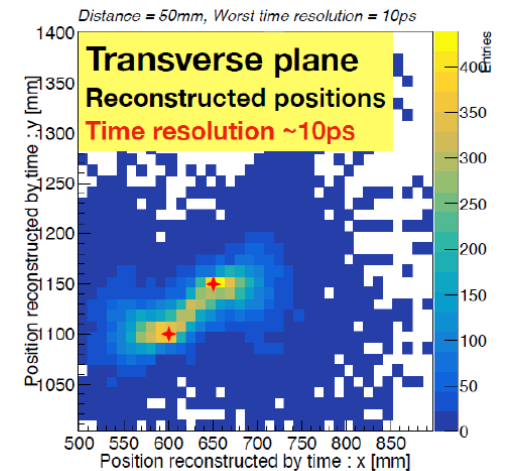
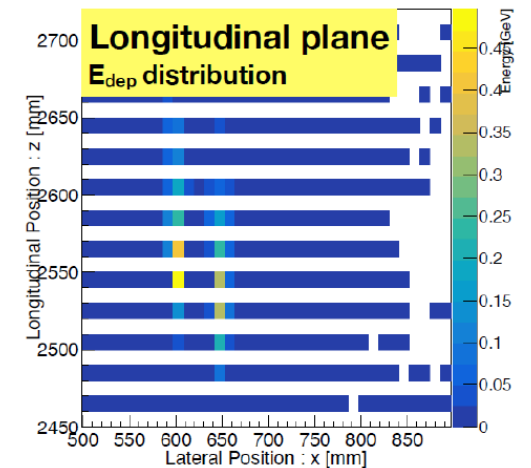
Overview: current activities

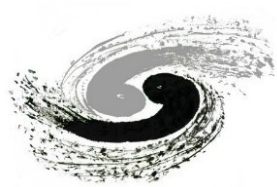
- Separation of two close-by particles and energy reconstruction
 - Ideas discussed, separation/reconstruction steps outlined
 - Working on the software implementation
- Preparation of MC samples
 - “CEPCv4”: crystal ECAL (+HCAL) geometry
 - Stand-alone Geant4 simulation



Shower separation and energy reconstruction: concepts

1. BarID and LayerID -> crossed bars
2. Timing info at two ends -> positions (resolve ambiguity)
 - Rough separation of two particles for the Step 3
3. Shower longitudinal profile
 - Rough estimate of incident particle energy; shower maximum
4. Shower axis finding and connection
 - Seeds per layer
 - Connect seeds in layers around the shower maximum
5. Shower lateral profile
 - Use fitting/histogram info (as template) to determine weights of energy splitting: currently focus on EM showers
6. Clustering of bars with weights for energy reconstruction

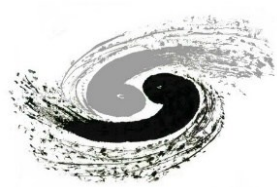




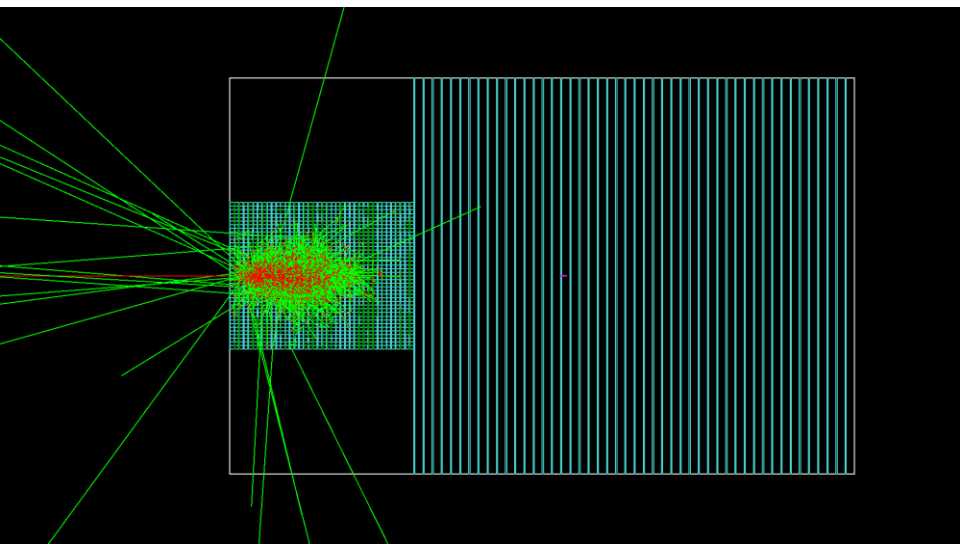
Separation and reconstruction: implementation

1. BarID and LayerID -> crossed bars
2. Timing info at two ends -> positions (resolve ambiguity)
 - Rough separation of two particles for the Step 3
3. Shower longitudinal profile
 - Rough estimate of incident particle energy; shower maximum
4. Shower axis finding and connection
 - Seeds per layer
 - Connect seeds in layers around the shower maximum
5. Shower lateral profile
 - Use fitting/histogram info (as template) to determine weights of energy splitting: currently focus on EM showers
6. Clustering of bars with weights for energy reconstruction

Several iterations (of running through the whole chain) would be expected; need to define criteria during the implementation



Preparation of MC samples



- Stand-alone Geant4 simulation (YL)
 - **Samples ready**: electrons and gammas (EM showers)
 - Crystal ECAL: 1mm x 1mm (1cm thick)
 - Scintillator HCAL: 3cmx3cm (3mm thick)
- CEPCv4 : crystal ECAL only
 - **Samples ready**: two gammas (Yuexin)
 - **Samples in production**: neutral pions (Baohua)
 - Granularity in ECAL: 1cmx1cm -> 1cmx40cm
- CEPCv4: crystal ECAL +HCAL
 - **Samples to be produced**: charged pions, (kaons, p/n's)
 - Granularity in ECAL: 1cmx1cm -> 1cmx40cm
 - Granularity in HCAL: 3cmx3cm

