Calorimetry simulations for the ALLEGRO FCC-ee detector

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ALLEGRO introduction

Figure 1. Scatch of ALLEGRO detector

Main features

- **A L**epton co**L**lider **E**xperiment with **G**ranular **R**ead-**O**ut
- General purpose detector for FCC-ee
- Drift chamber as a tracker
- Solenoid (2T) located between an electromagnetic (Ecal) and a hadronic (Hcal) calorimeter
- Note: The design of the detector is still being optimised

High granular noble liquid calorimeter

- Readout by straight multilayer PCB electrodes
- Pb/W absorbers inclined by 50.4°
- LAr/LKr as active medium
- Inclined straight absorbers in the barrel region, turbine-like layout in the endcaps

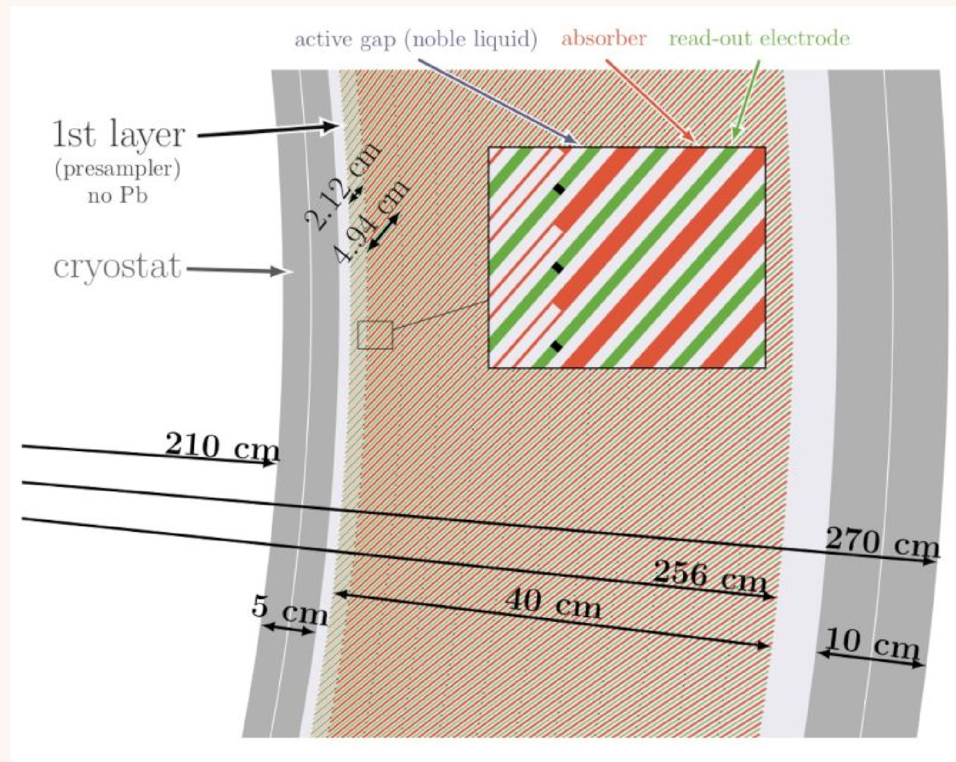

Figure 2. Noble liquid Ecal design in the barrel region

Particle Flow Calorimetry

- Need high granular calorimeter
- Particle Flow (PFlow) objects built from tracks and (associated) clusters
- Energy from calorimeters used as little as possible
- Calorimeter needed for reconstruction of neutral components of shower
- Composition of jet:
  - charged hadrons 60%
  - photons 30%
  - neutral hadrons 10%

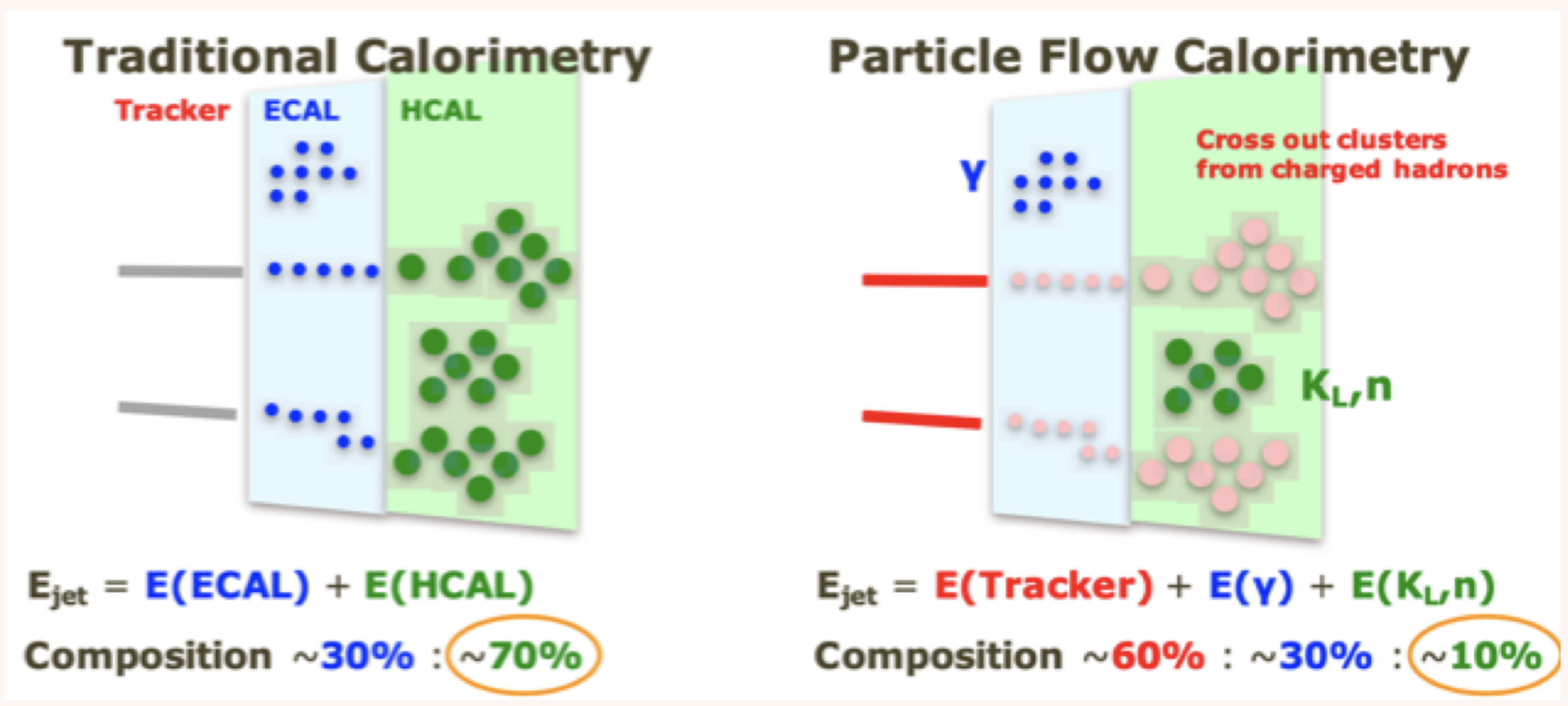

Figure 3. Difference between traditional calorimetry and particle flow calorimetry

Particle Flow studies and ALLEGRO

- Using ALLEGRO ECal with eta-phi segmentation within CLD geometry
- Pandora parameters are set for CLD detector
- First simulations of single photon
  - energy 10GeV & 50GeV
  - 1000 events
  - θ range $(60°, 120°)$
- The energy of PFlow object is shifted and has tail
- Most events have more than 1 reconstructed PFlow object
- PFlow objects are reconstructed as
  - photons (57% - 63%)
  - neutrons (43% - 37%)

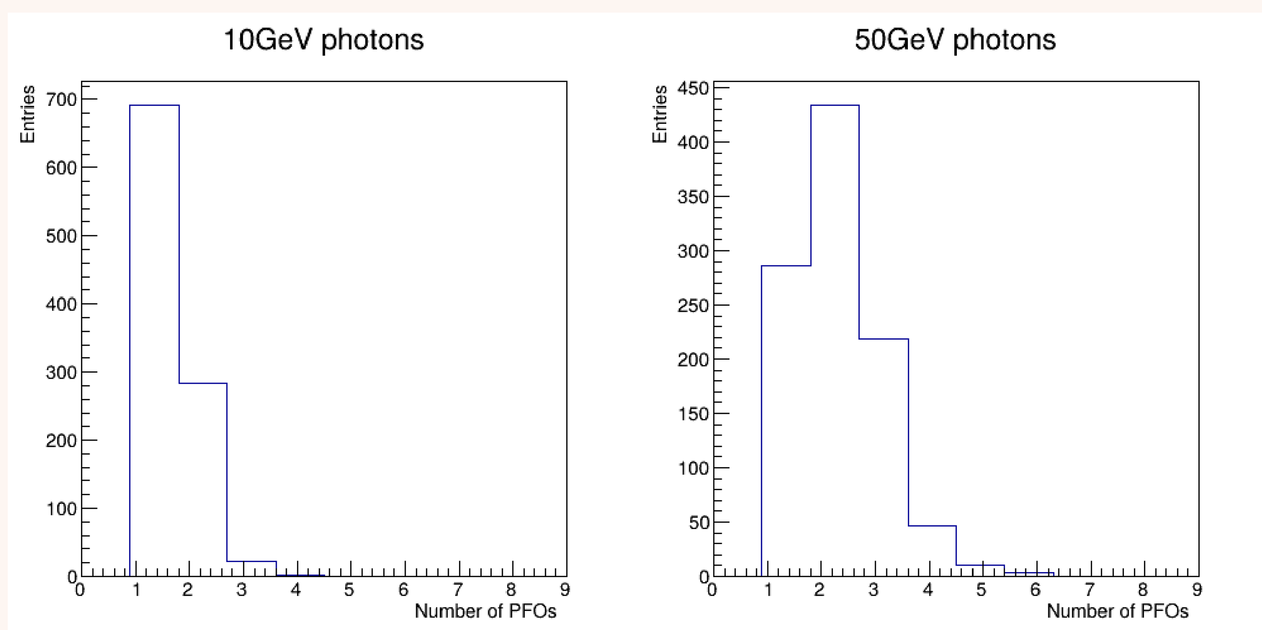

Figure 5. Number of reconstructed PFlow objects

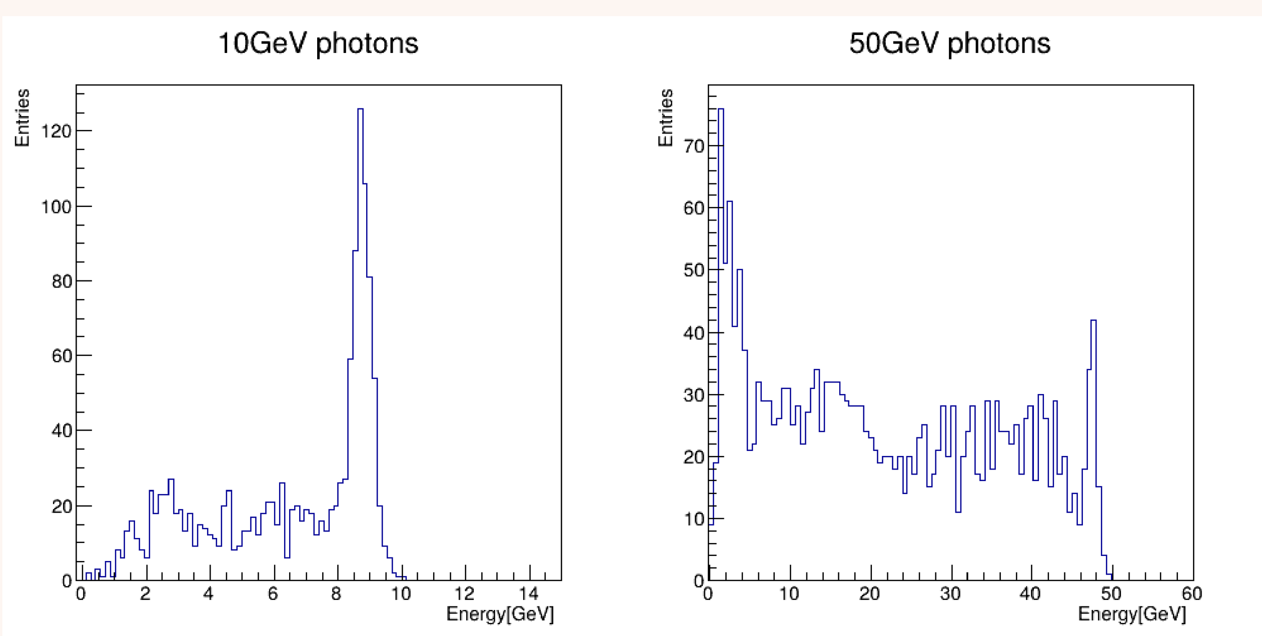

Figure 4. Energy of all PFlow objects

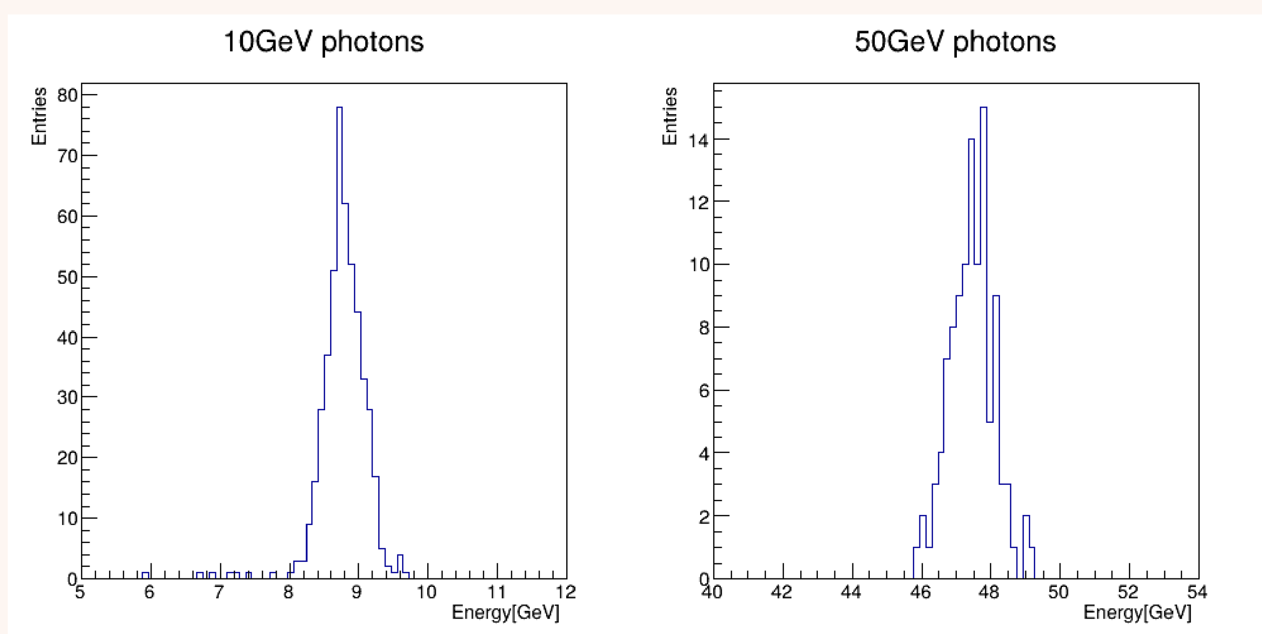

Figure 6. Energy of PFlow objects reconstructed as photon

Conclusions

- Rich detector R&D programme as a part of DRD on Calorimetry (DRD6)
- Pandora parameters and finding photons need to be optimised for ALLEGRO

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