ECAL reconstruction
based on reduced sizes

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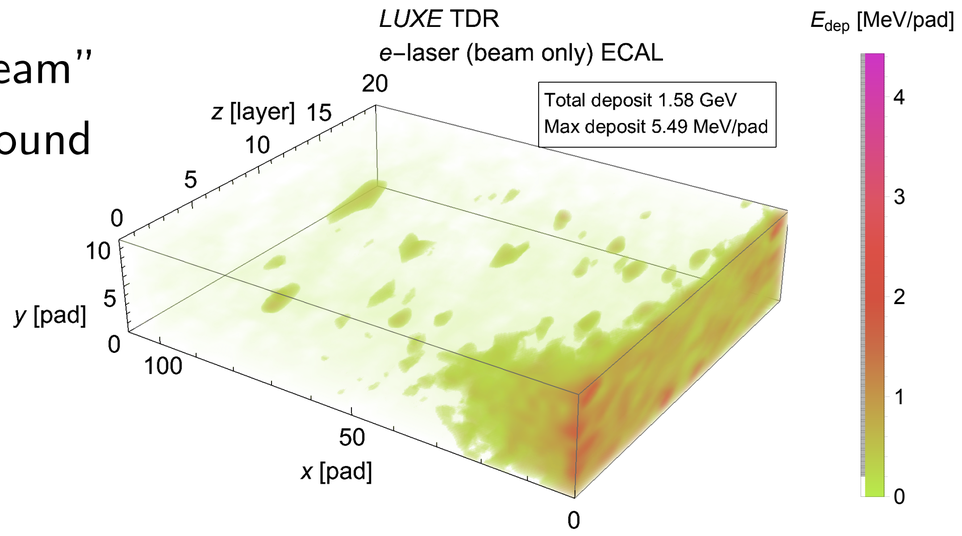
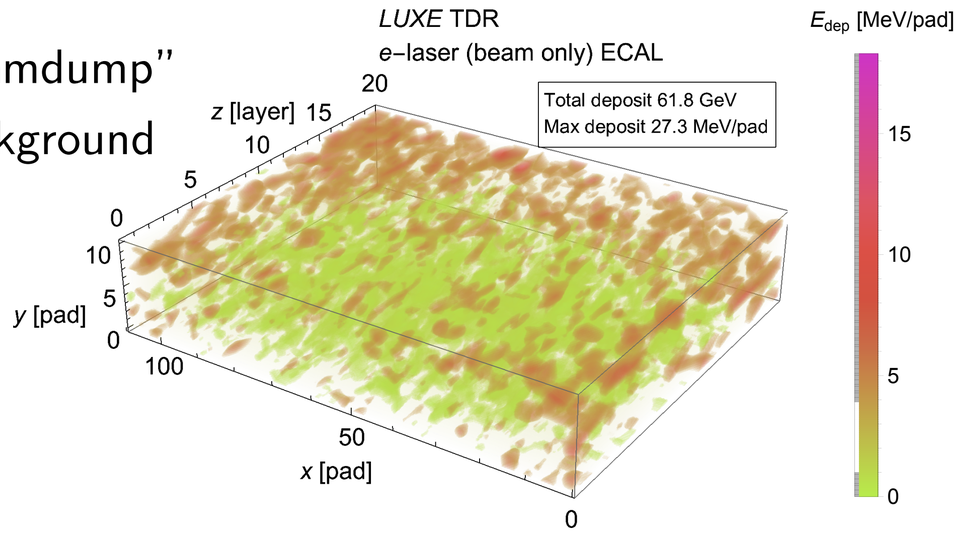
“Upstream” background

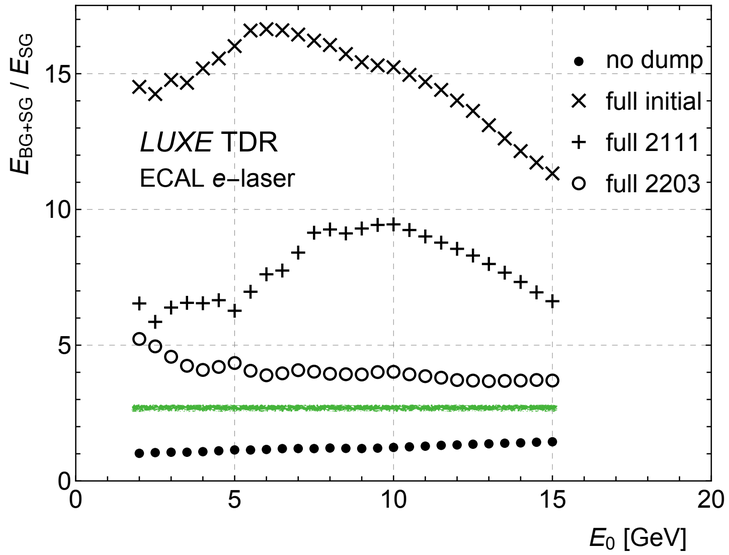


“Beamdump” background



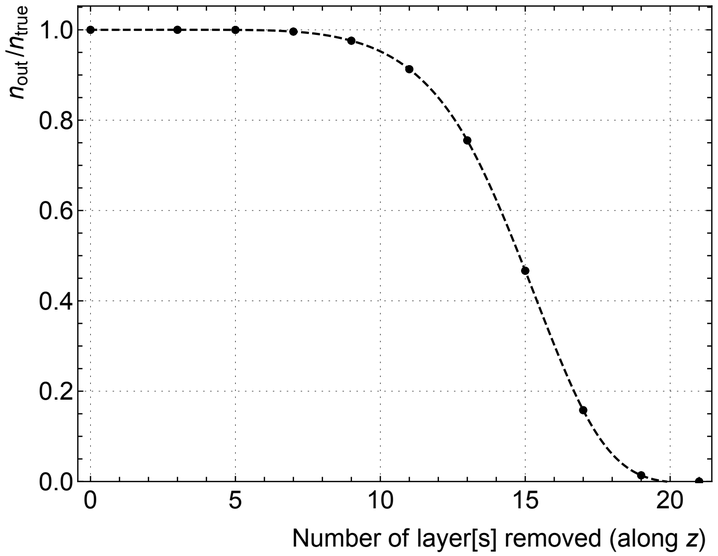
1. Background level
   - Upstream electron scattering: relatively low
   - Beamdump neutron scattering: high and disperse
2. Cost rise on sensor

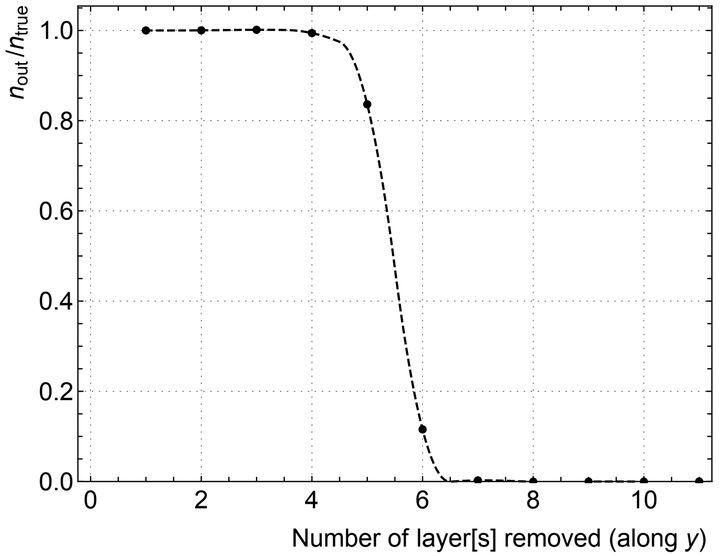
Use a partial of the ECAL for reconstruction



Early CNN reconstruction results

Sela, Huang, Horn. MDPI Algorithms 15 115 (2022)

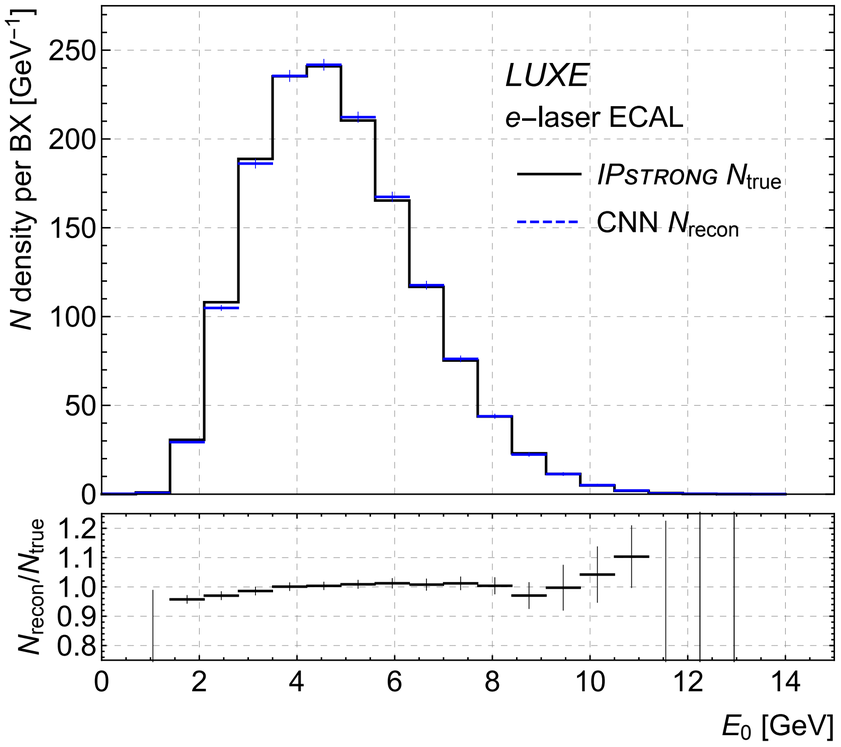




- Based on IPstrong data (907 BX)
- Randomly took a partial
  to train (729 BX) and test (178 BX)

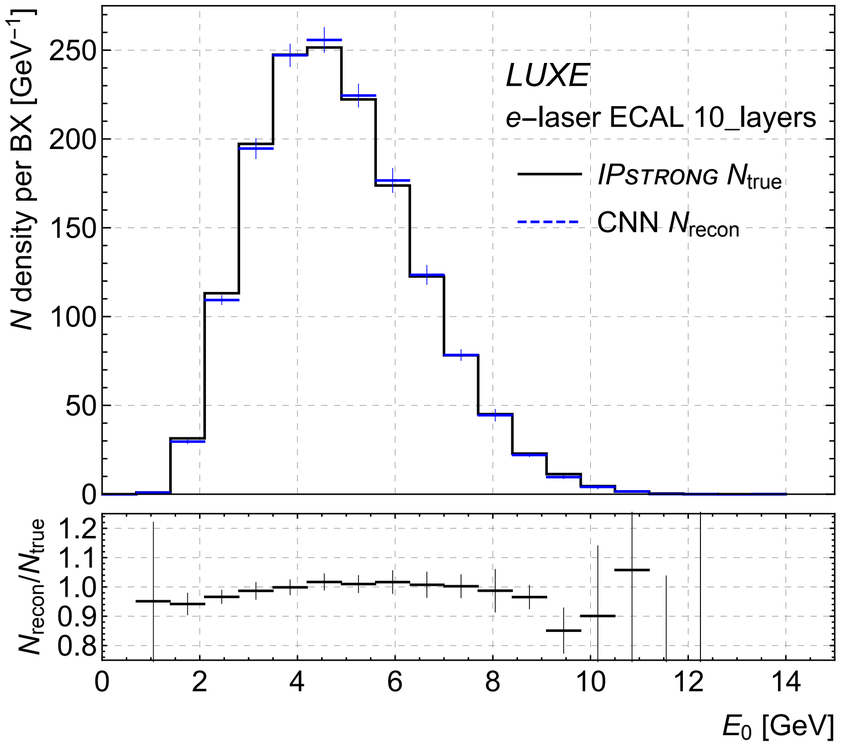
- Reconstruction of multiplicity with a reduced ECAL seems workable with machine learning using the convoluted neural networks
- Better than energy flow based on Edep resolution

CNN spectrum reconstruction



Relative bias: (0.03 \pm 0.40)%

Relative chi2: (0.75 \pm 0.16)%

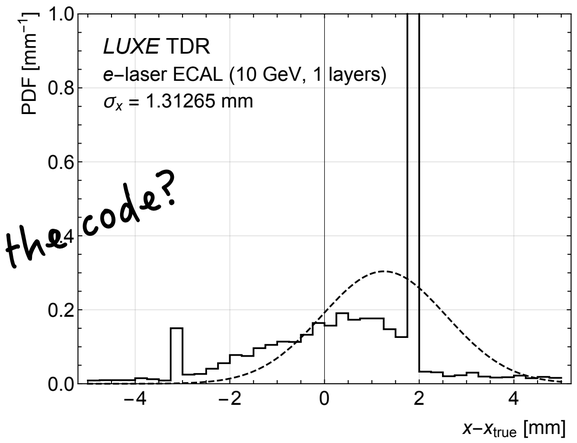


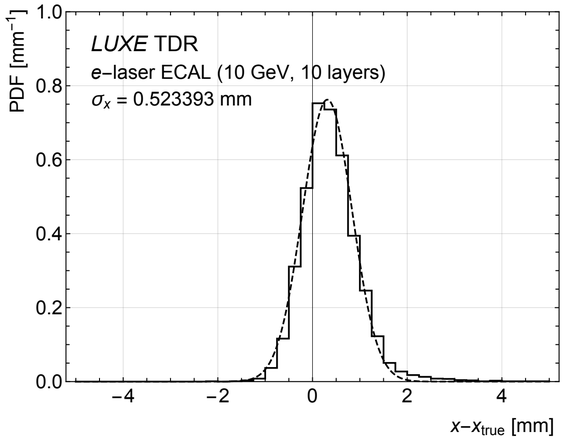
Relative bias: (-0.2 \pm 0.4)%

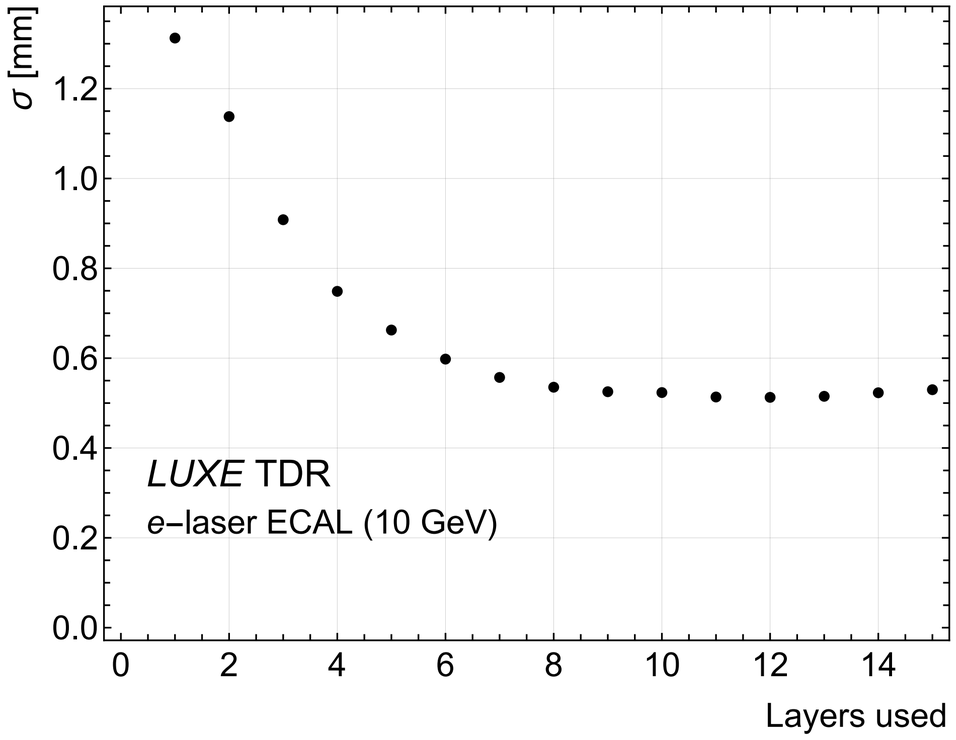
Relative chi2: (0.66 \pm 0.11)%

Position reconstruction

Some bugs in the code?

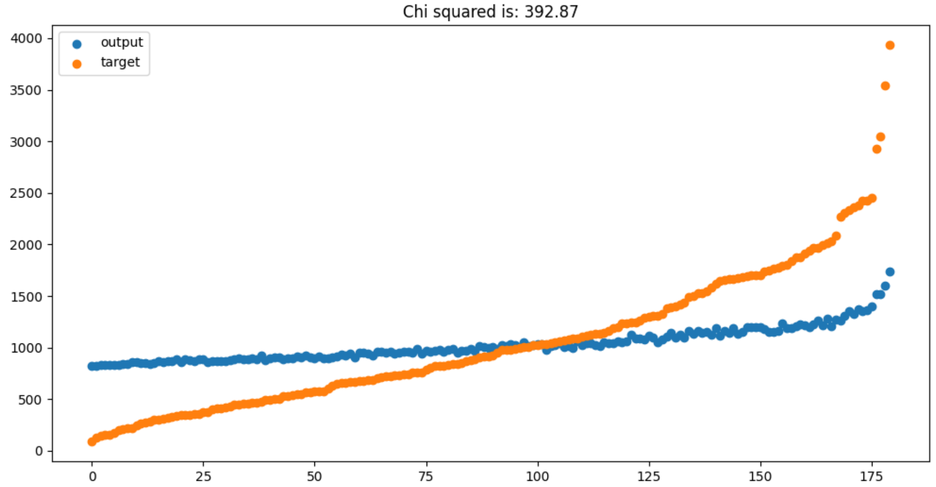




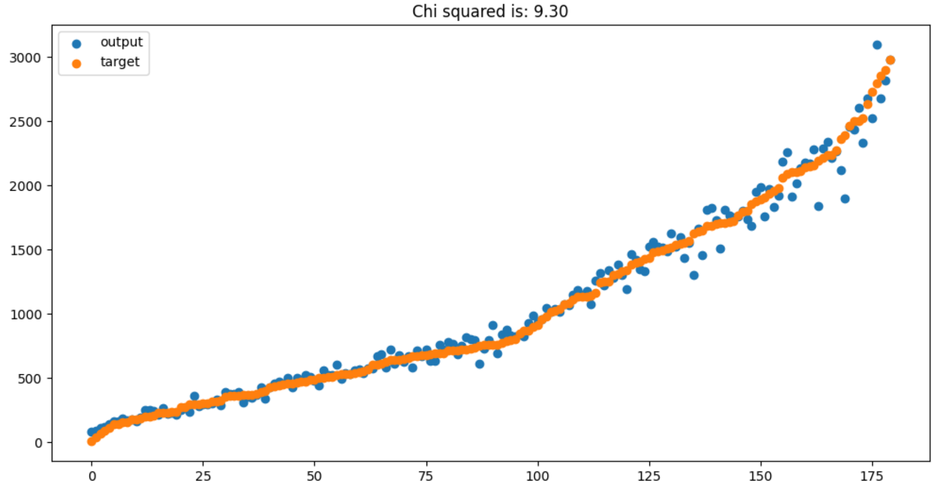


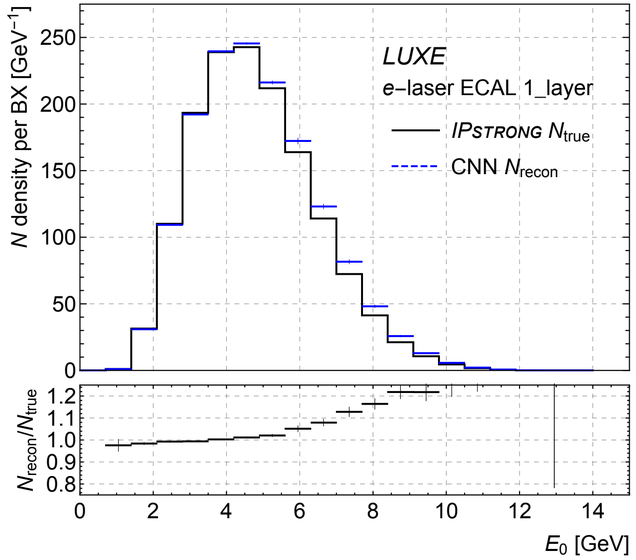
Conventional method based on weighted average

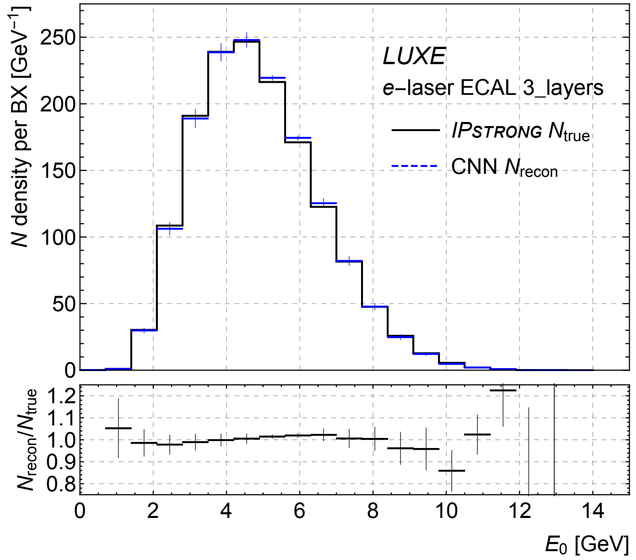
Multiplicity



Event label







Small number of layers leads to the average spectrum