

Status of the simulation for the SiW ECAL prototype

Fabricio Jiménez Morales, for the SiW ECAL team

Laboratoire Leprince-Ringuet (CNRS/IPP)

2021 TB analysis Kickoff meeting

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Simulation - 2017 setup

- Simulation code of this detector prototype with beam tests are in place
→ Daniel Jeans @ cern gitlab, [calice_dd4hepTestBeamSim](#)
- In LCIO “ecosystem” ILCSOft
- We generated samples for the following setups:
 - The 2017 test beam (e^+), same for e^-
 - No Tungsten (configuration 0) for e^- and e^+ @ 3 GeV, and μ @ 40 GeV
- Run by Adrián
- ~Easily adaptable to current prototype

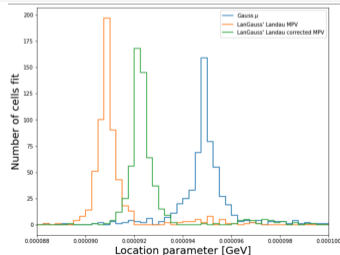
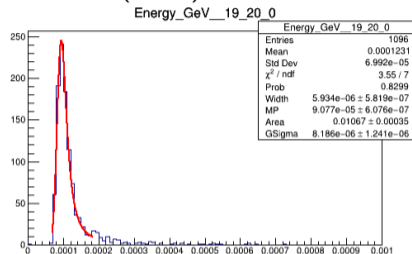
Towards DESY TB2021 simulation

- Starting point for an updated version of simulations
 - Geometry / Material budget → visit Orsay
 - Particle gun (point) → now beam width included
 - Multiple MIP peaks
 - Parameters from data
 - Same beam setups simulated for TB2017?
- Digitization
 - ~ done for 2017, minor adaptation once Sim TB2021 available
 - Conversion - Shaping - (Conversion), w/ calibration as done in data
 - Format after digitization LCIO ↔ build
- Shower analysis comparison

Conversion

(Simulation) “MeV” \Leftrightarrow “MIP” \Leftrightarrow ADC (Data)

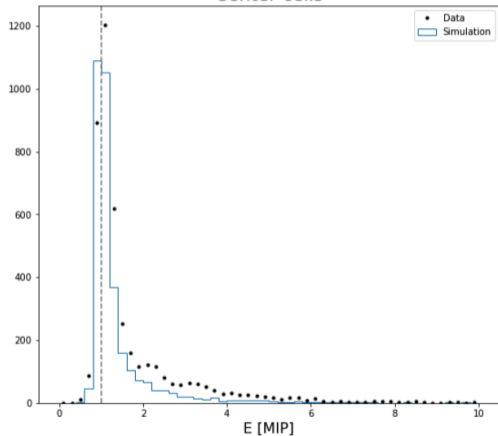
- Simulation: MeV to MIP
- (Data: ADC to MIP)
- Fit cell energy spectrum to “LanGauss” function (among options)
- MIP peak locations
→ conversion factor
- Converted energy used to set trigger threshold
- Shaping as it is now introduces another factor



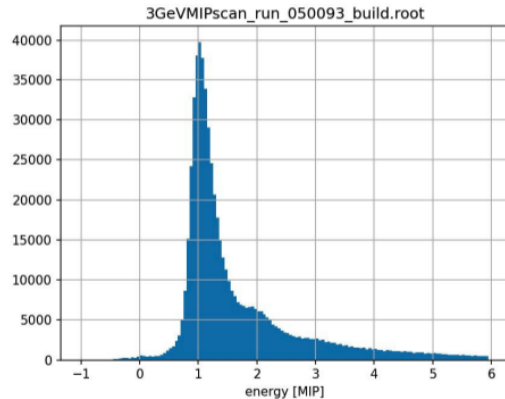
MIP peaks (not) in simulation

2017 TB / sim

Center cells

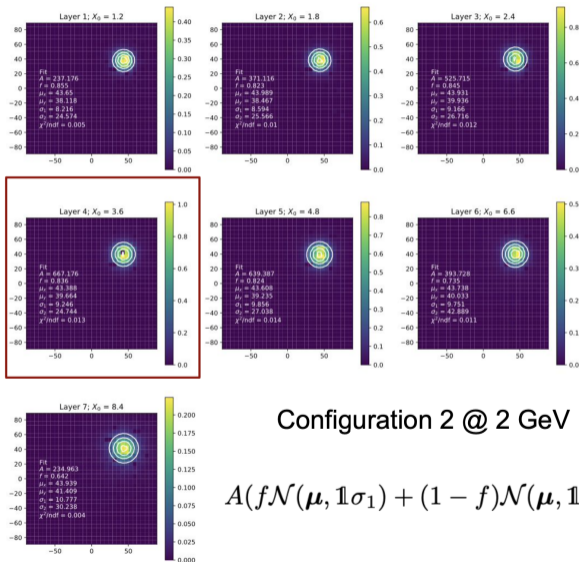
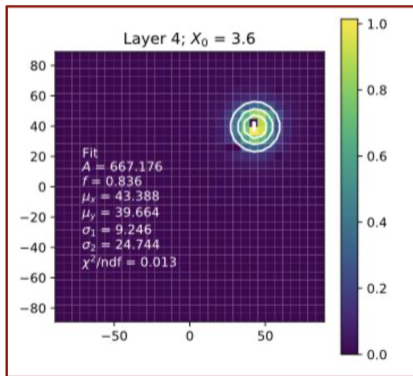


2021 TB (Jonas)



Shower model for layers

Fit double gaussian per layer



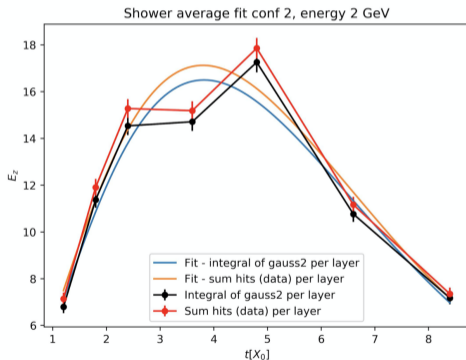
Configuration 2 @ 2 GeV

$$A(f\mathcal{N}(\mu, \mathbb{1}\sigma_1) + (1 - f)\mathcal{N}(\mu, \mathbb{1}\sigma_2))$$

Shower longitudinal profile

$$\frac{dE}{dt} = E_0 b \frac{(bt)^{a-1} e^{-bt}}{\Gamma(a)}$$

No requirement on central slabs



Central slabs hit required

