

Progress and Outlook for my thesis

17.07.2026

Motivation and Goal of the thesis

- Hadronic backgrounds appear worse problem than previously thought (Laney's master thesis)
- Pushing back target results in larger opening angle for HCAL and ECAL
- More hadrons can be detected, but electrons will now also hit ECAL
- Is it possible to move the target and still resolve the photons in the ECAL?
- $\Rightarrow$ Discern photon and electron cluster in ECAL

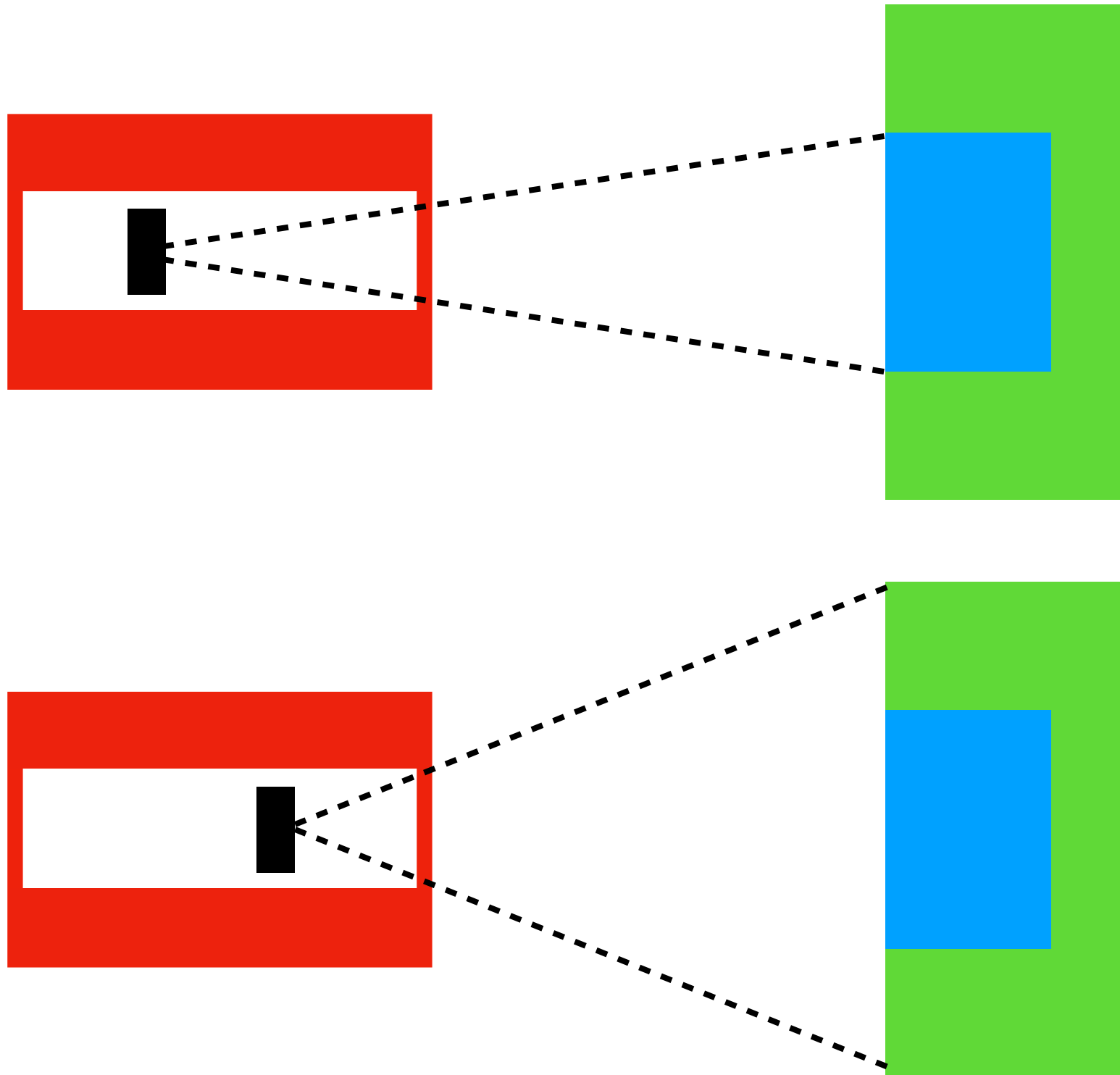
Different Target Positions

Magnet

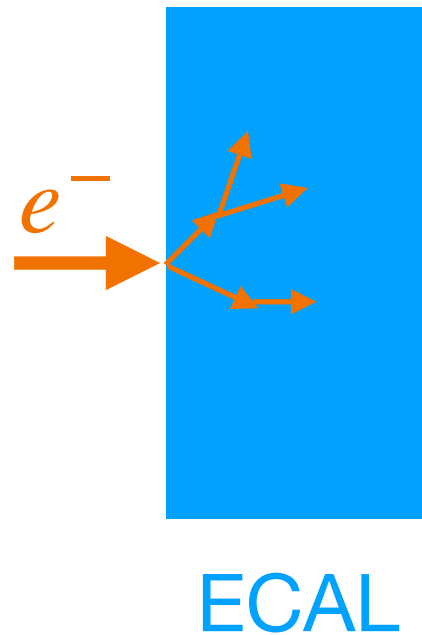
Target

ECAL

HCAL

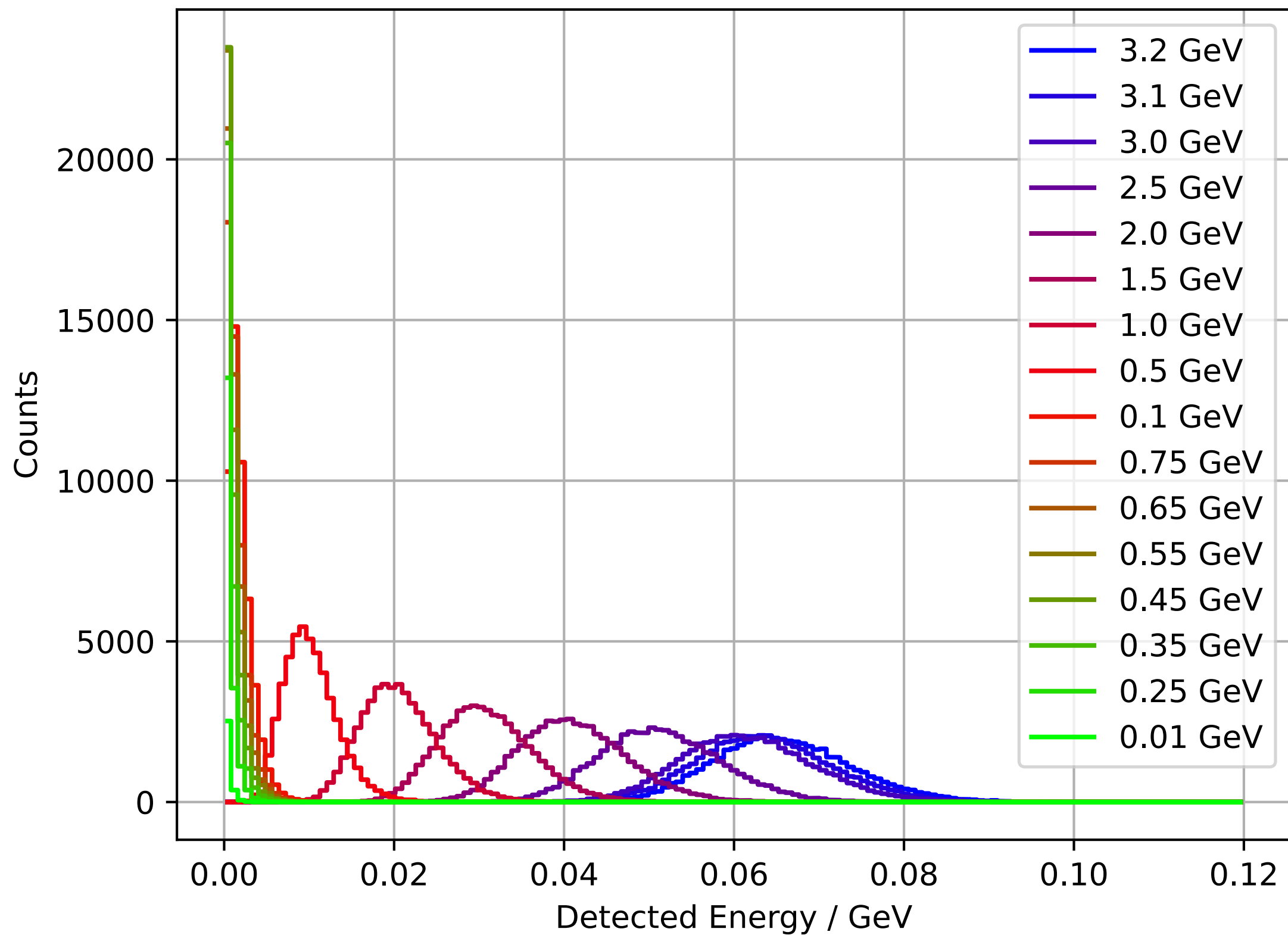


ECAL Energy Calibration

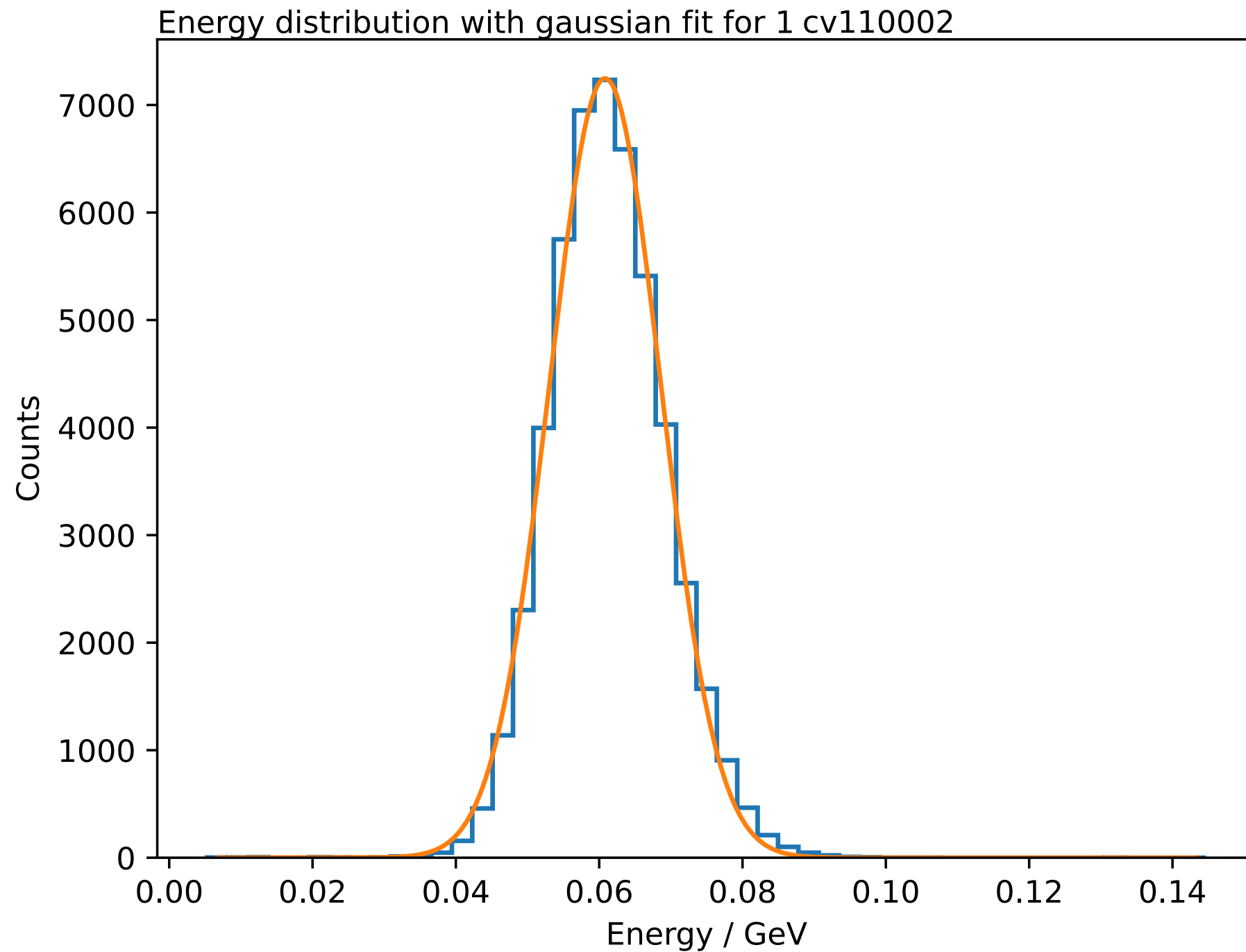


- Known input energy from 0.01 to 3.2 GeV
- Detected Energy calculated by summing over all particles in ECAL
- Gaussian Fit for resulting histograms
- Mean and fit uncertainty plotted in calibration curve

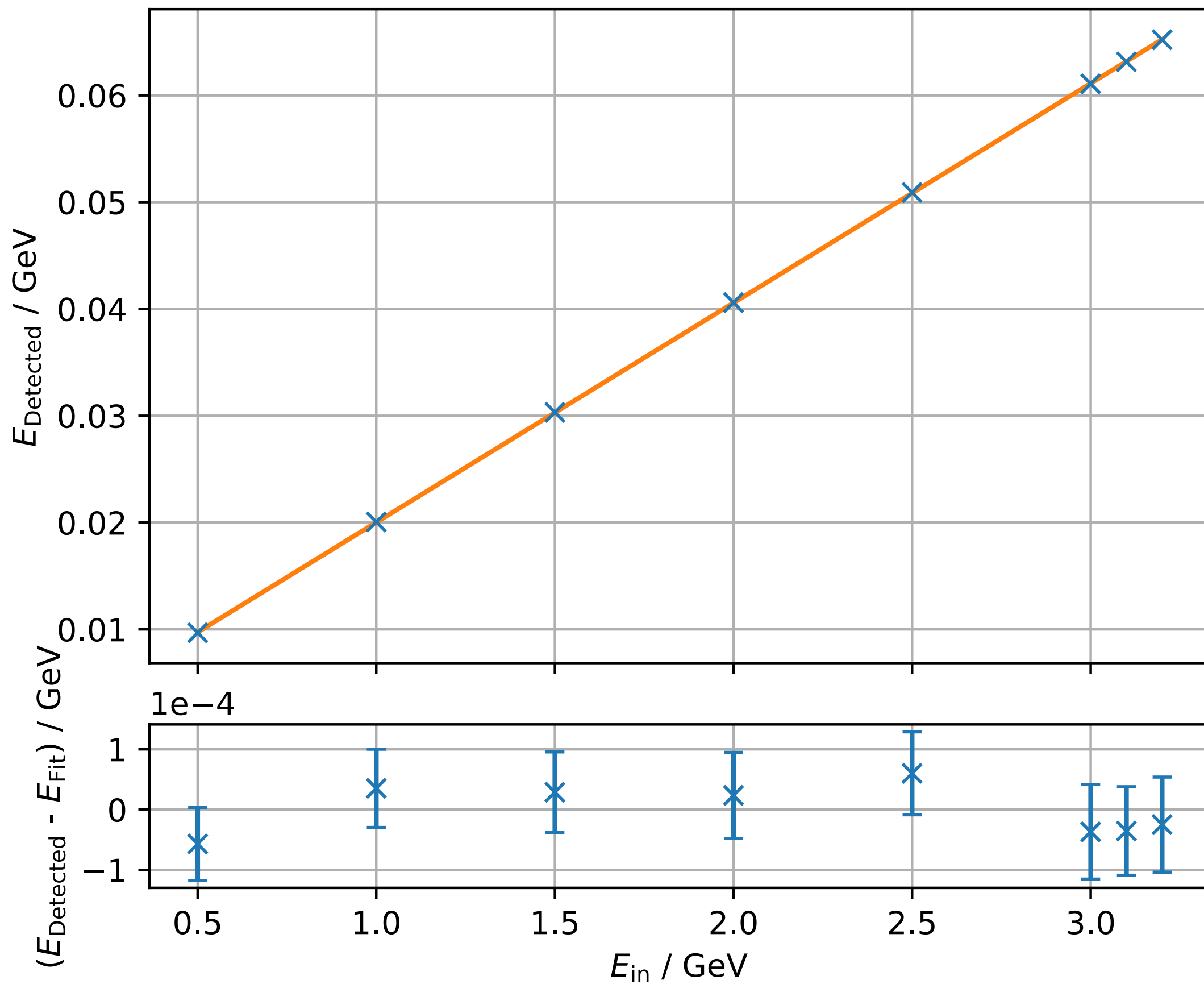
Histograms for electrons of all input energies



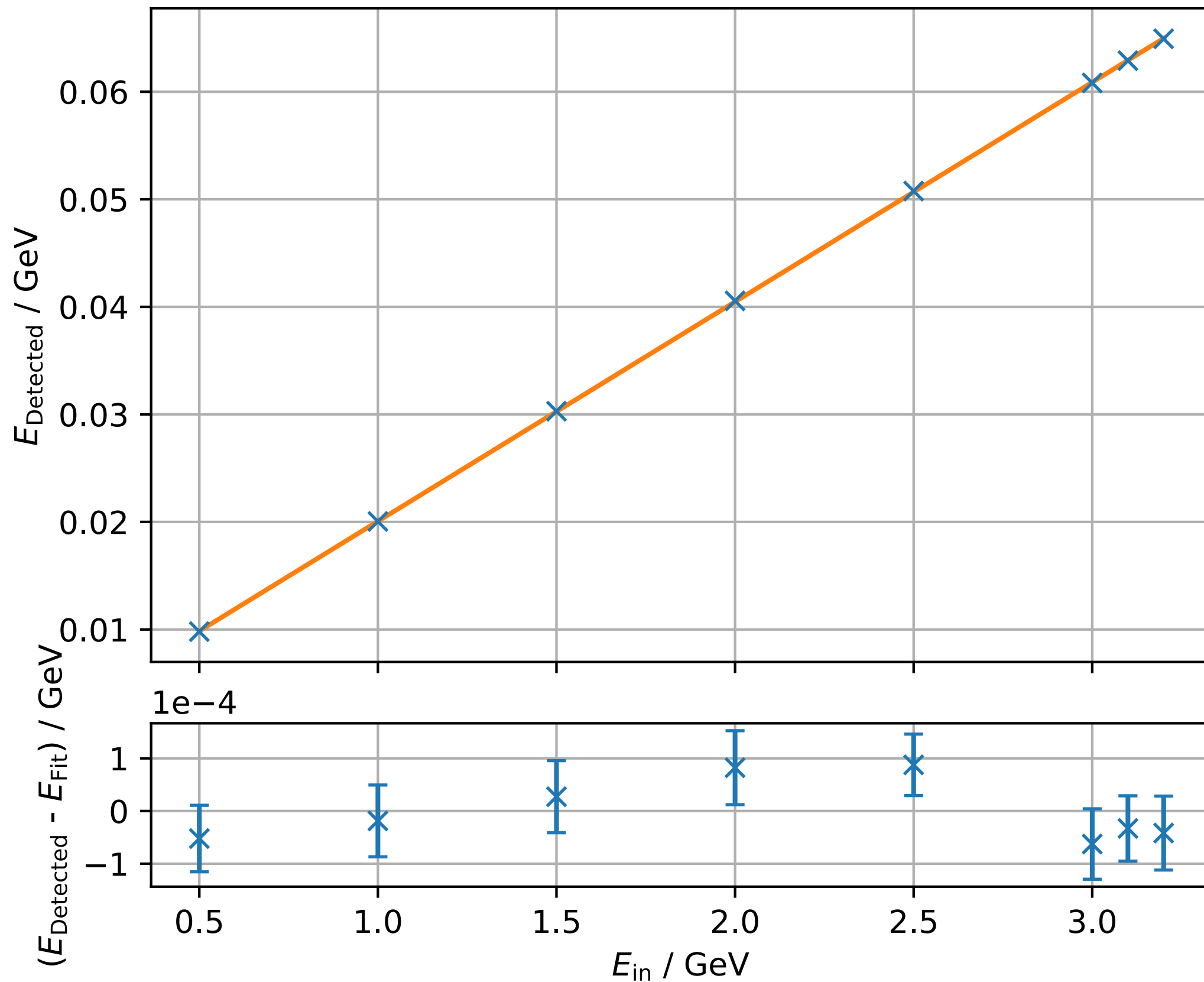
Gaussian fit for input energy of 3 GeV

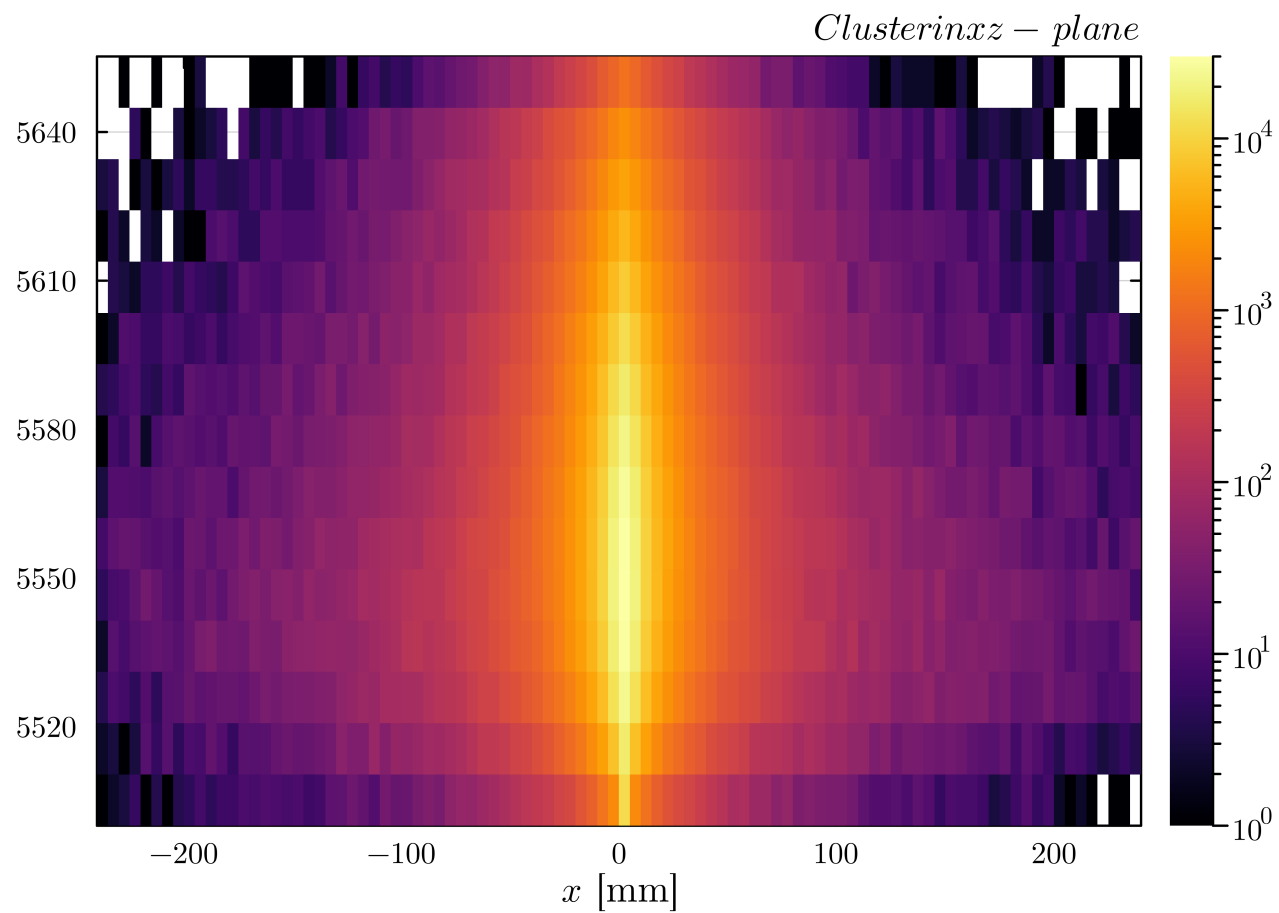


ECAL Calibration with gaussian fit for Electrons

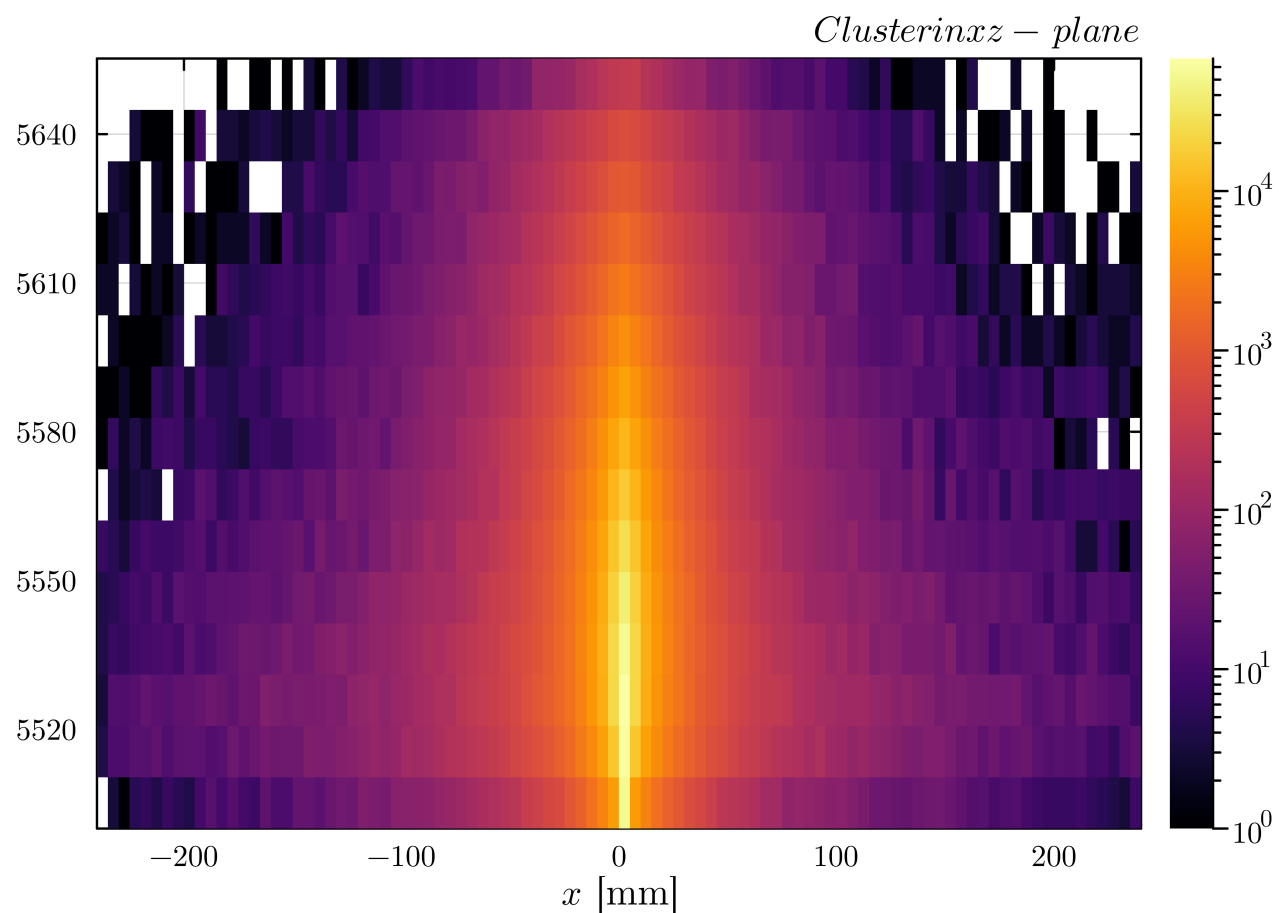


ECAL Calibration with gaussian fit for Photons





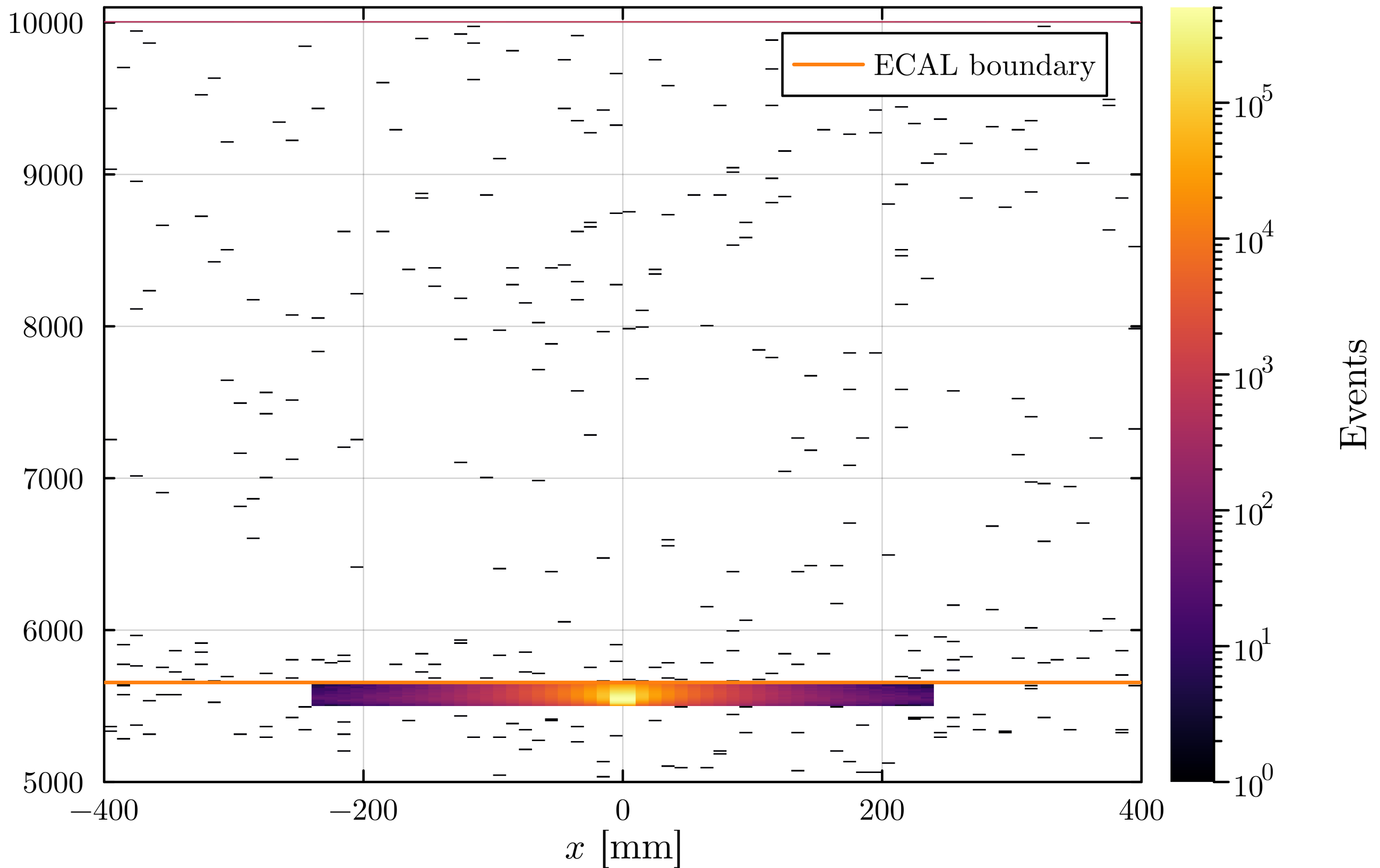
- 3.2 GeV
- cluster does not end in ECAL
- Not all energy is deposited in ECAL



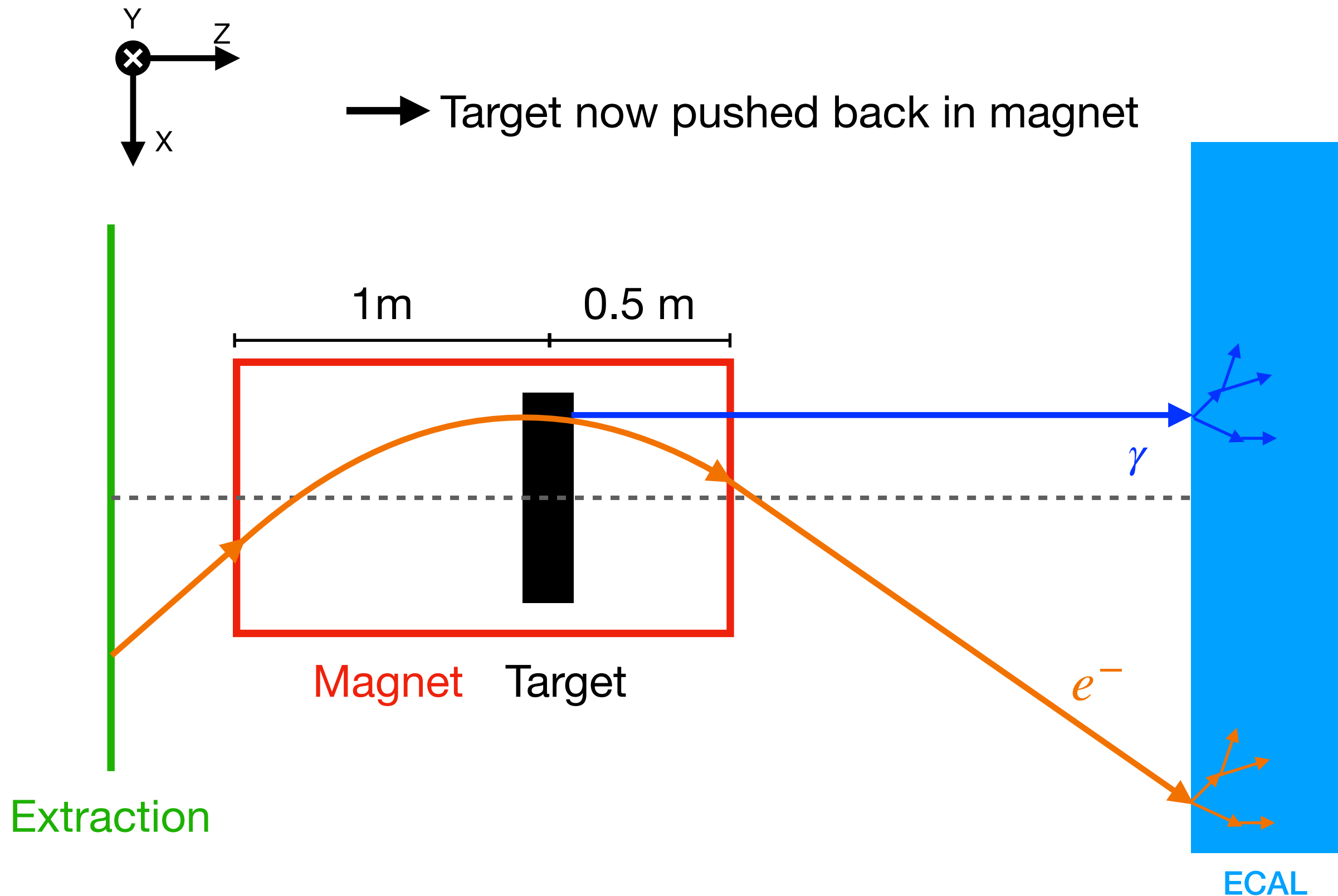
- 0.5 GeV
- Shorter cluster fitting in ECAL

Input Energy of 3.2 GeV

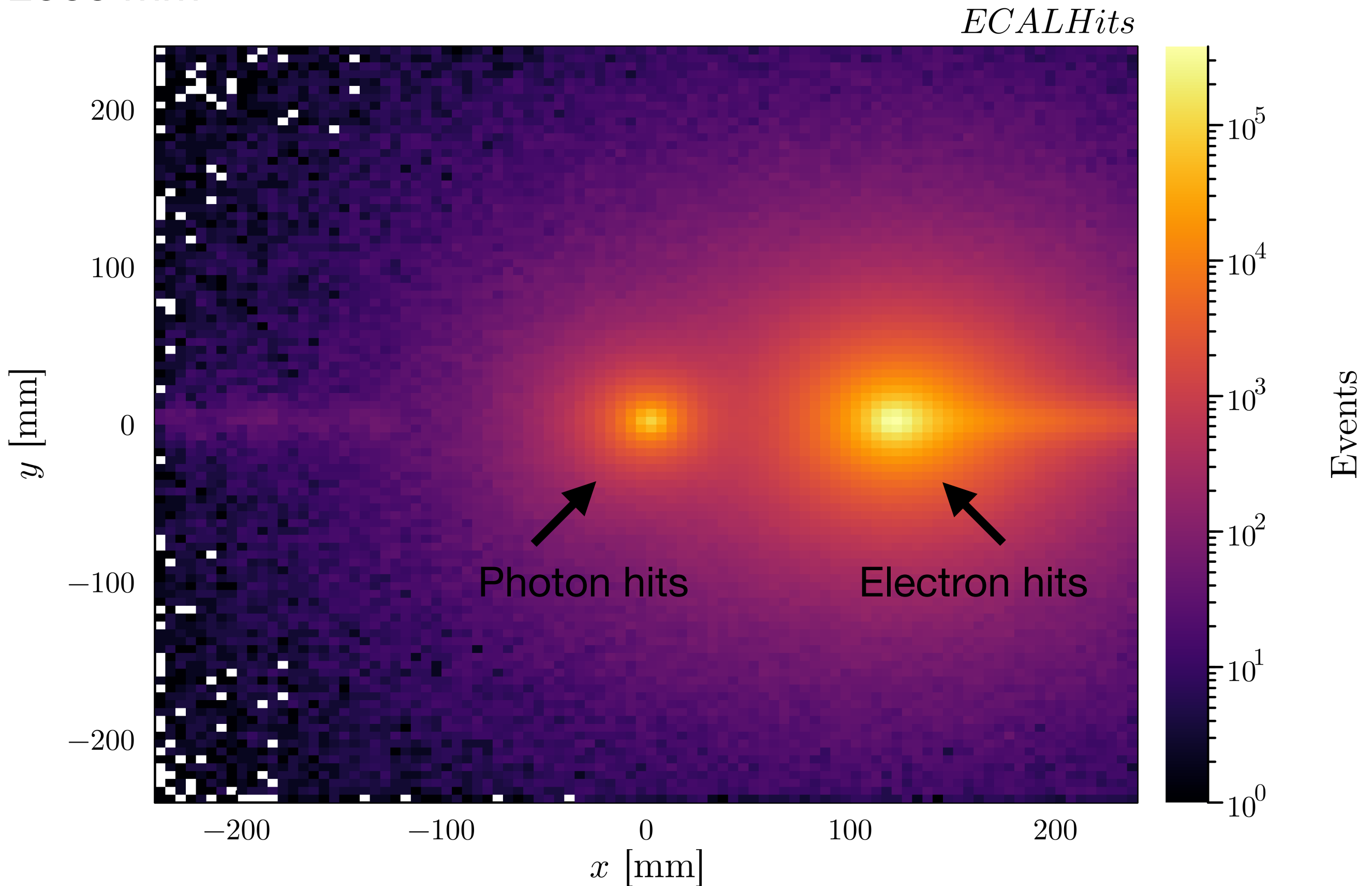
Endpointsofallparticlesoriginatingfromprimaryelectron



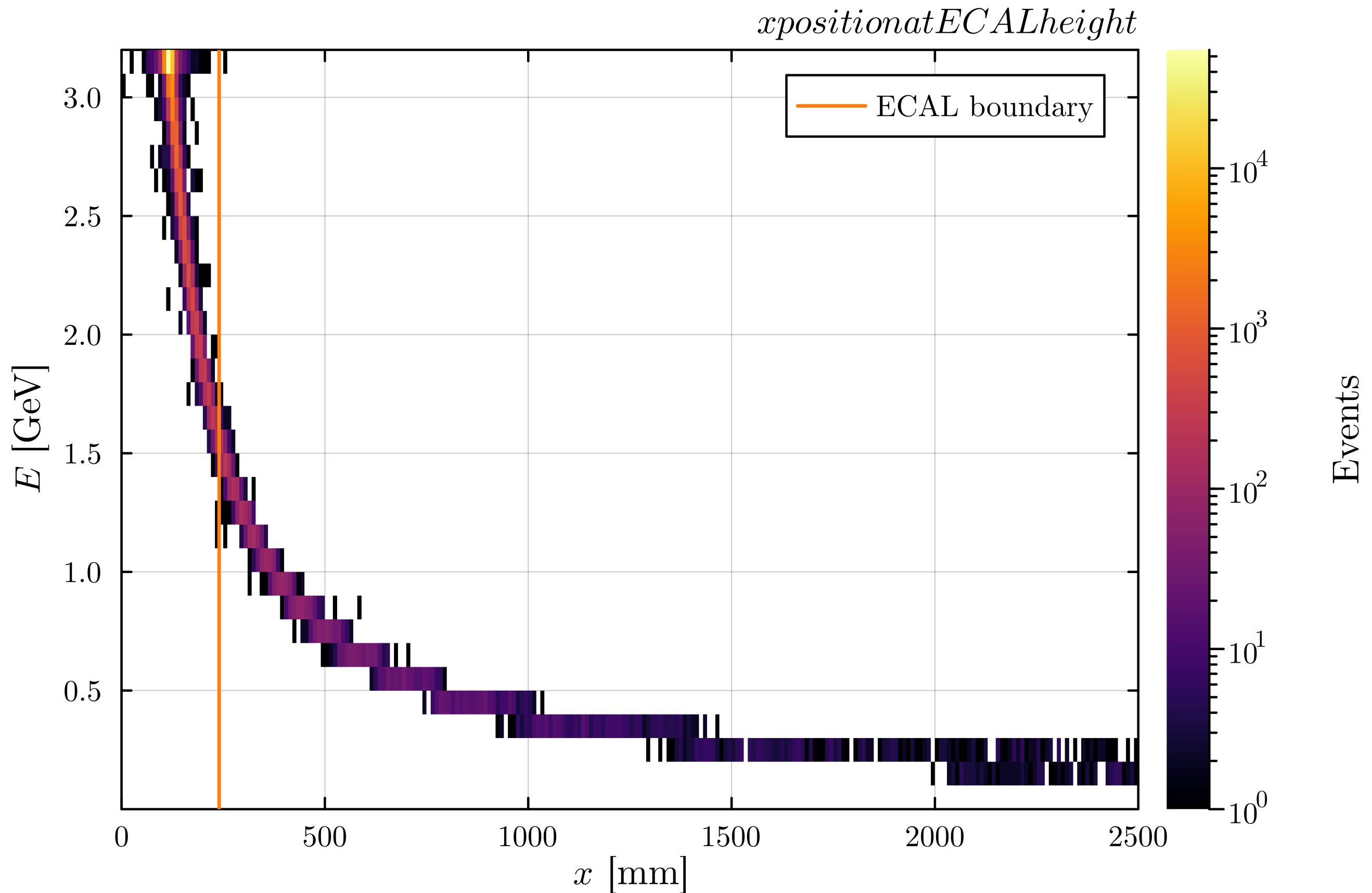
Simulation for Clustering Attempts



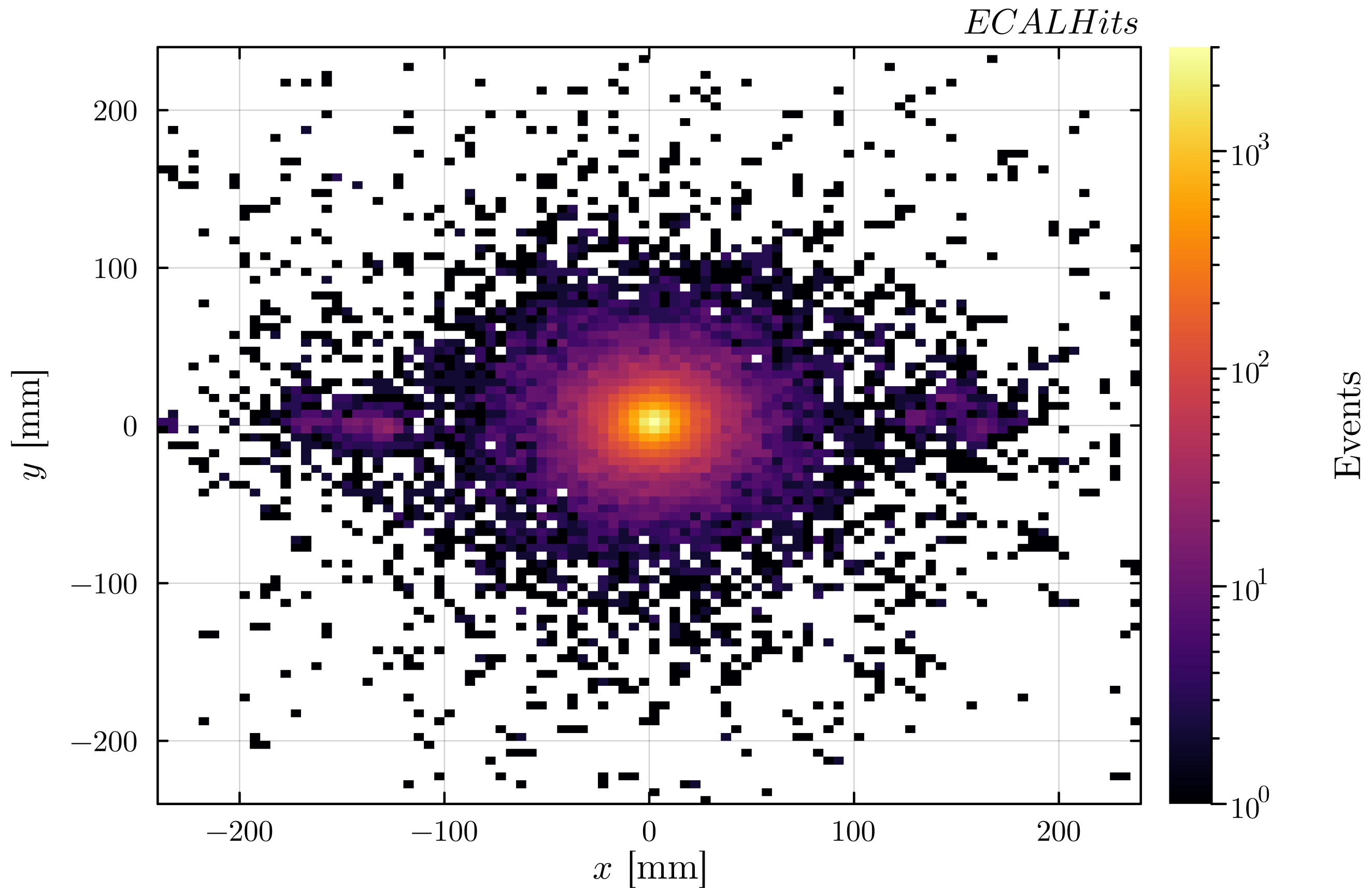
Distribution of hits in the ECAL in xy-plane for target positioned at 2500 mm



Calculated x value for cluster seeds and energy of events

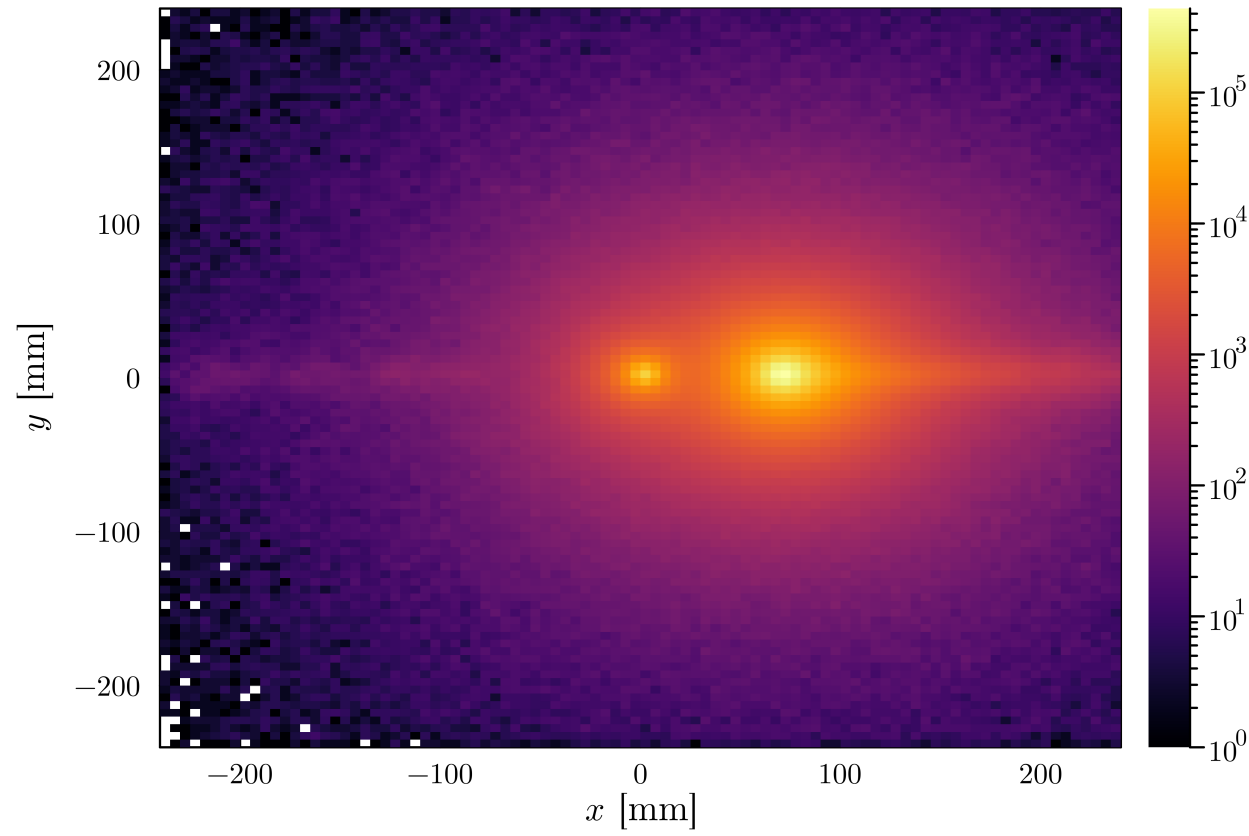


ECAL hits for events where the electron does not land in the ECAL



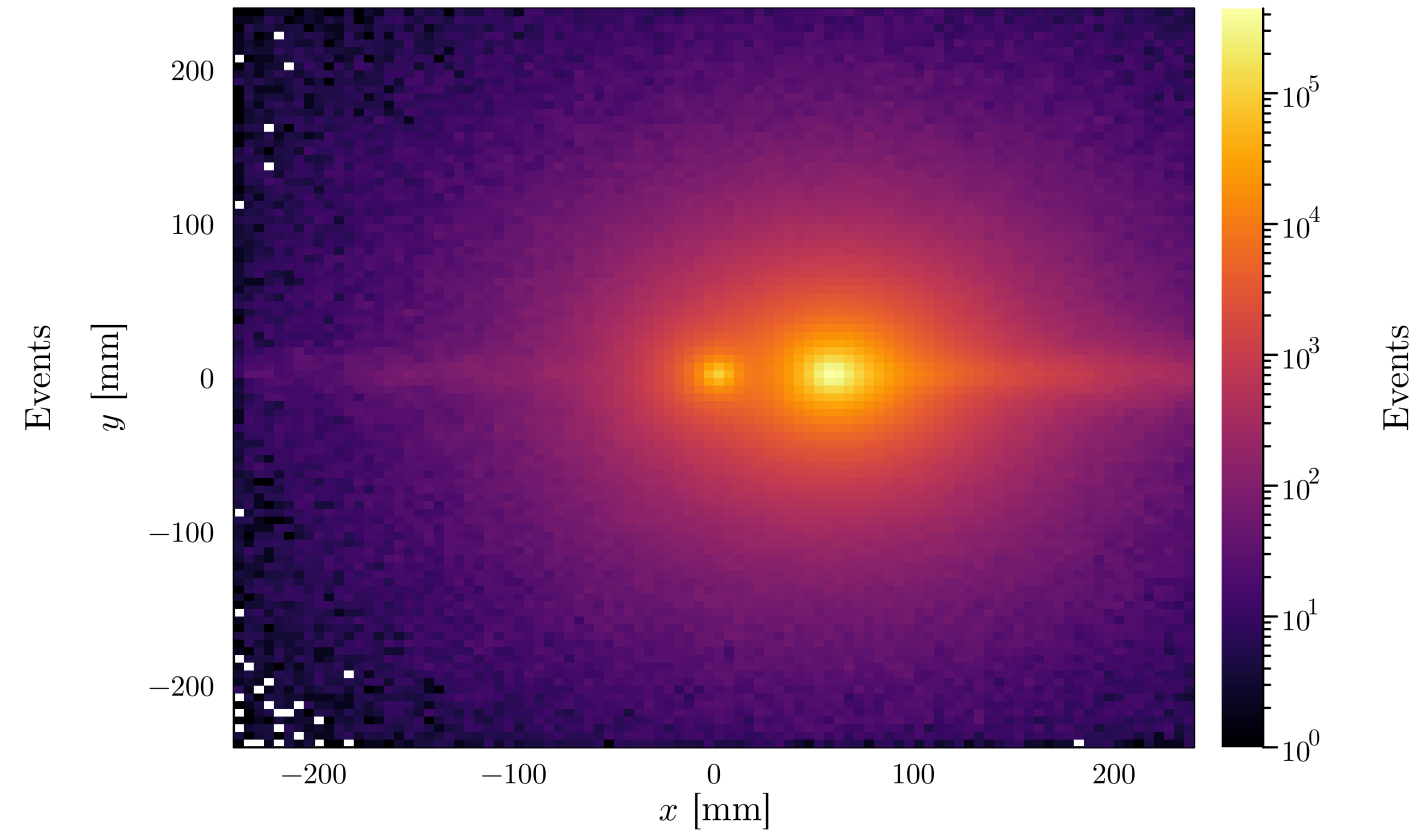
2700 mm

ECALHits

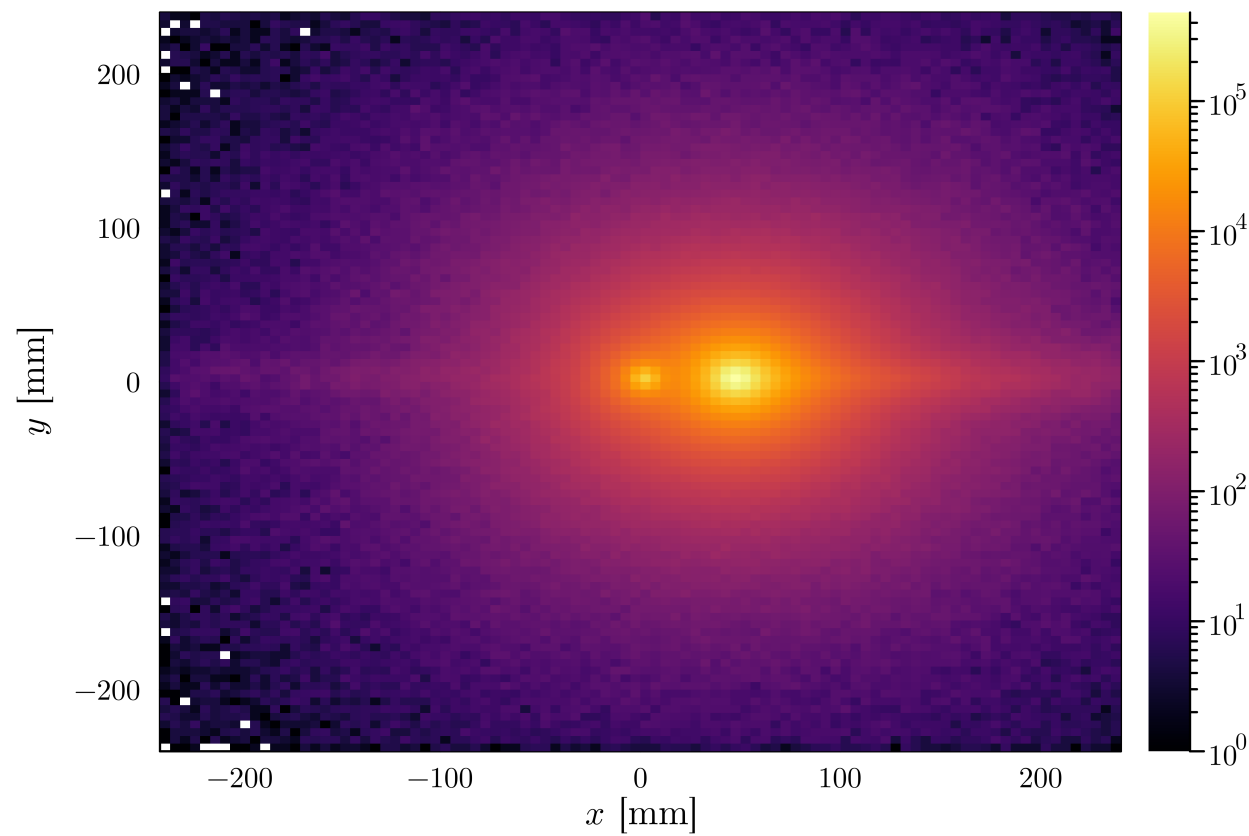


2750 mm

ECALHits

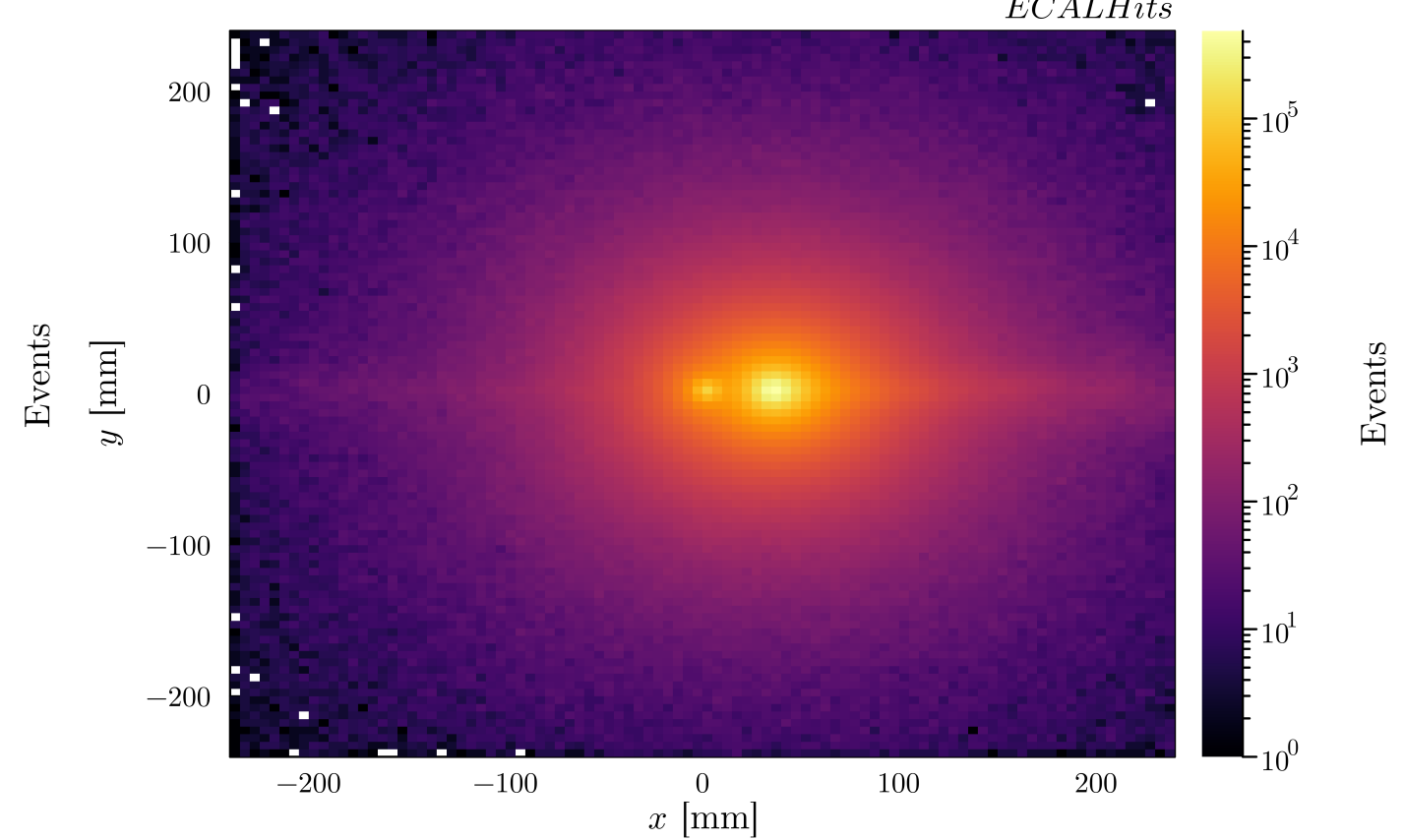


2800 mm

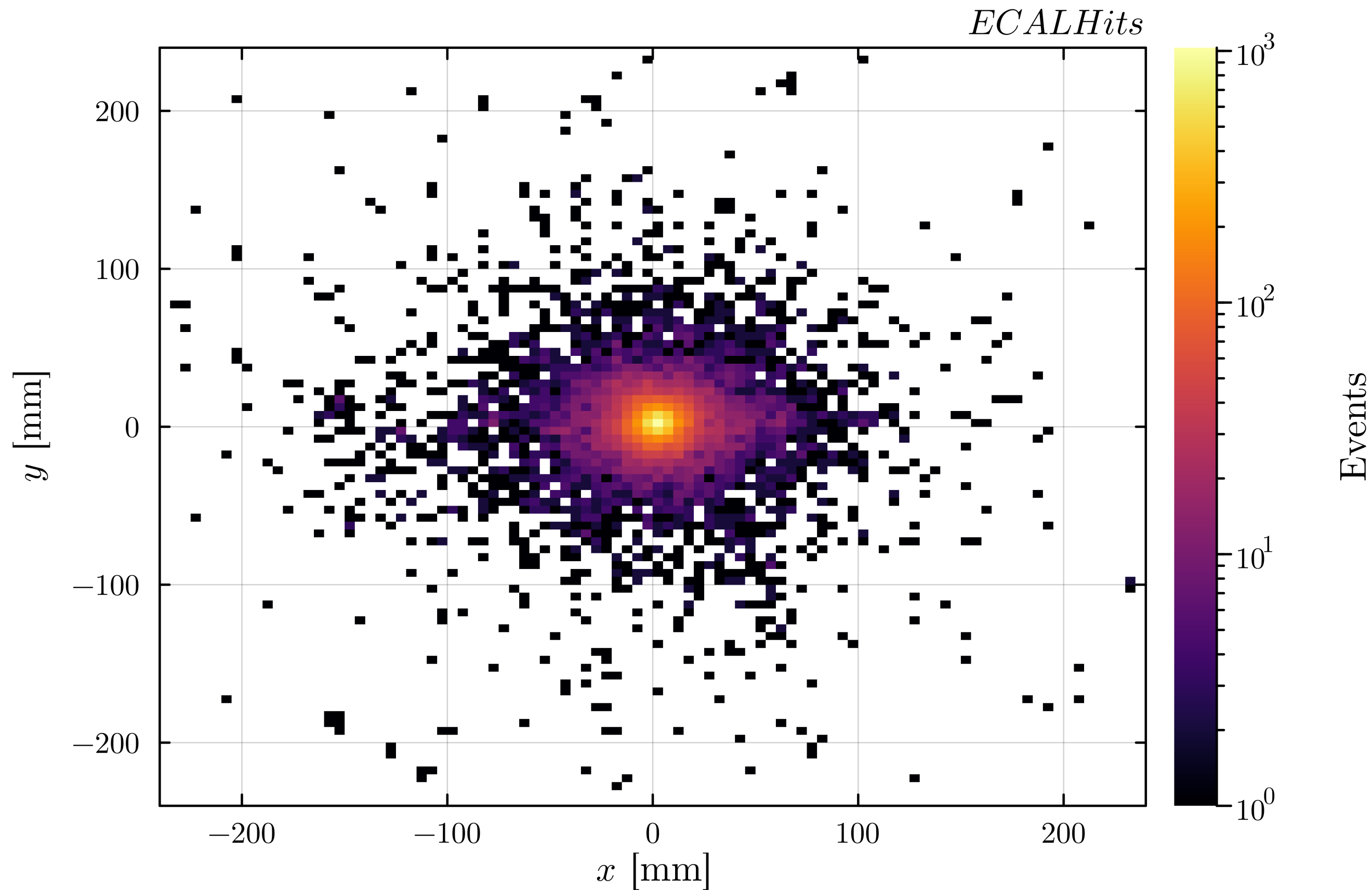


2850 mm

ECALHits



Target at 2850 mm; Events where electron does not hit ECAL



What's next?

- Make histogram showing photon contributions for ECAL hits
- Mask ECAL and observe how photon energy is over/underestimated