

LUXE ECAL-P at TAU

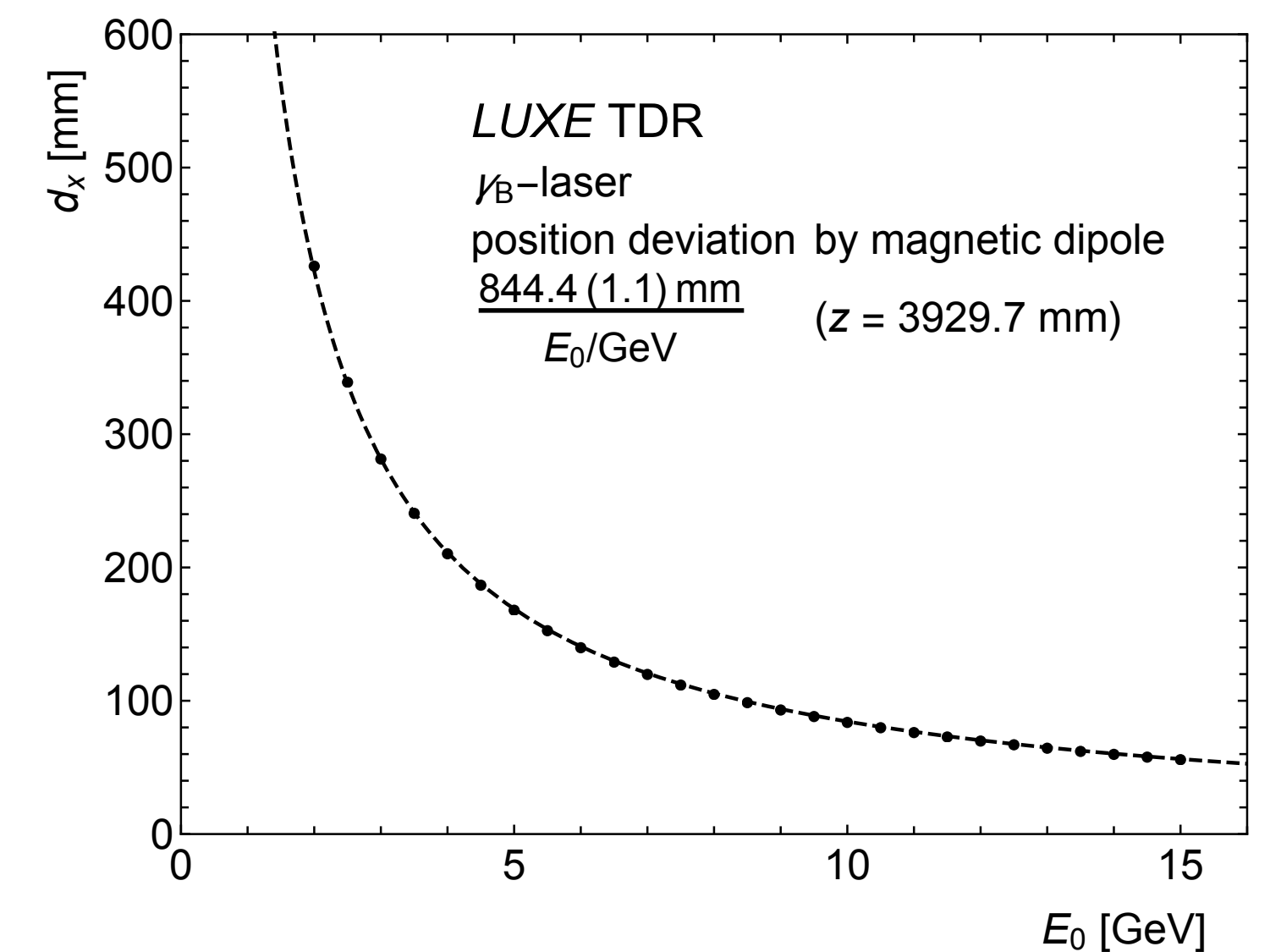
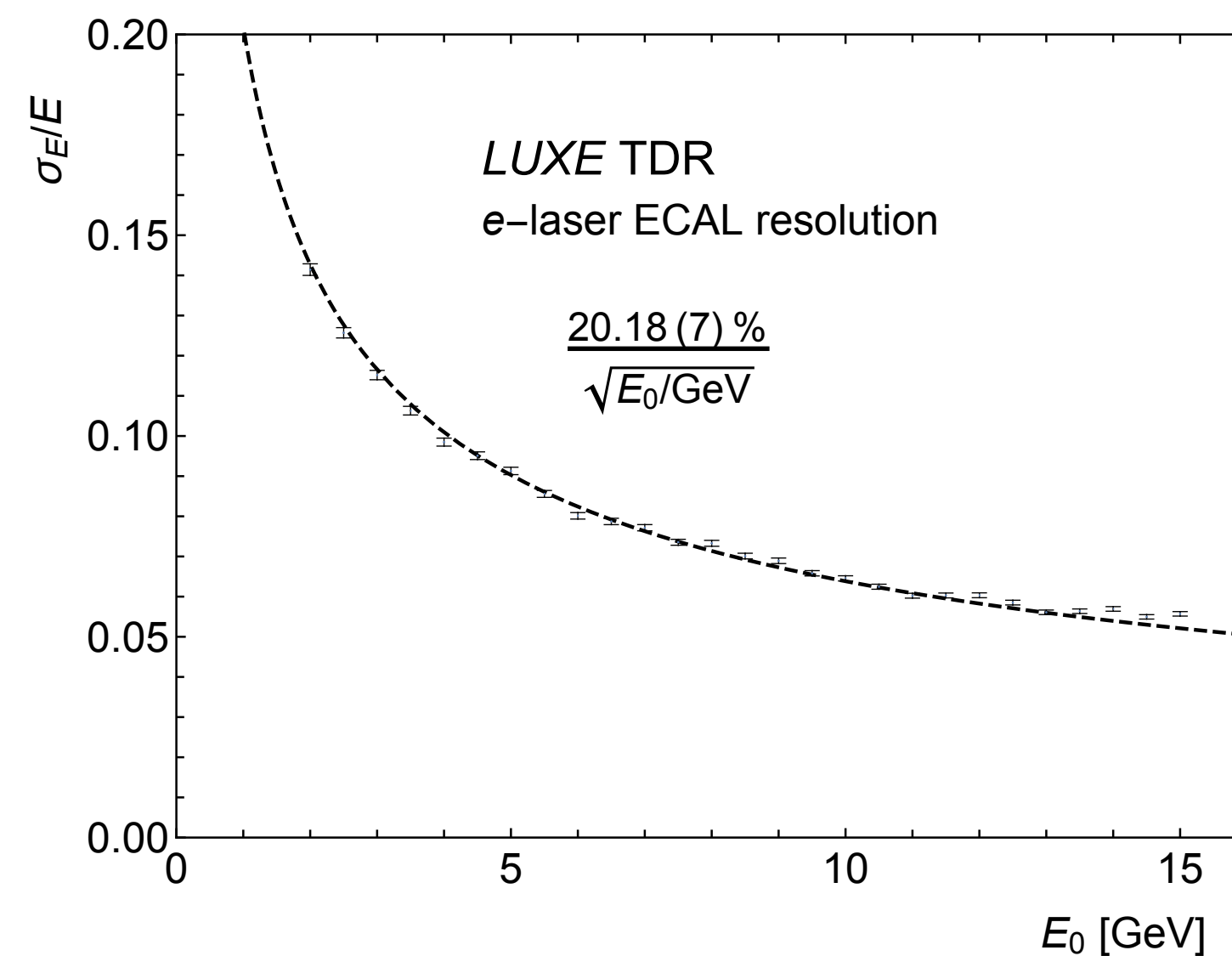
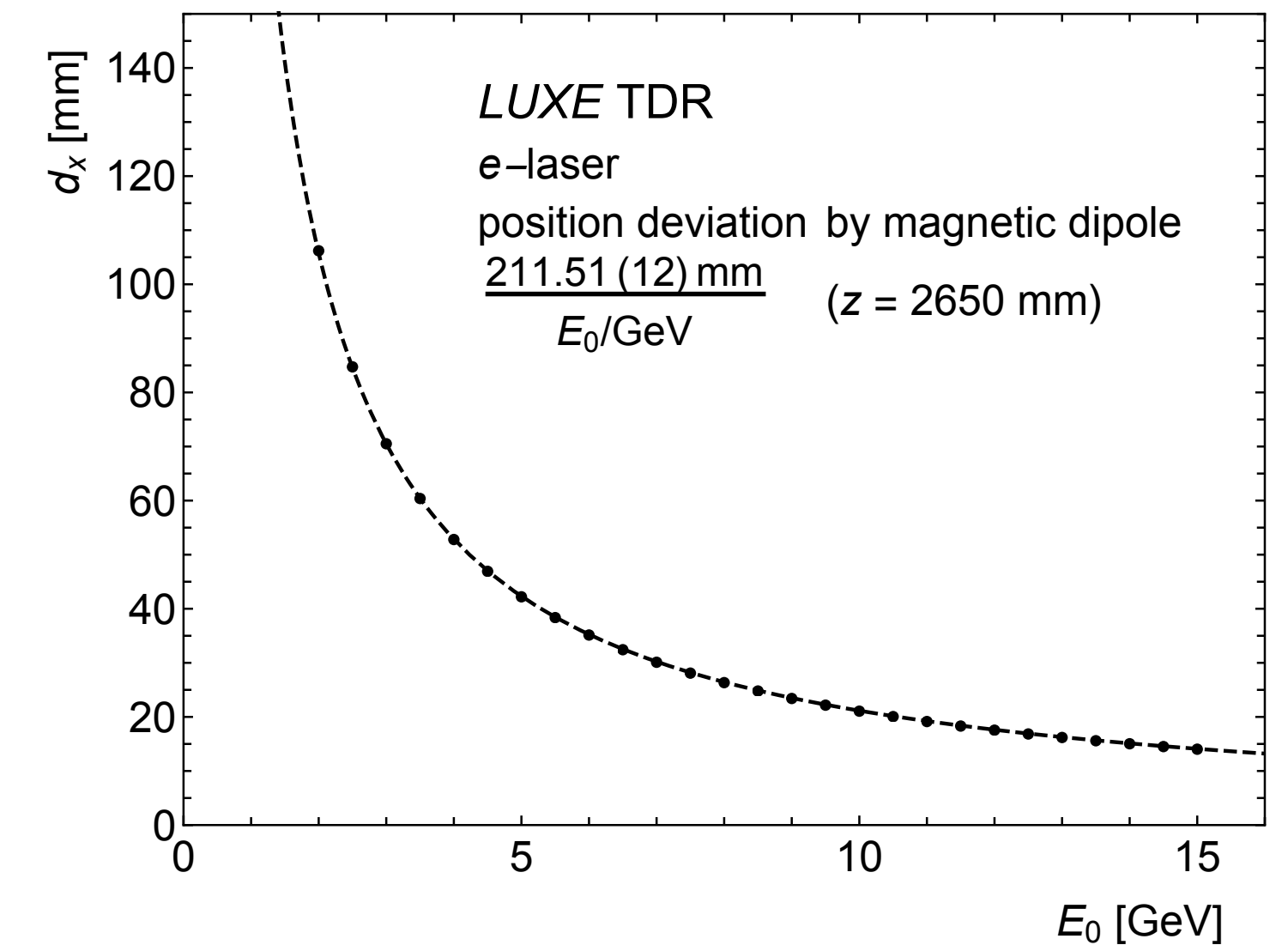
Aharon, David, Dor, Itamar, Halina, Michal, Nir, Shan, Yan
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05 March 2023

- Design
 - Calibration & Optimisation (Michal)
- Reconstruct
 - Position (Shan, Dor)
 - Shower clustering (Michal, Dor)
 - Energy spectrum (Shan, Nir)
 - Background (Shan)
- Testbeam
 - Telescope analysis (Shan)
 - Data merging (Shan)

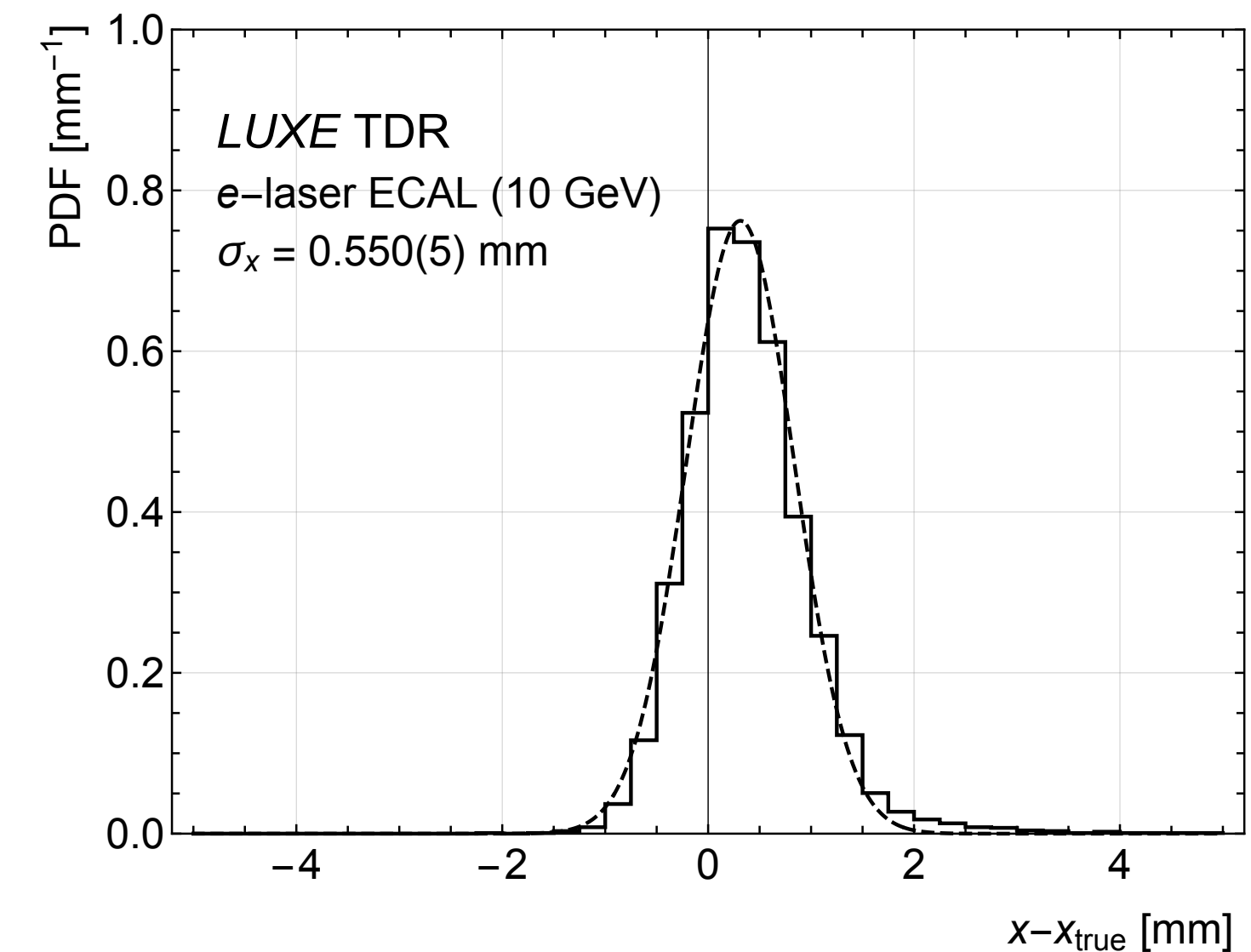
Calibration

- The dependency between energy and position
 - Two setups
 - At least two ECAL designs
 - Length: ~~20 layers~~ & 15 layers
 - Thickness: 320 μm & 500 μm
 - Width: ~~5.0 mm~~ & 5.5 mm
- Positron incident angle
 - Maximum at around 15 degrees



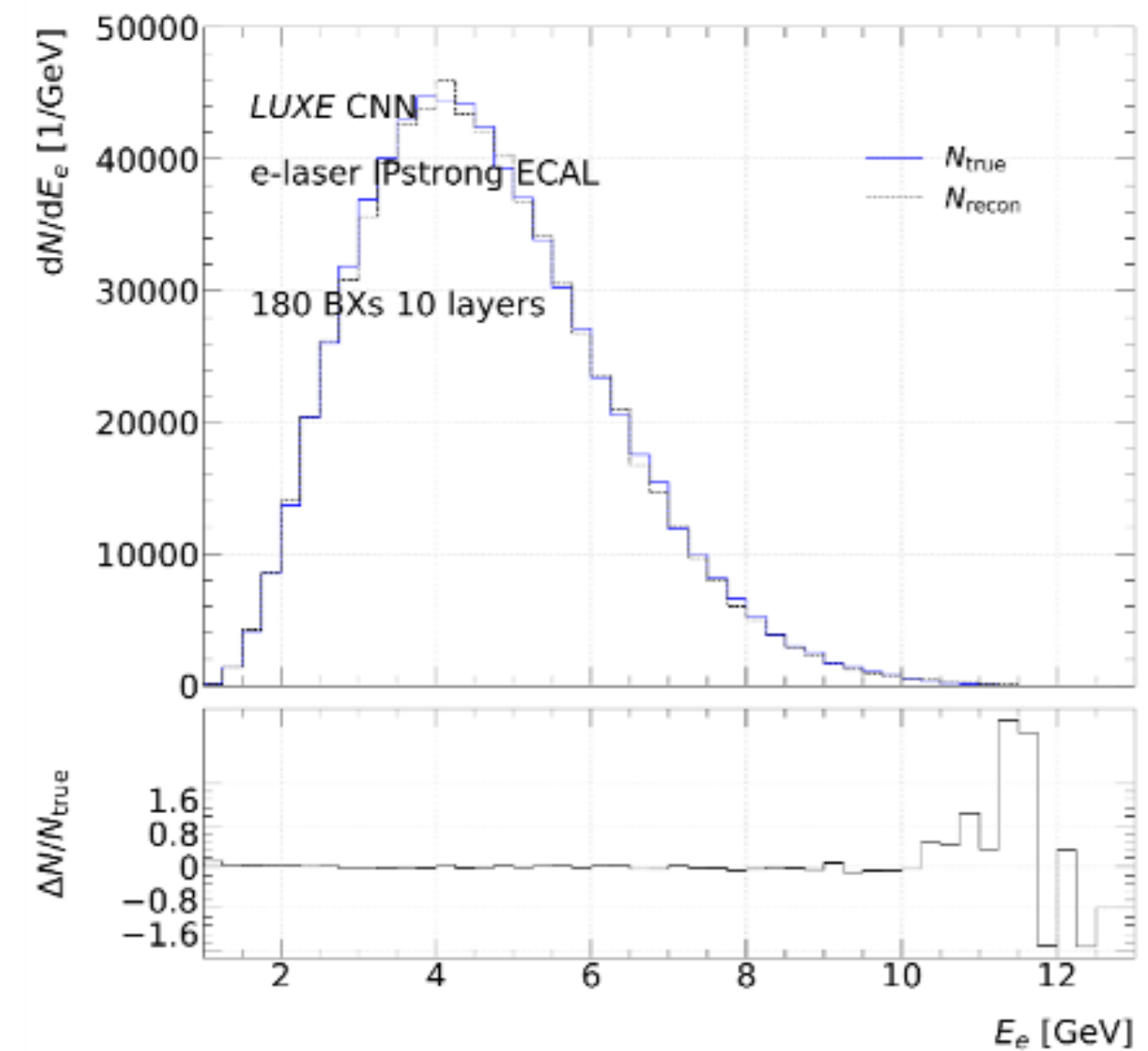
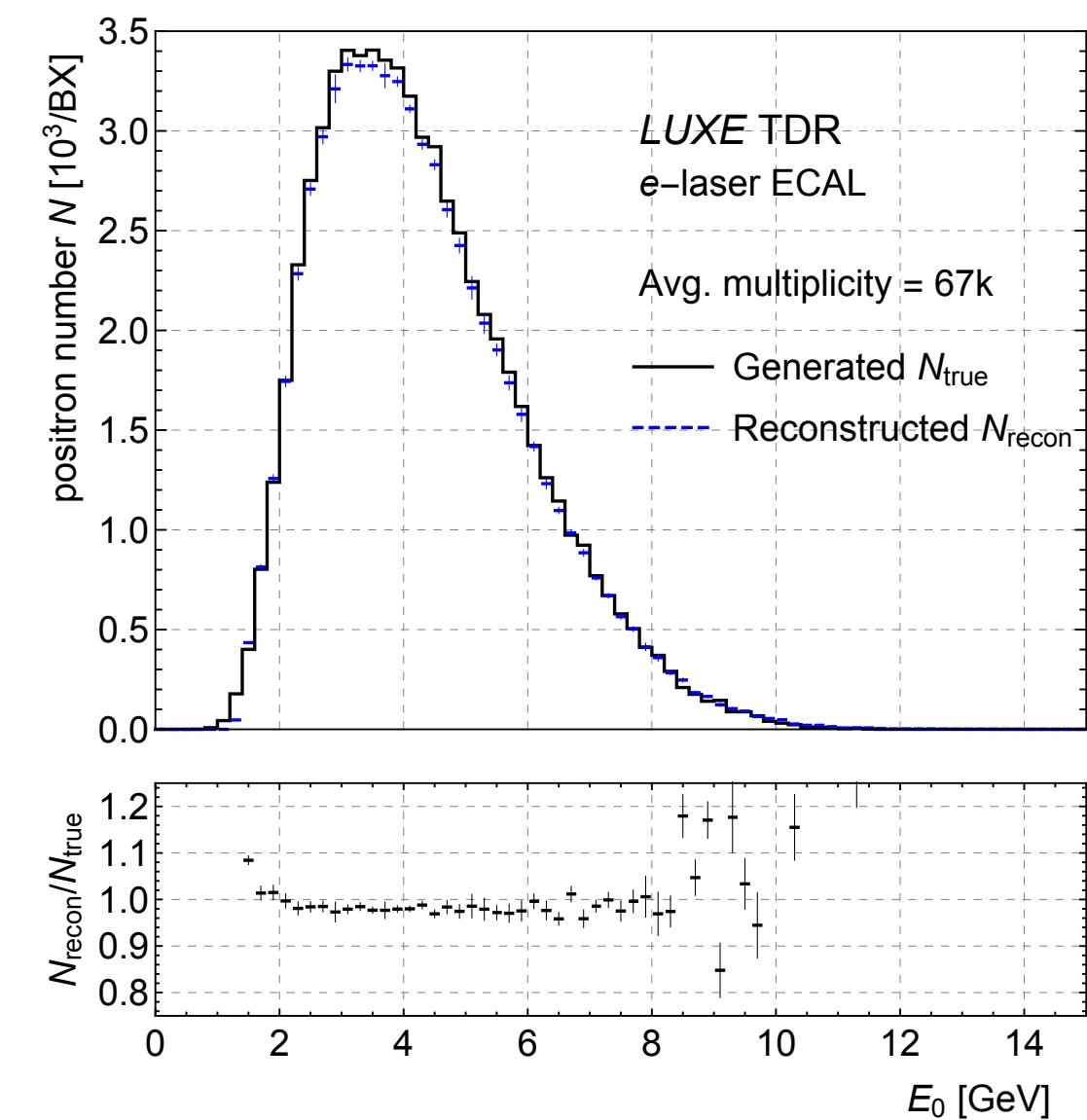
Reconstruction

- Position reconstruction
 - Logarithmic weighting (early 2021)
 - based on tower
 - 0.5 mm resolution (can be improved)
 - biased due to angular effect
 - Neural network
 - unbiased
 - poorer resolution
 - not yet generalised
 - Trajectory method
- Clustering
 - maximum-value based (late 2020)
 - quantum computation similar to the tracker?



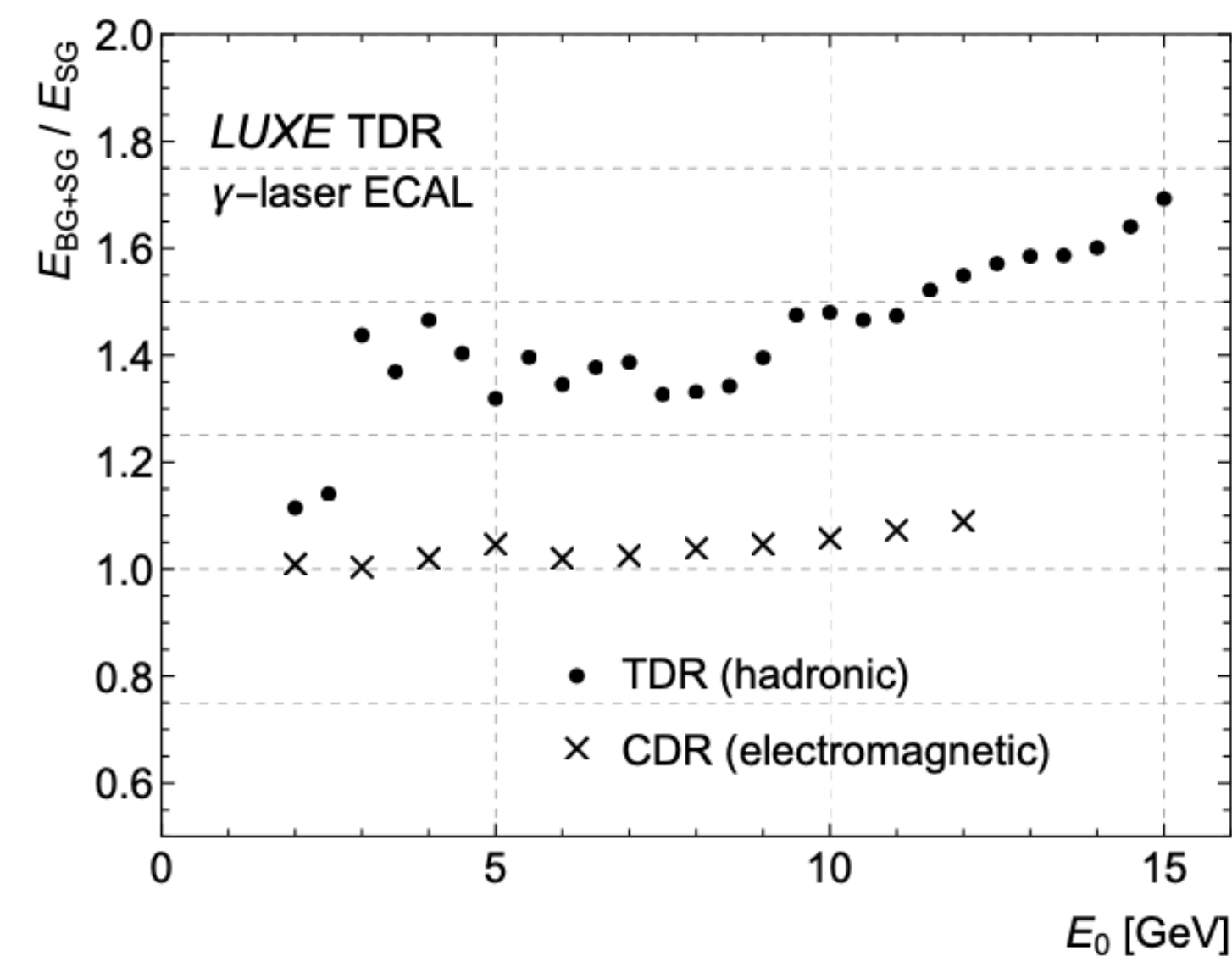
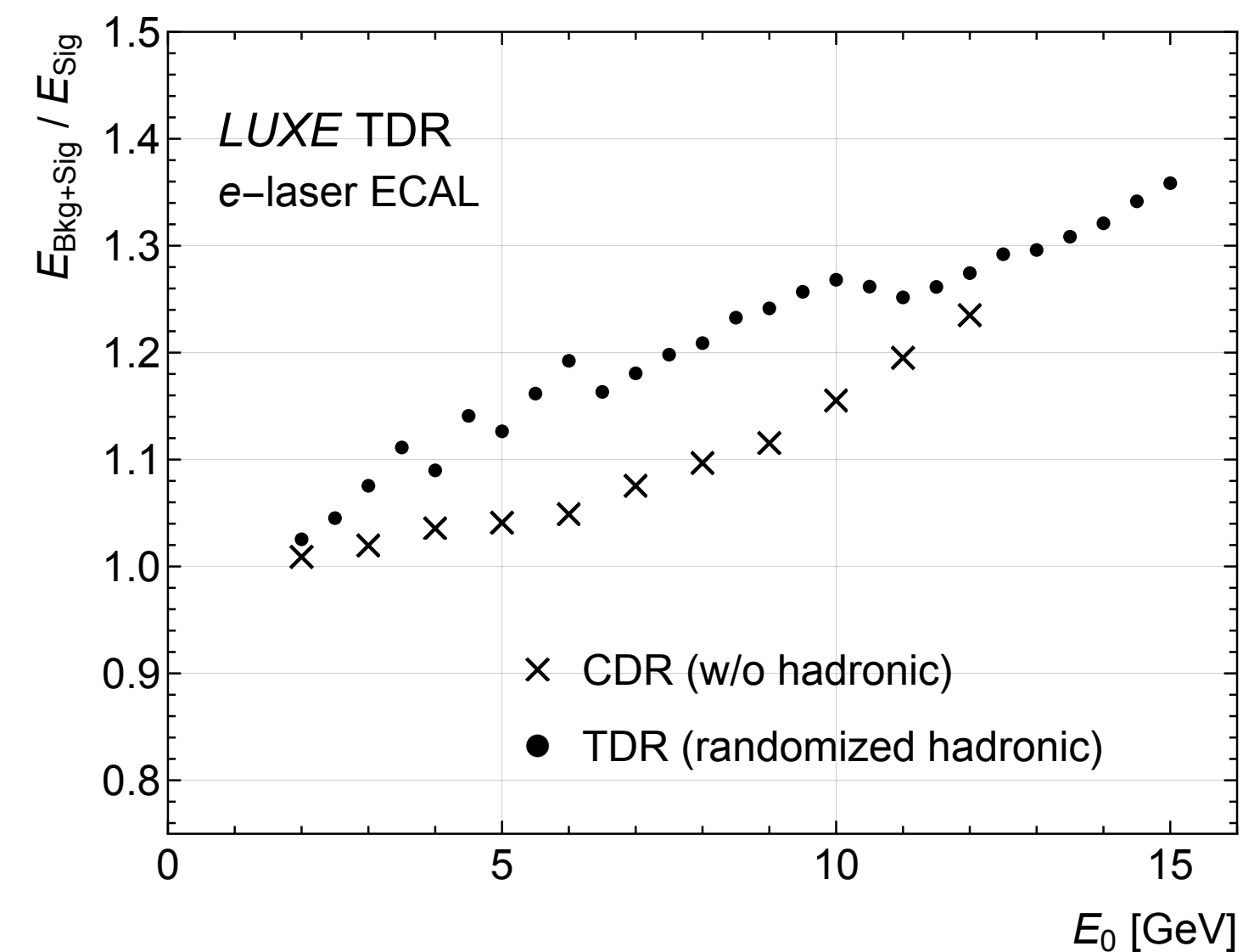
Reconstruction

- Energy spectrum
 - Energy flow (middle 2021)
 - angular effect correction
 - ~~0.5%~~ bias
 - without background
 - Neural network
 - trained with electromagnetic background
 - able to reconstruct with limited information
 - spectrum related
 - transition to Ptarmigan dataset



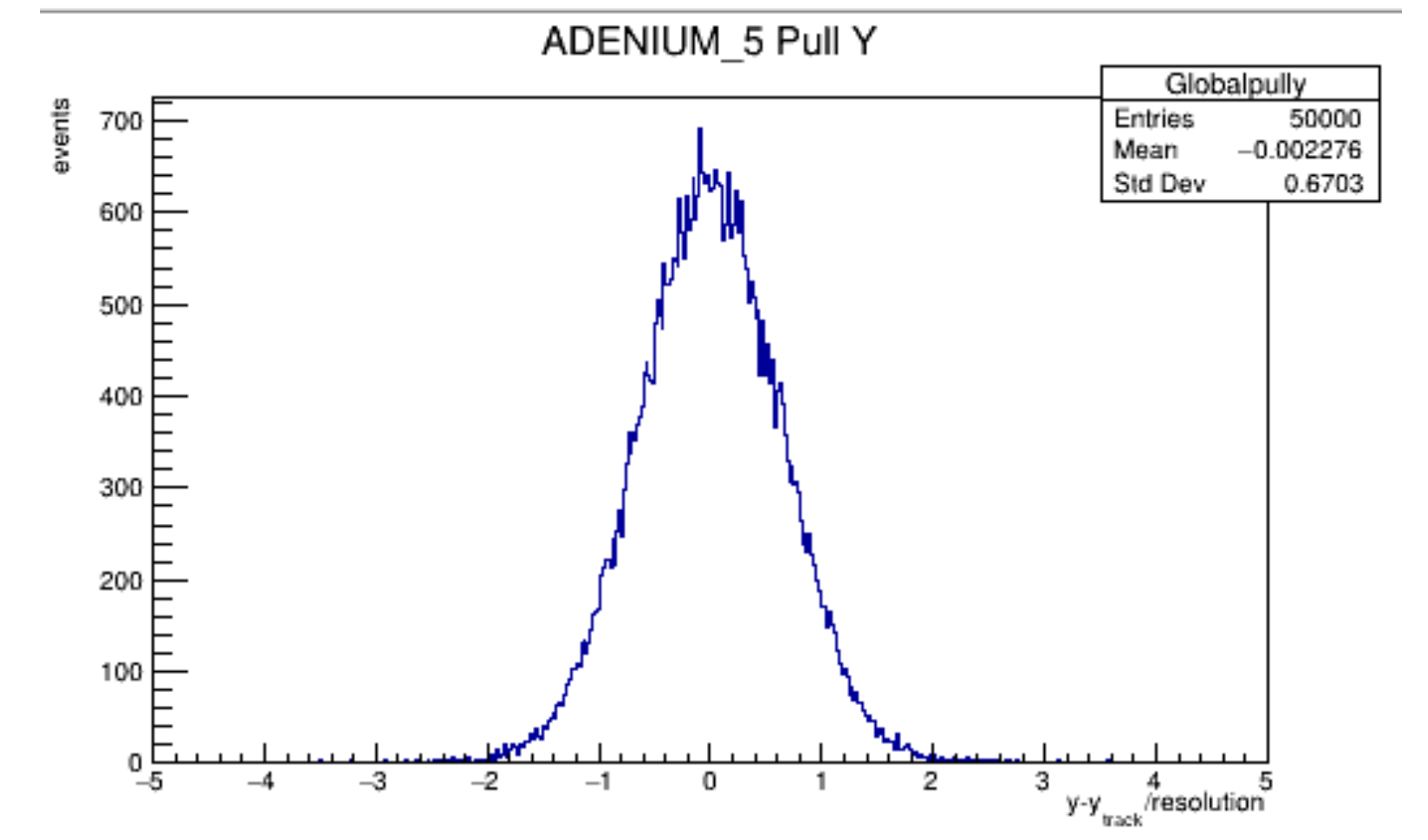
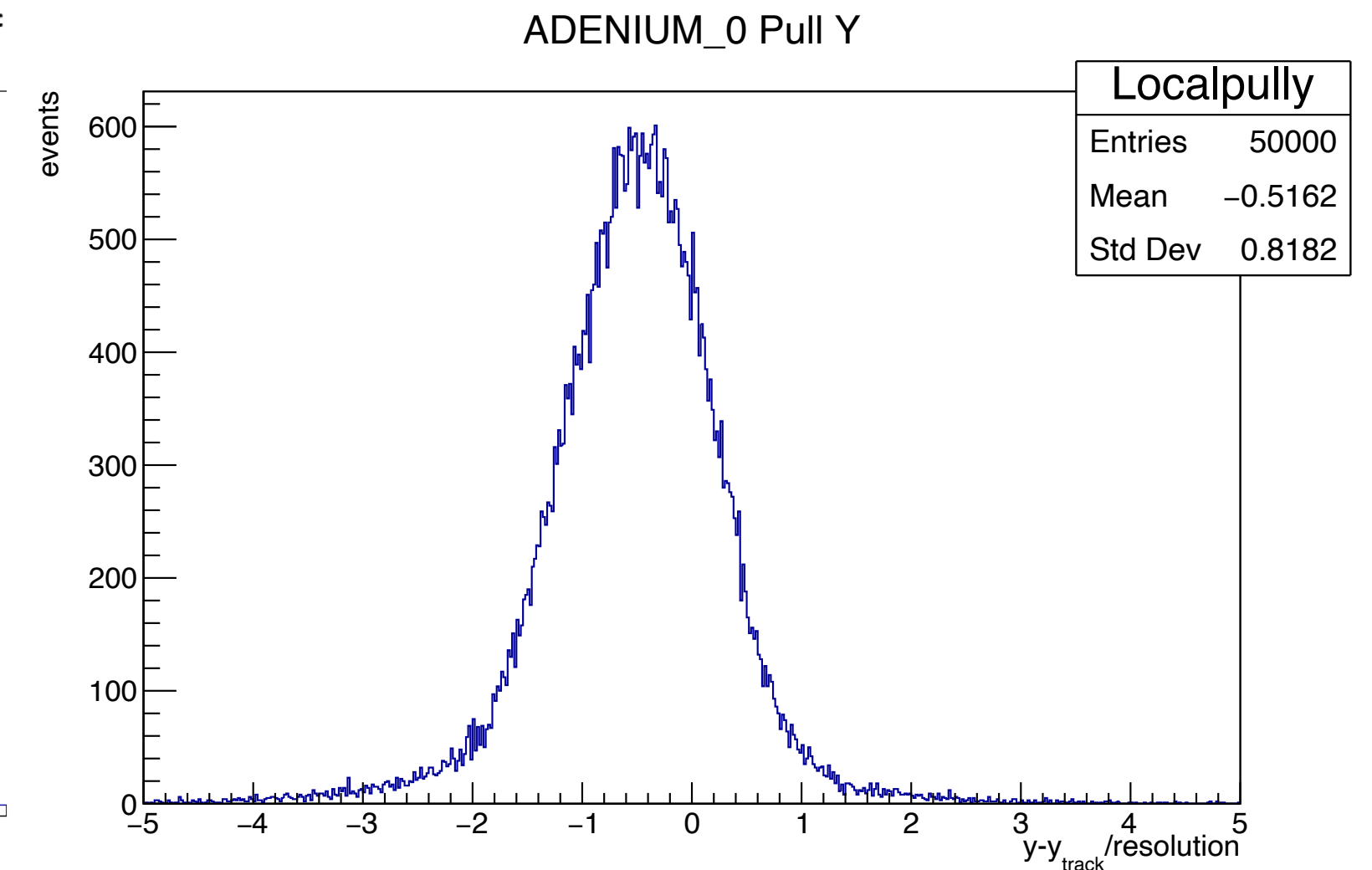
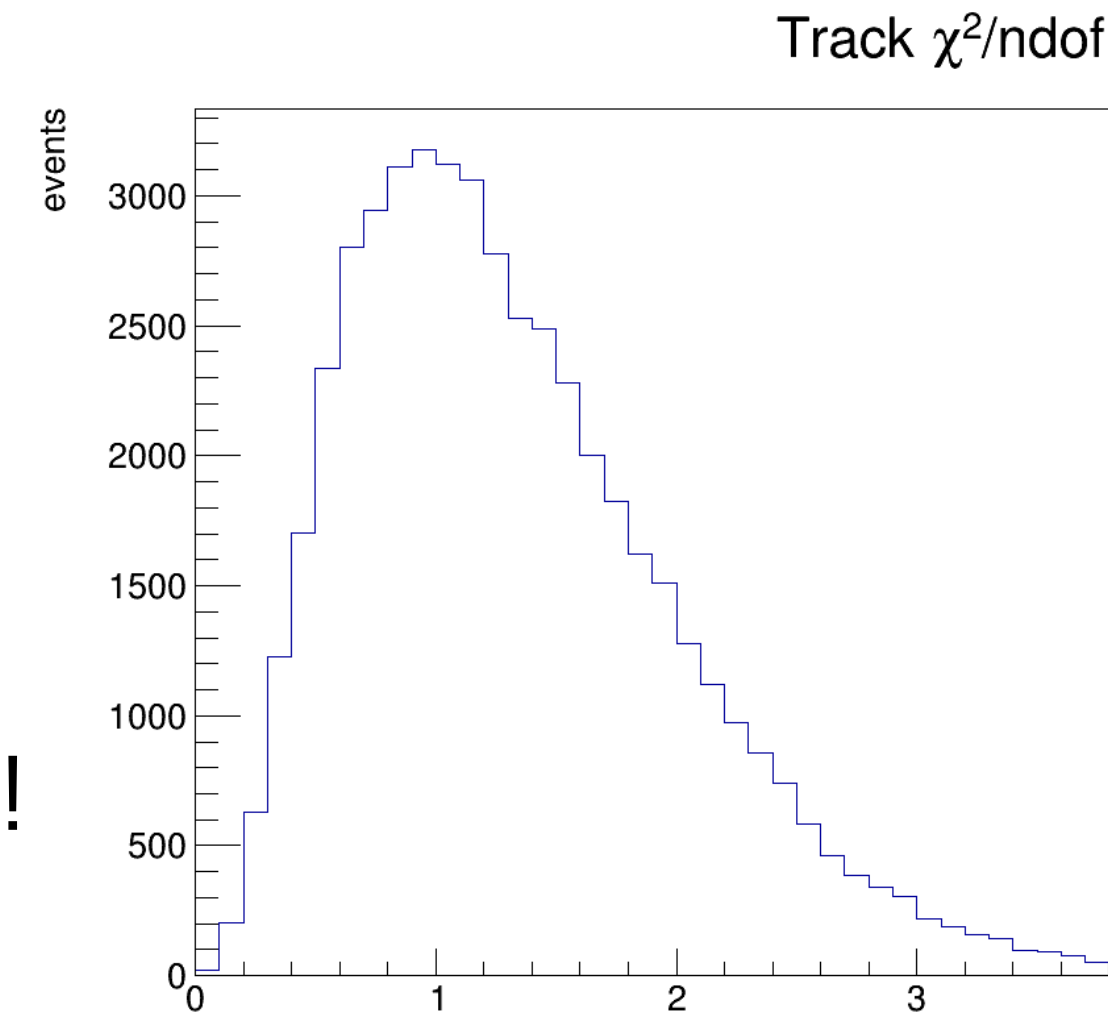
Reconstruction

- Background
 - Hadronic background
 - nonlocalised (comparing to the EM background)
 - unusual high deposit (over 1 MeV $\sim$ 10 MIP)
 - spoiling current method of estimation
 - Possible solution
 - extra shielding (only in e-laser, seemingly)
 - time cut at 100 ns
 - randomisation
 - Potential issue also in g-laser



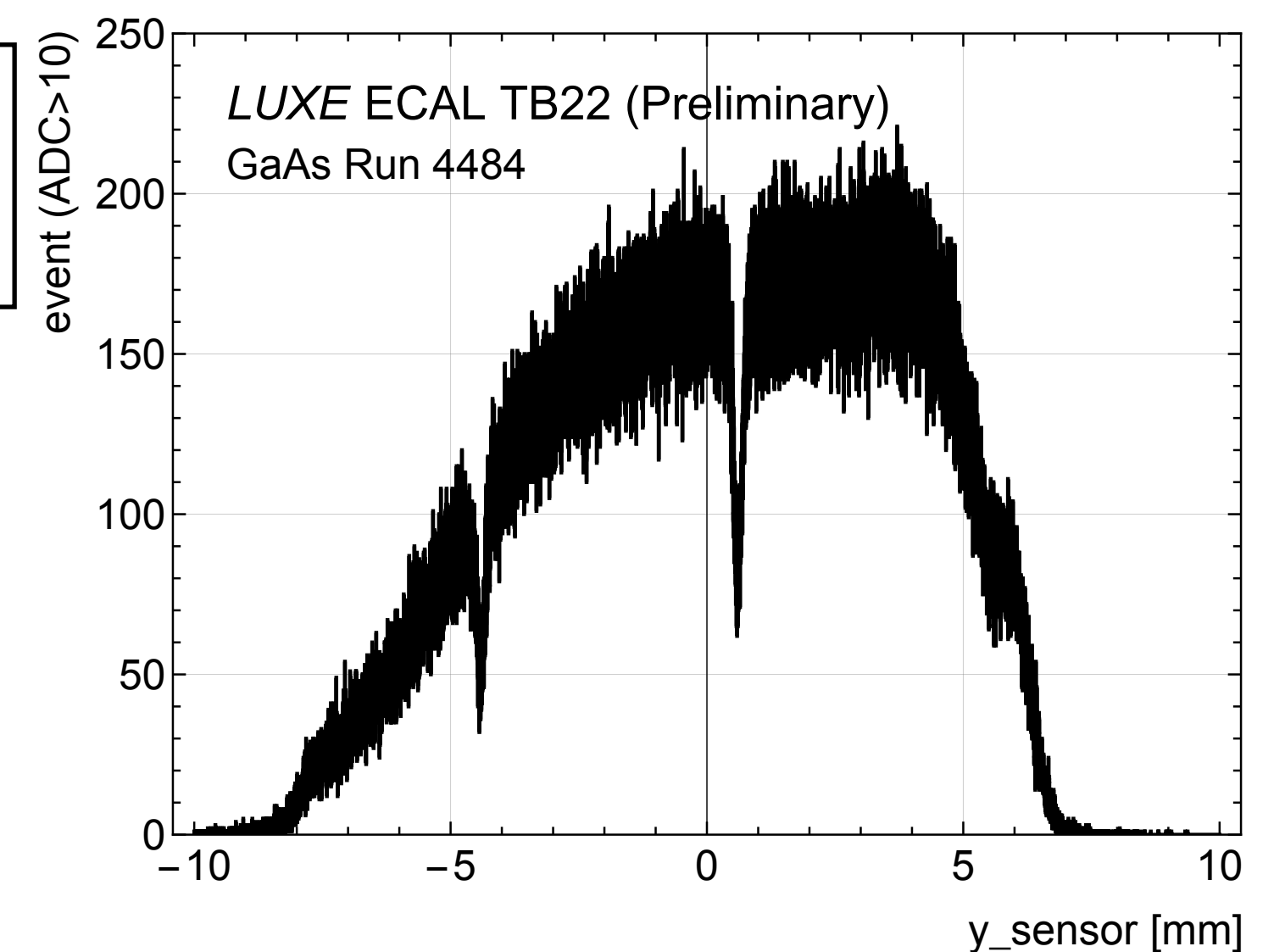
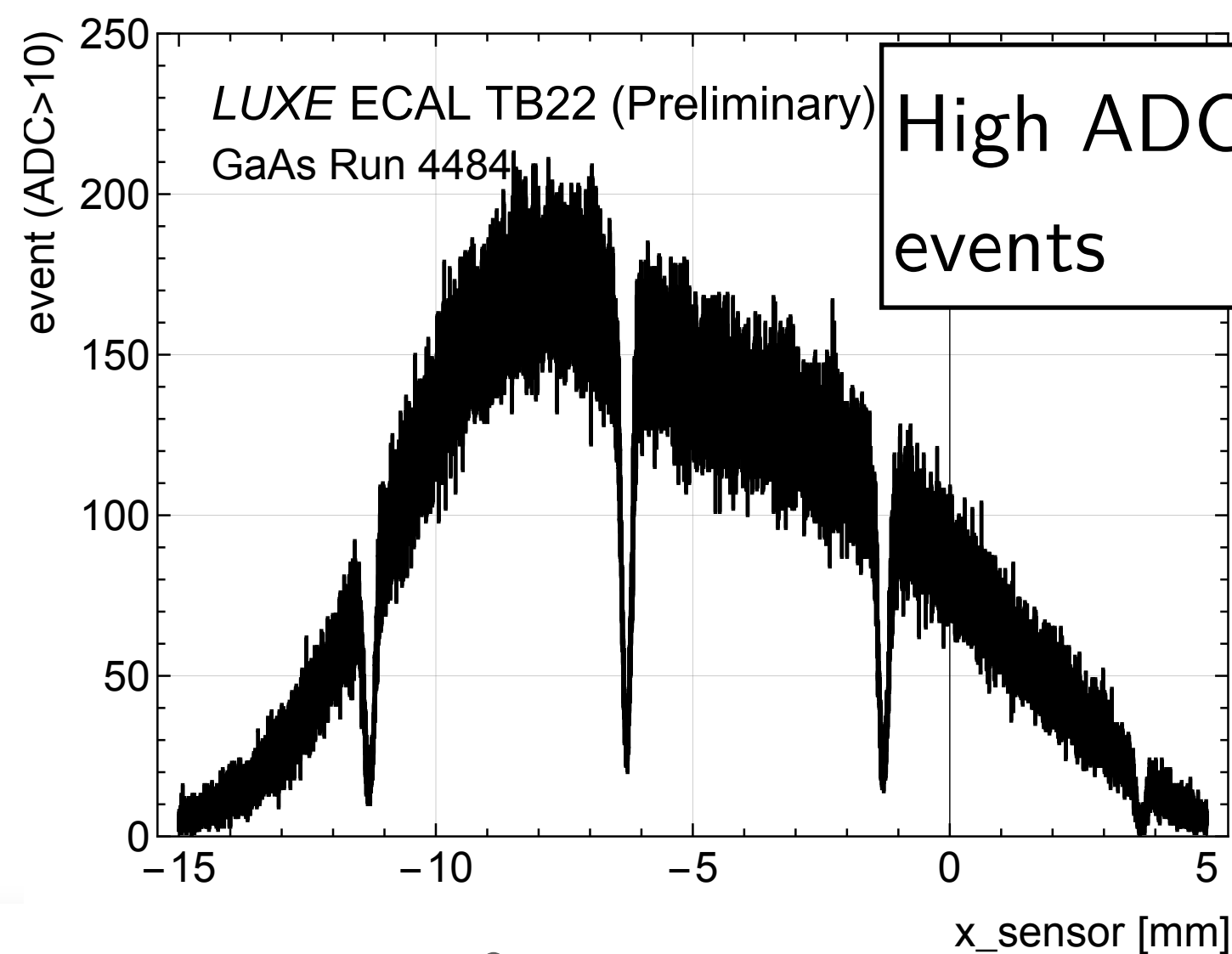
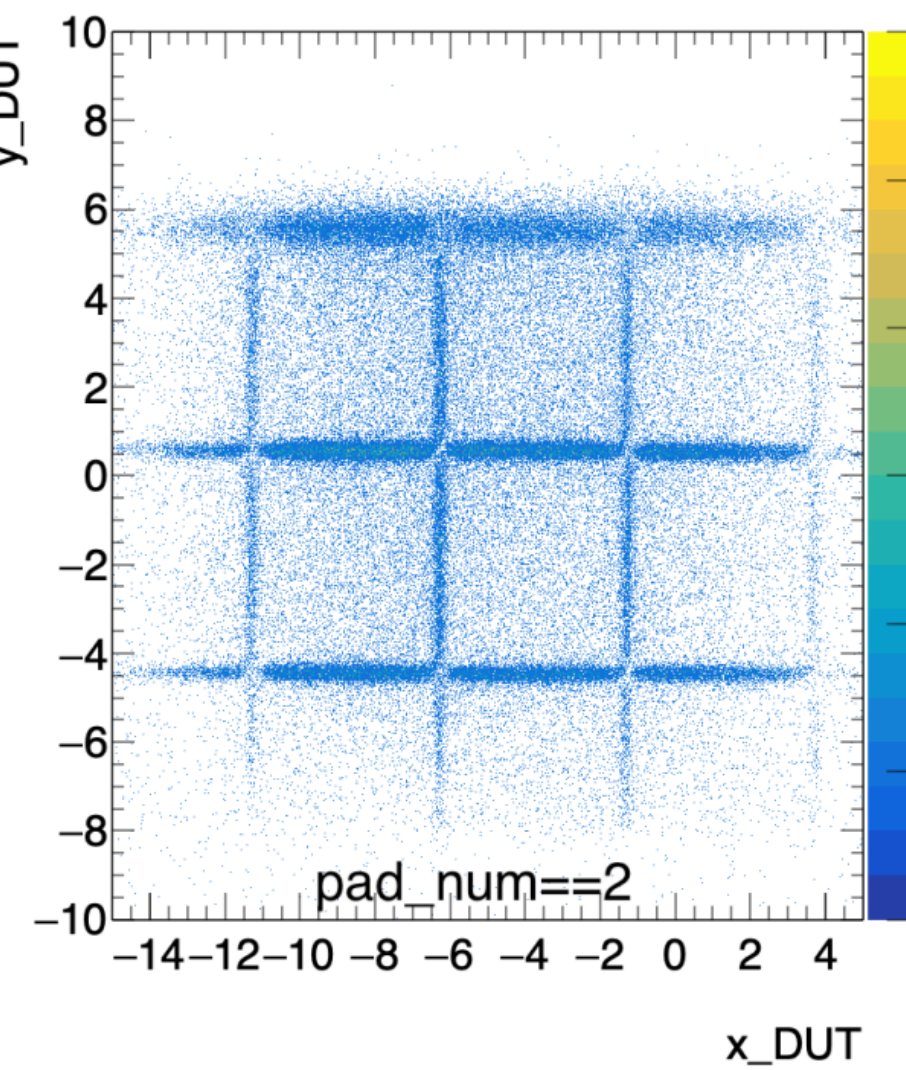
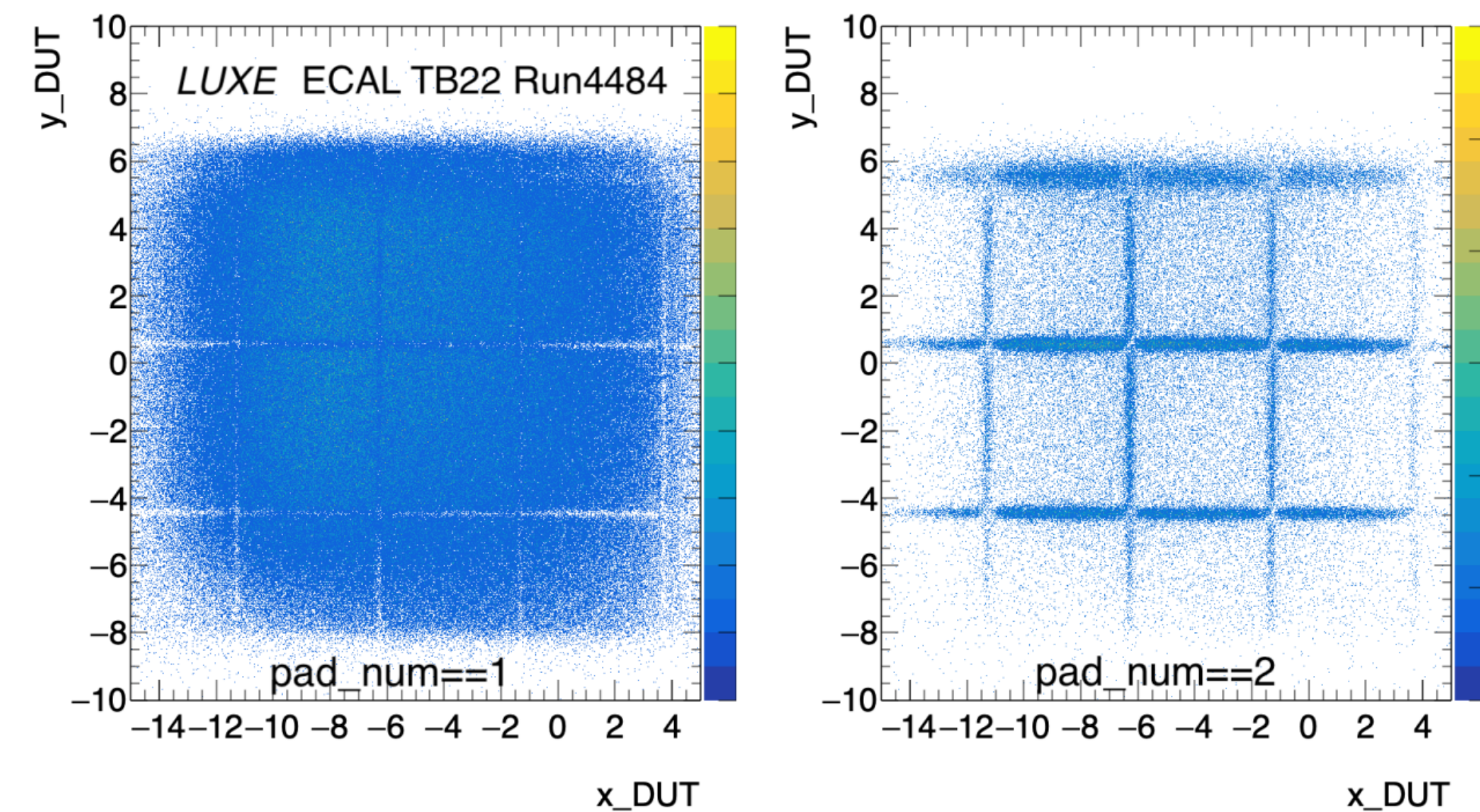
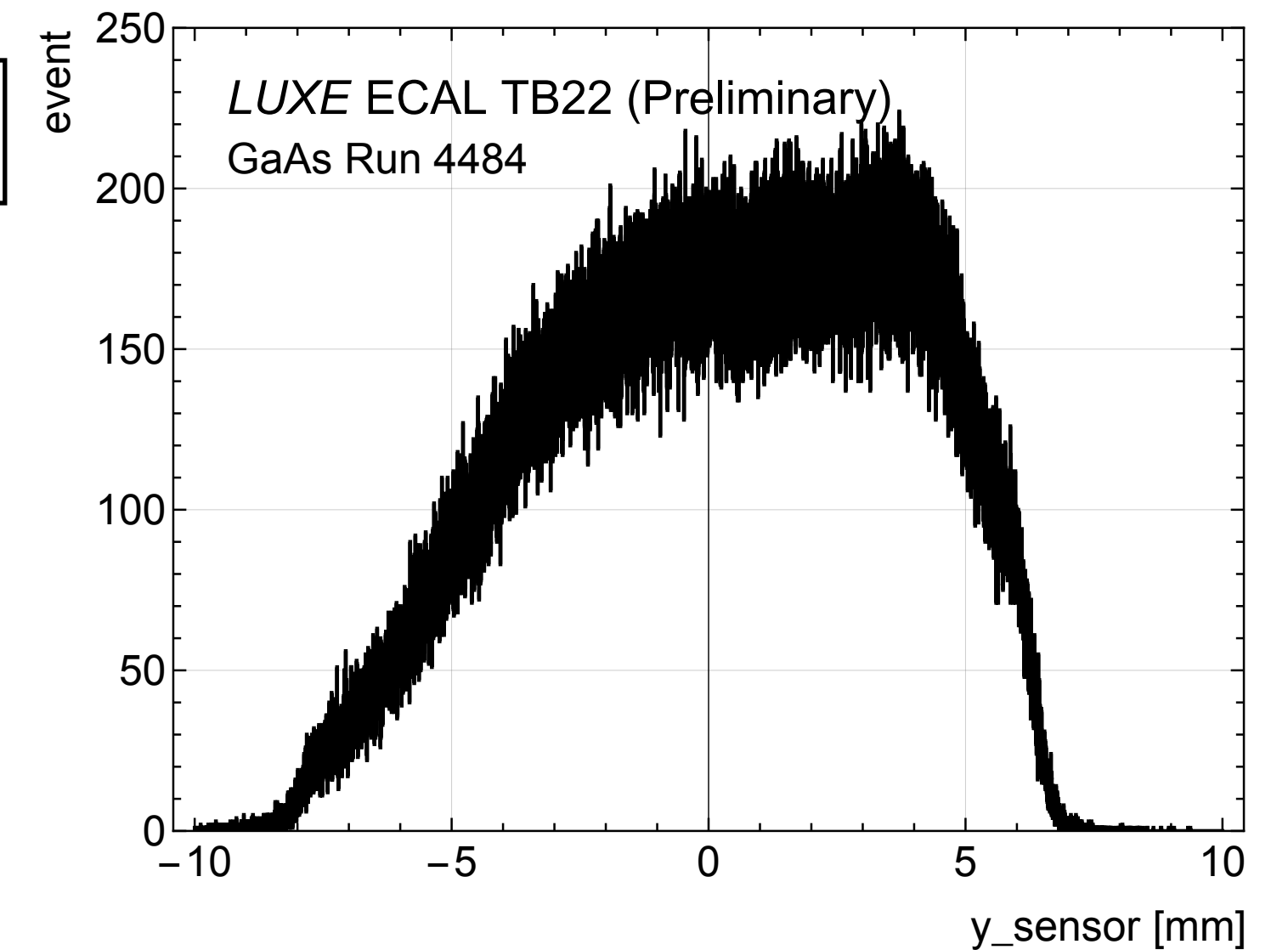
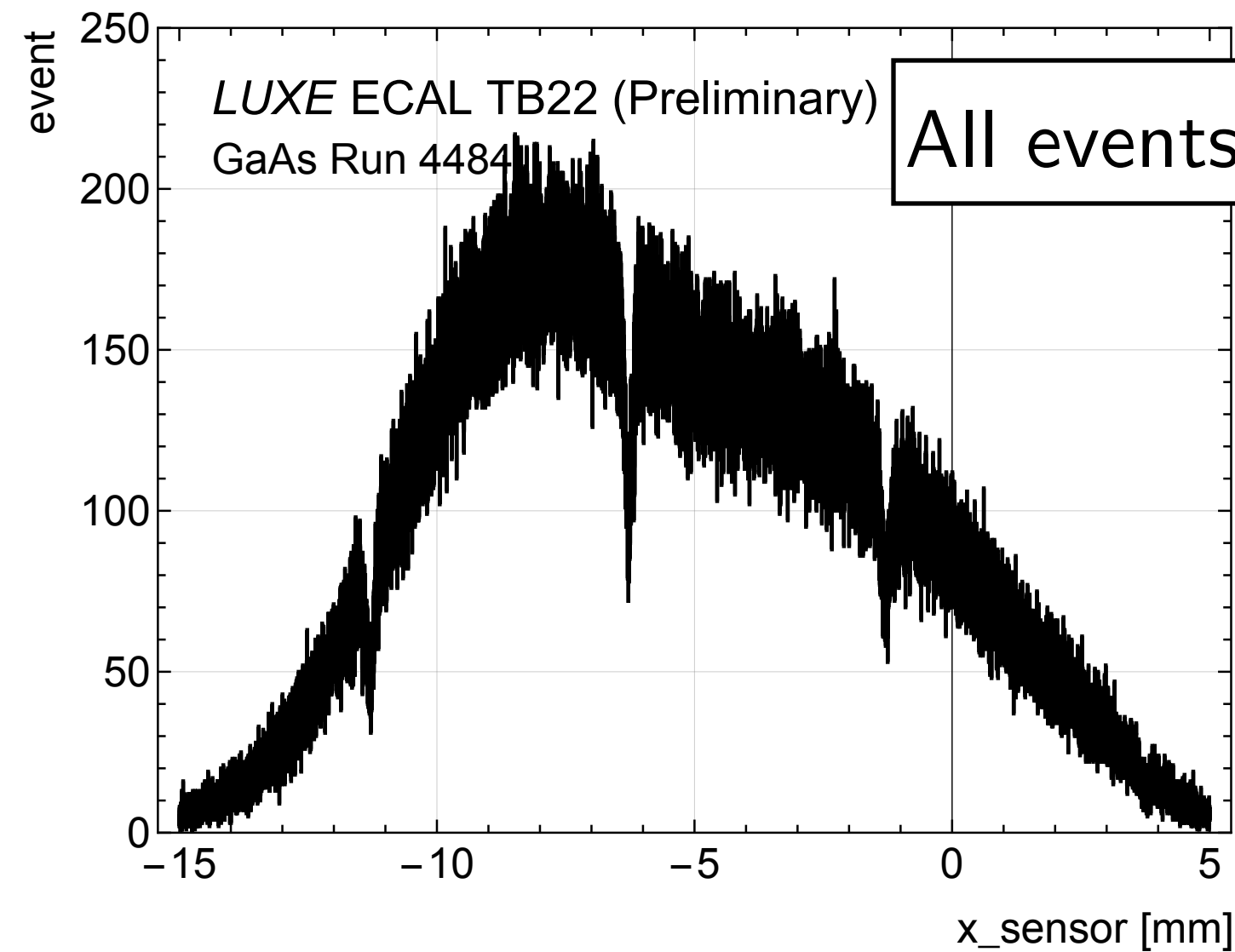
Testbeam

- Telescope
 - Alignment
 - Corryvreckan
 - benchmark achieved (or even better?)
 - trick: watch the track-over-event ratio!
 - Reconstruction
 - Corryvreckan + module to dump data per track
 - module for uncertainty valid since last month
 - to be redone with the updated alignment
- Data merging
 - alignment between the telescope and the sensor
 - load FireDAQ root file into Corryvreckan
 - to be done after new reconstruction
 - time-frame issue (currently only timeframe 2 or 3 is taken)



Telescope & Sensor

- Gap of event between sensor channels
- The gaps are used to manually align telescope and sensor



Telescope

Shan Huang posted on 23. Aug. 2022 14:03h – last edited by Shan Huang on 02. Oct. 2022 17:01h

At DESY Testbeam, a EUDET-type pixel detector system, namely the telescope is provided.

The telescope consists of a series of (parallel) ALPIDE sensors to determine the track of the (one, normally) incoming electron from the testl electron's hit on the under-test sensor.

The information from telescope is stored in EUDAQ "raw-data" files.

Check the user manuals of EUDAQ and Corryvreckan for installation requirements. If the server/computer is compatible with CVMFS, several

EUDAQ (version 2+)

Install EUDAQ

```
1 # Pulling source codes
2 git clone https://github.com/eudaq/eudaq.git
3 # Compiling EUDAQ
4 cd eudaq
5 mkdir build && cd build
6 cmake -DUSER_TLU_BUILD=ON .. # use cmake to check other options, if needed
7 make install # use -j[n] option to parallel compile (n = number of compiling cores)
```

Altel (outdated from TB22)

Adenium

Install Adenium

```
1 # Pulling source codes
2 git clone https://gitlab.desy.de/beam-telescopes/adenium.git
3 # Compiling Adenium
4 cd adenium
```

<https://confluence.desy.de/display/luxeecal/Telescope>

<https://github.com/shan-yamabuki/>

[TBTelescope-Configure](#)

<https://github.com/LUXEsoftware/>

[TBTelescope-TrackingInfo](#)

Instructions by Roma for TB2020

<https://github.com/RomaBugiel/FLAME/>

[tree/main/FLAME_clustering](#)

Data (will be) available at ISS Bucharest server