ECAL-P Background

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21 Nov 2022

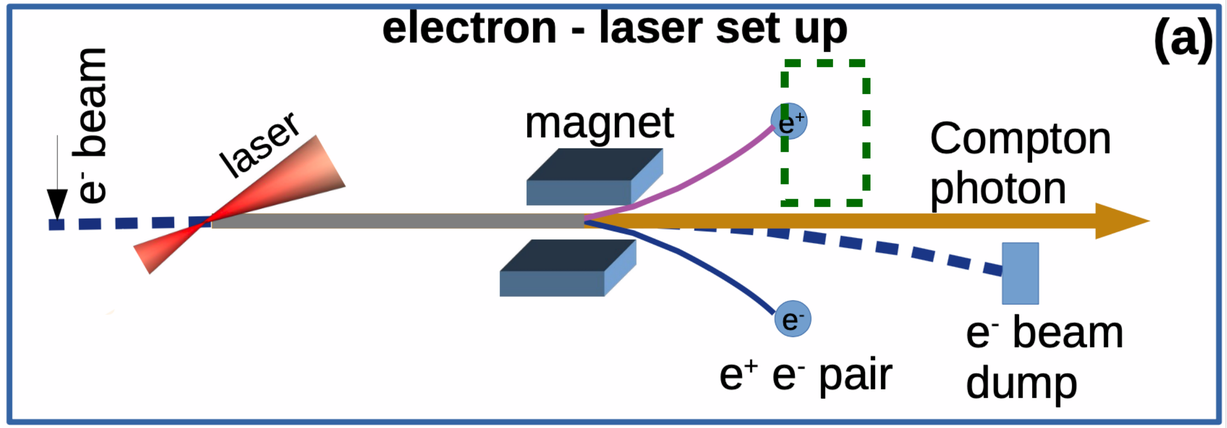
ECAL-P

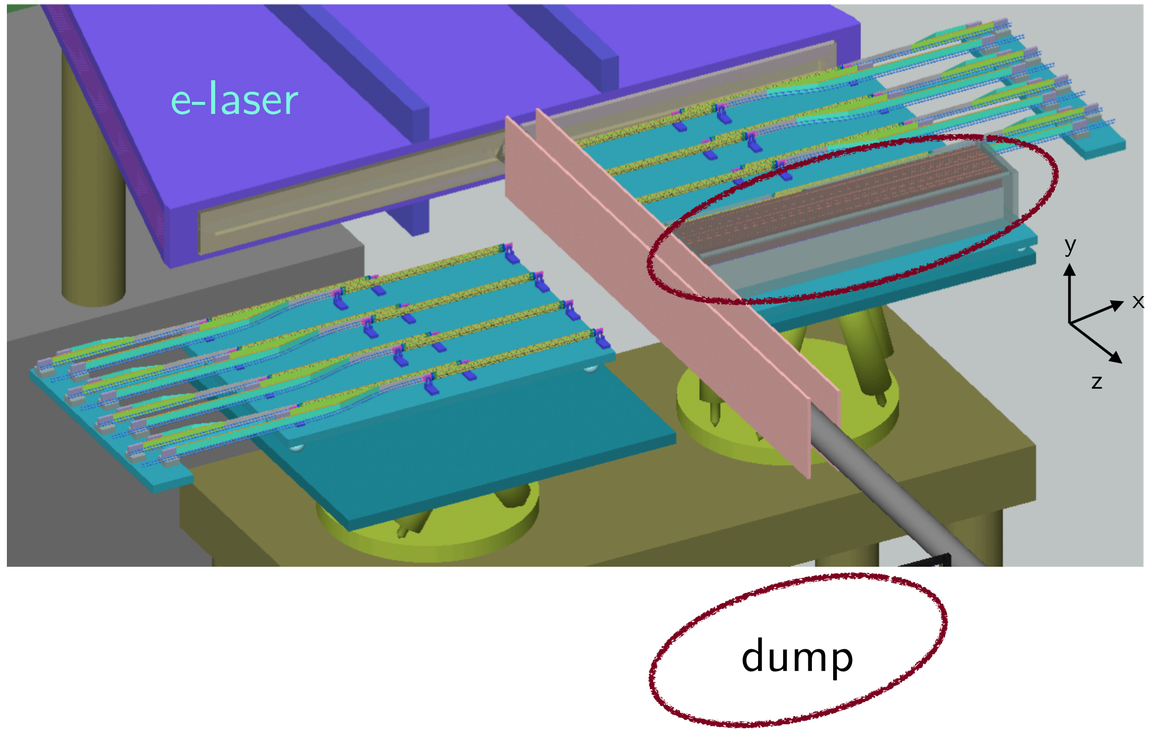
Electromagnetic calorimeter for positron

- SiW high granularity ECAL
- Pad size: 5.5 x 5.5 mm^2 (20% smaller in sim.)
- ECAL size: 100 x 10 pads (110 x 11 pads in sim.)
- z = 4.4 m (z = 0 for IP)

Hadronic background (not considered in the CDR):

- Slightly increased for upstream BG
- Serious downstream BG from electron dump
  - z = 7.5 m (about 10 ns from ECAL)
  - ion shielding
  - BPE neutron absorber





Background & Time cut

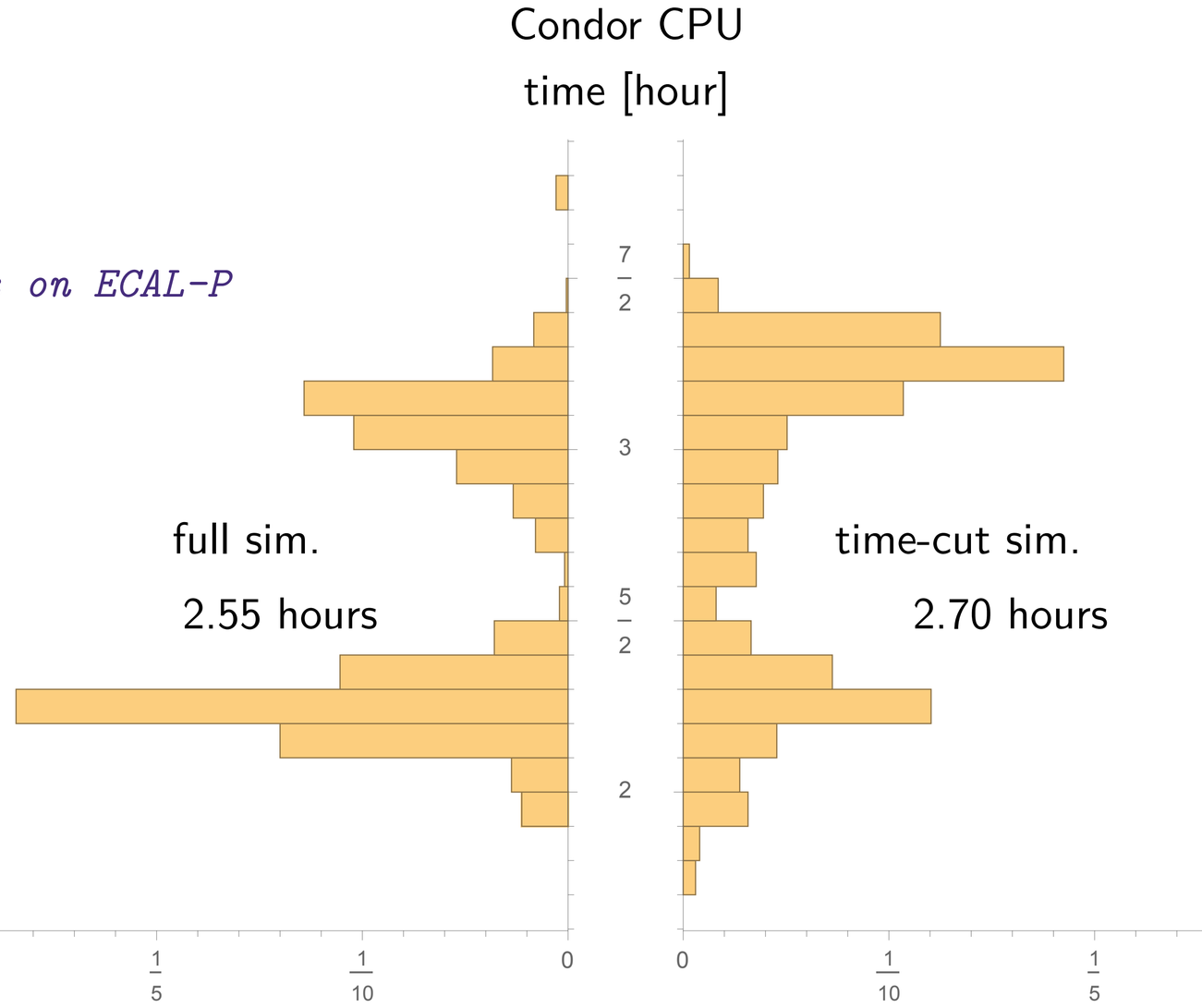
Electromagnetic calorimeter for positron

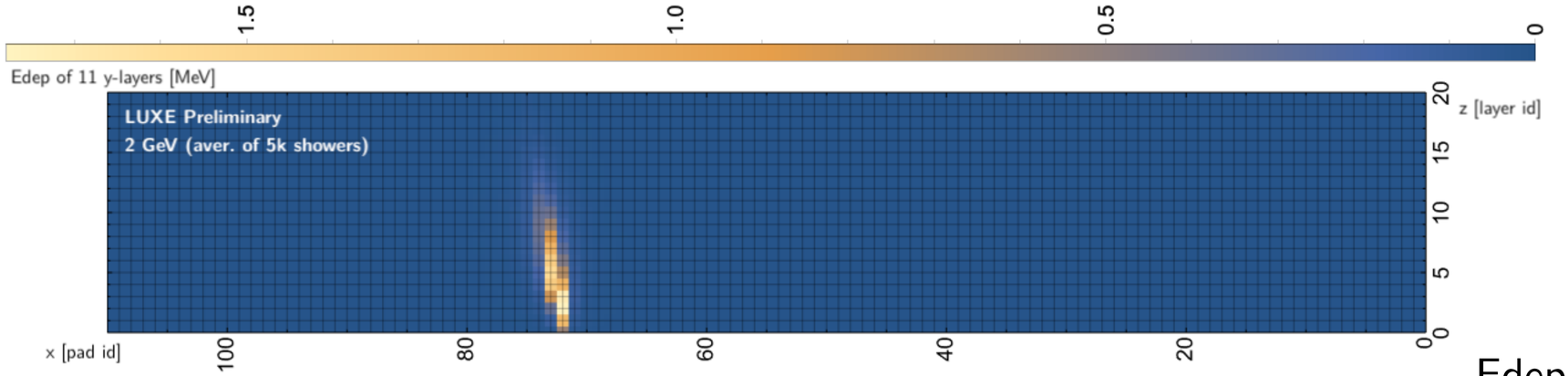
- Timing cut applied at 100 ns (= 10 + 90 ns)
- Most background ejected *after positron hits on ECAL-P*
- Not enough statistics...
  - not many neutrons over 100 MeV

Fast sim. (killed at dump)	Full sim. (w/o shielding)	Full sim. (fully shielded)
7.45 BXs	2.13 BXs	0.46 BX

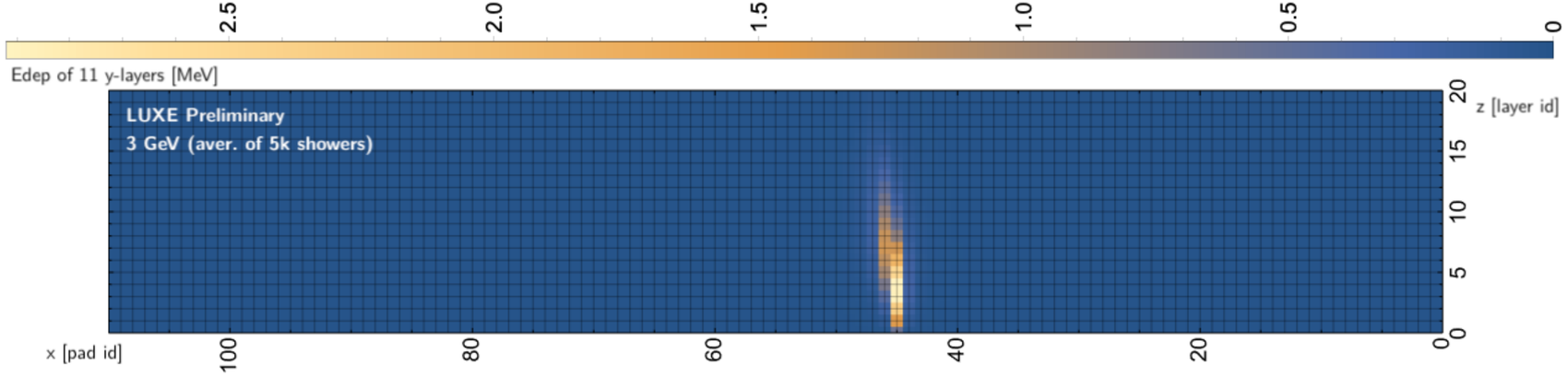
At ATLAS-IL cluster during the past two weeks

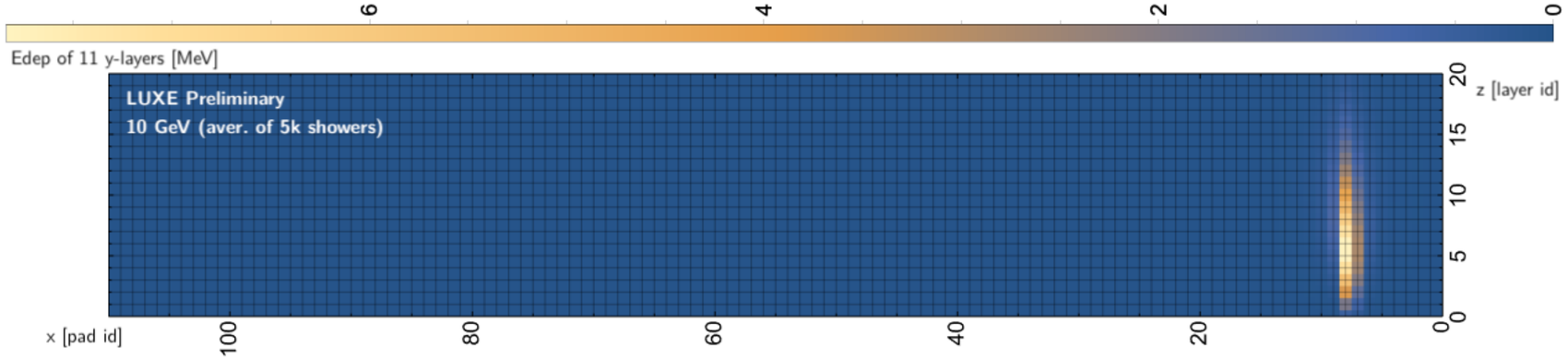
- 0.01 BX full sim.
- 0.03 BX time-cut sim. (at 1000 ns)



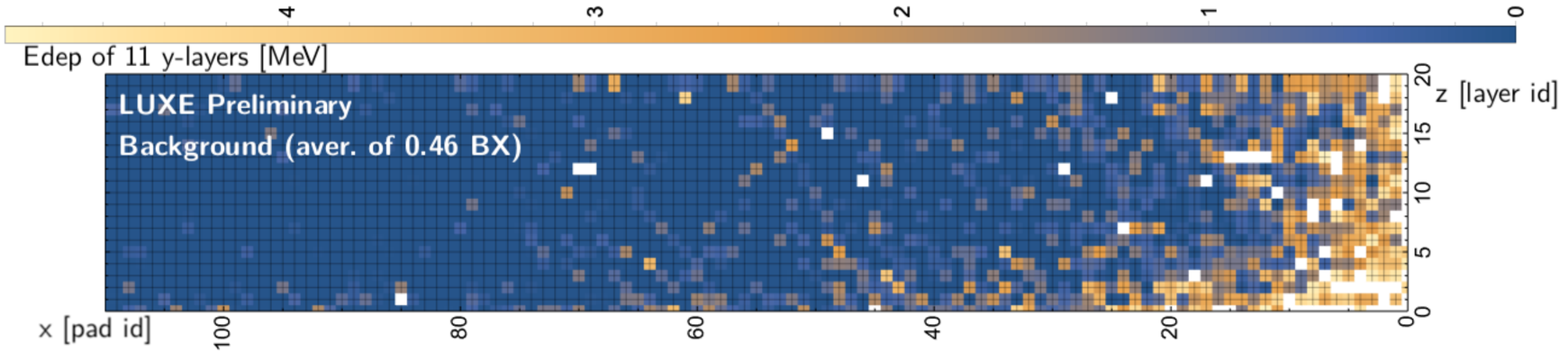


$$\text{Edep(total)} = \text{E0}/85$$

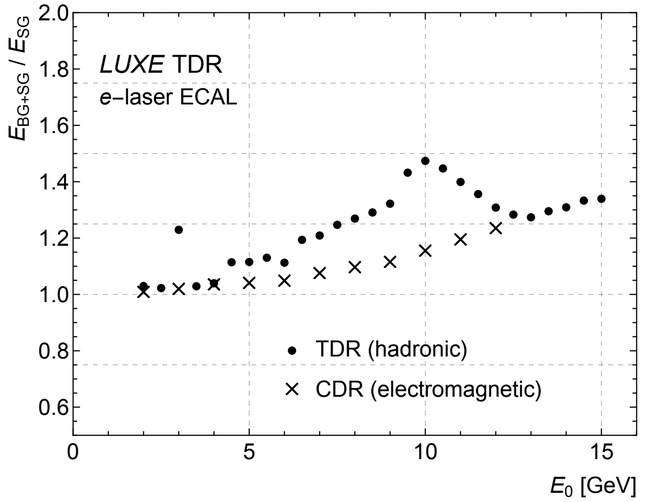


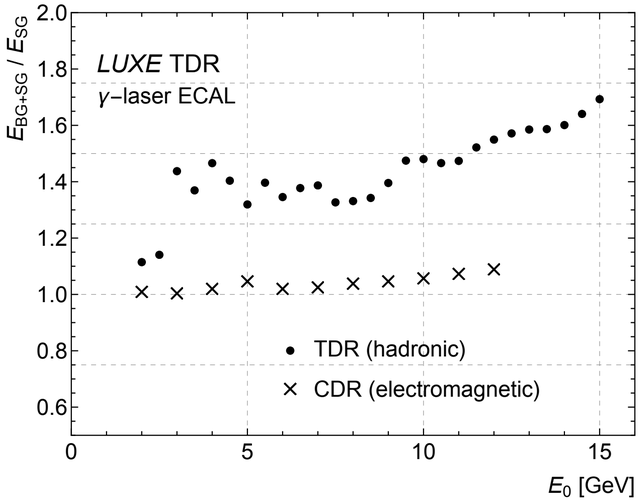


Background & Time cut



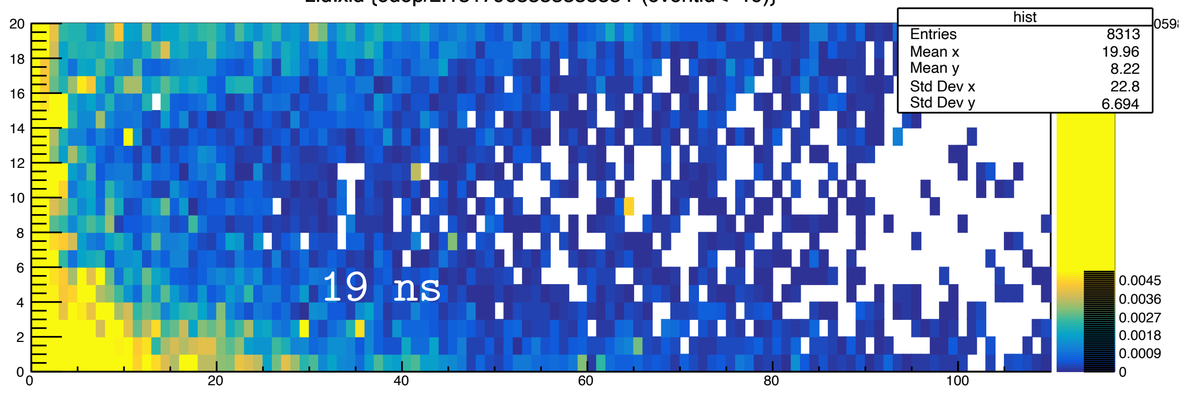
Huge Edep from one hit!

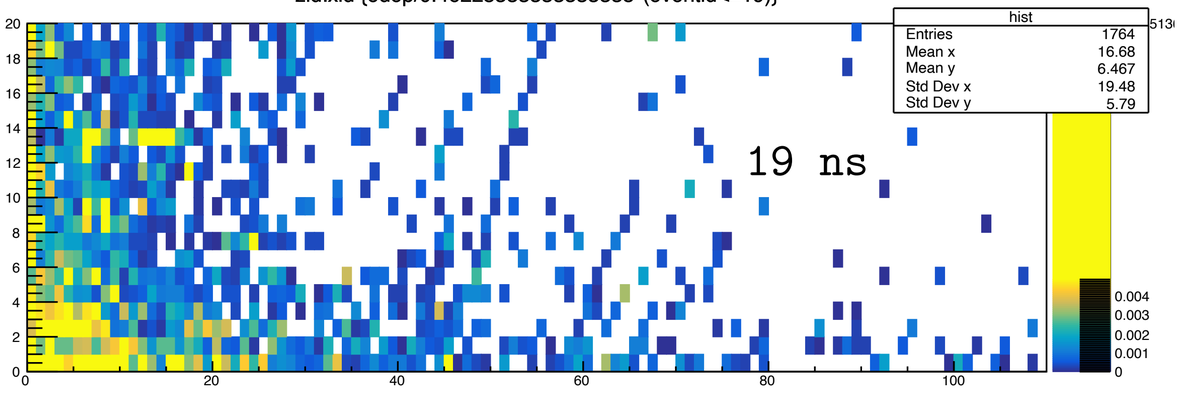




Magnetic-geometric dependency

$E = 160 / xid$

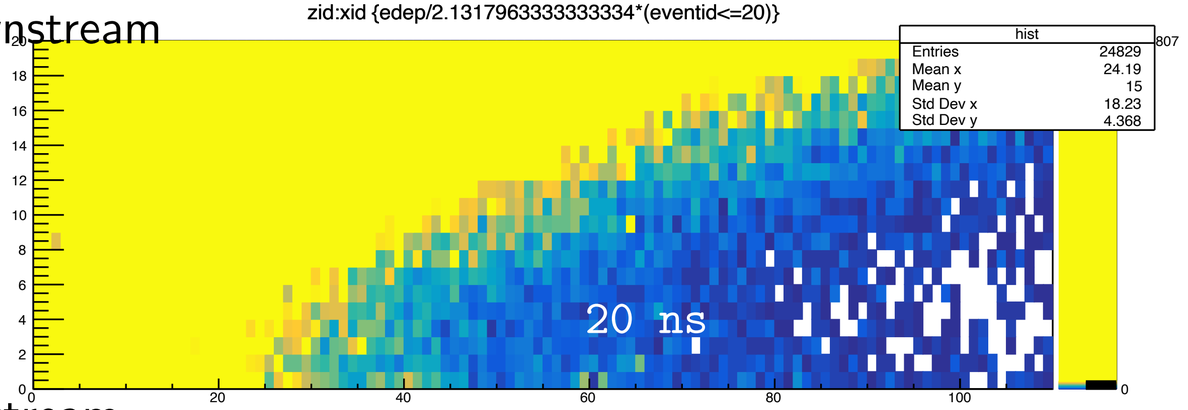


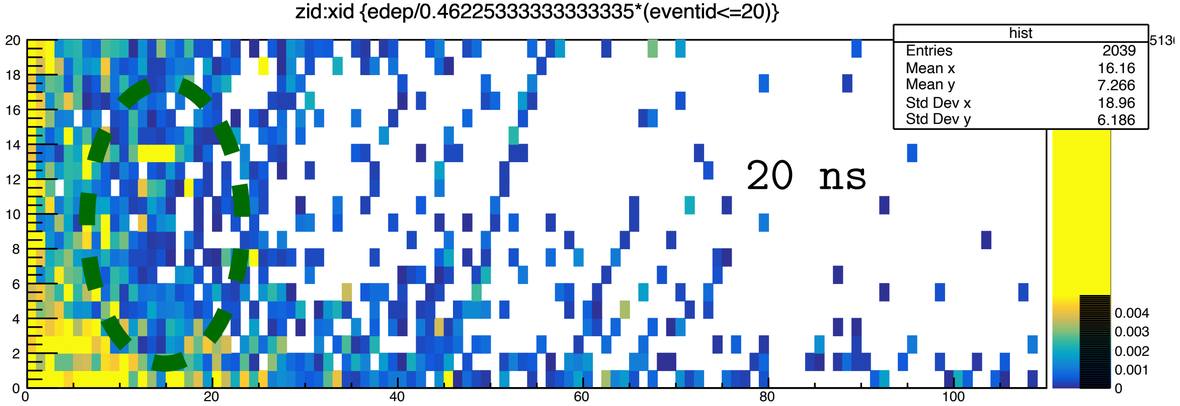


Full simulation w/o shielding

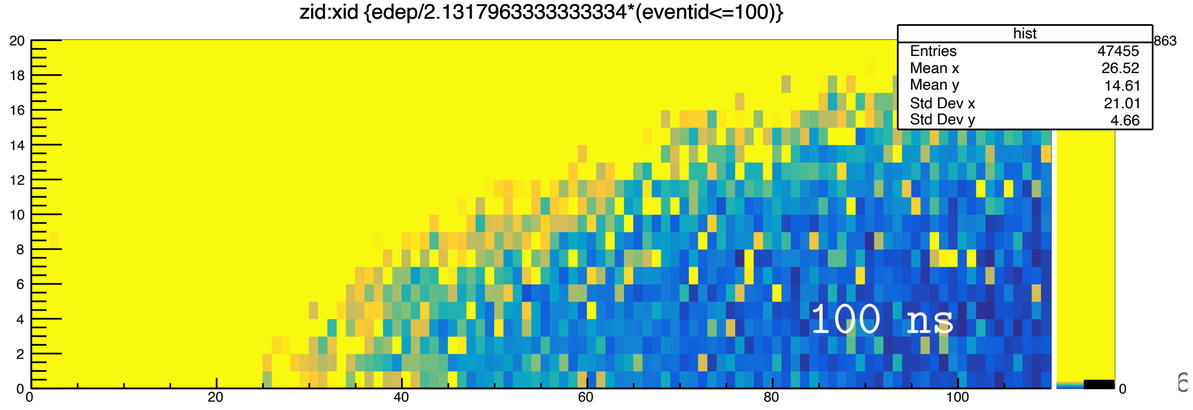
Full simulation with proper shielding

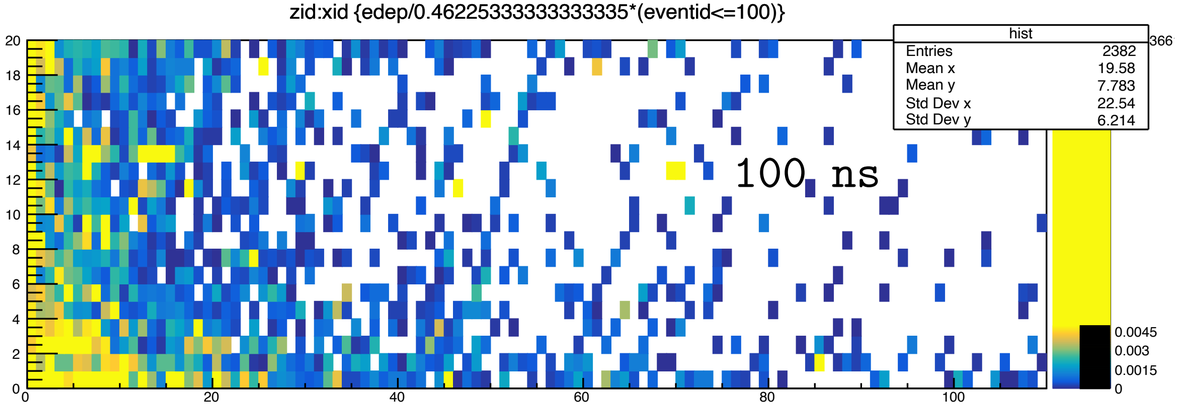
Downstream



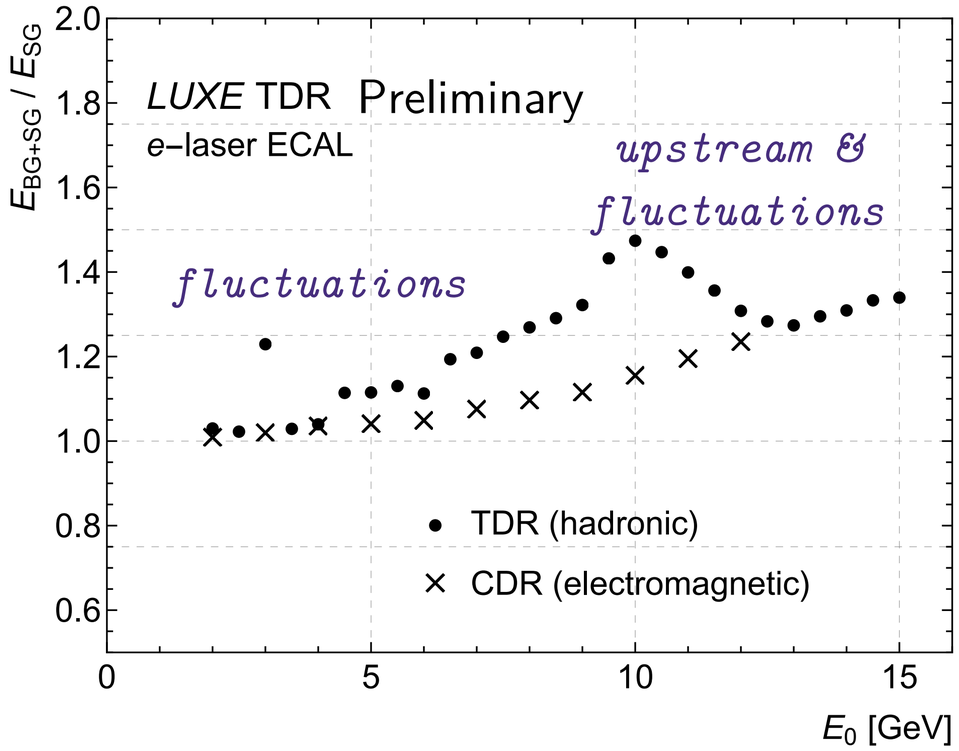


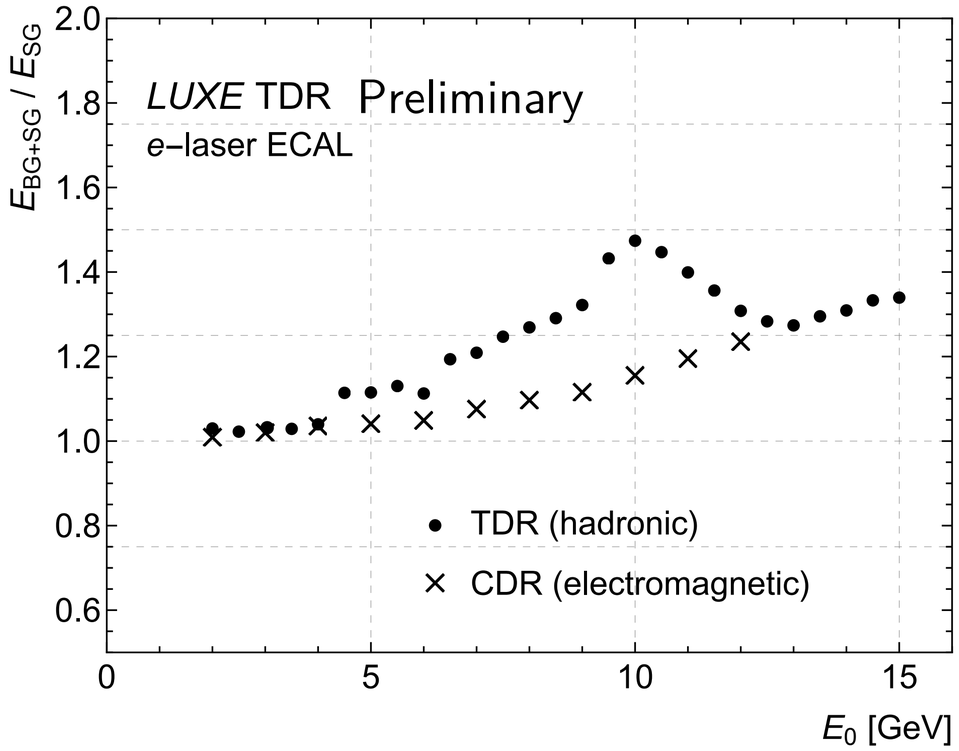
Upstream





Temporary fix…





Summary

- Fluctuation causes the structures in background-over-signal ratio
- Simulation underway
  - as a calibration of future fast simulation
  - background fluctuation needs to be studied for ECAL reconstruction
- Temporary fix: remove the out-of-blue hits from background simulation
  - error bars needed
  - “fast” neutrons may need to be absorbed