NPOD background simulation studies update

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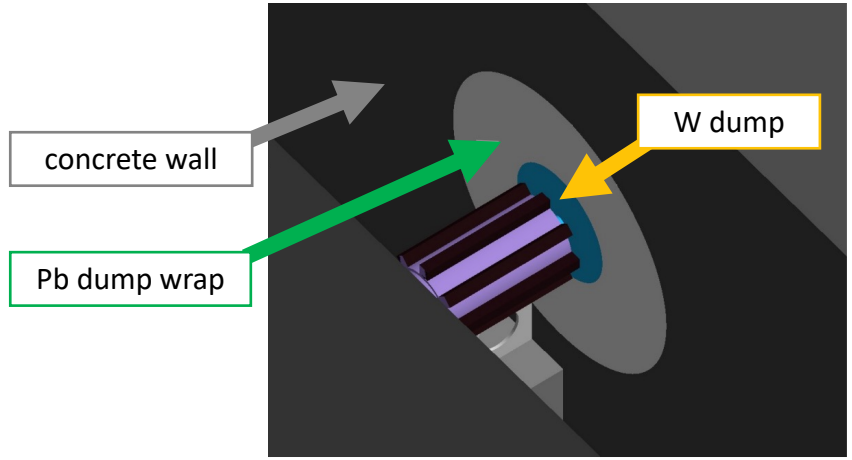
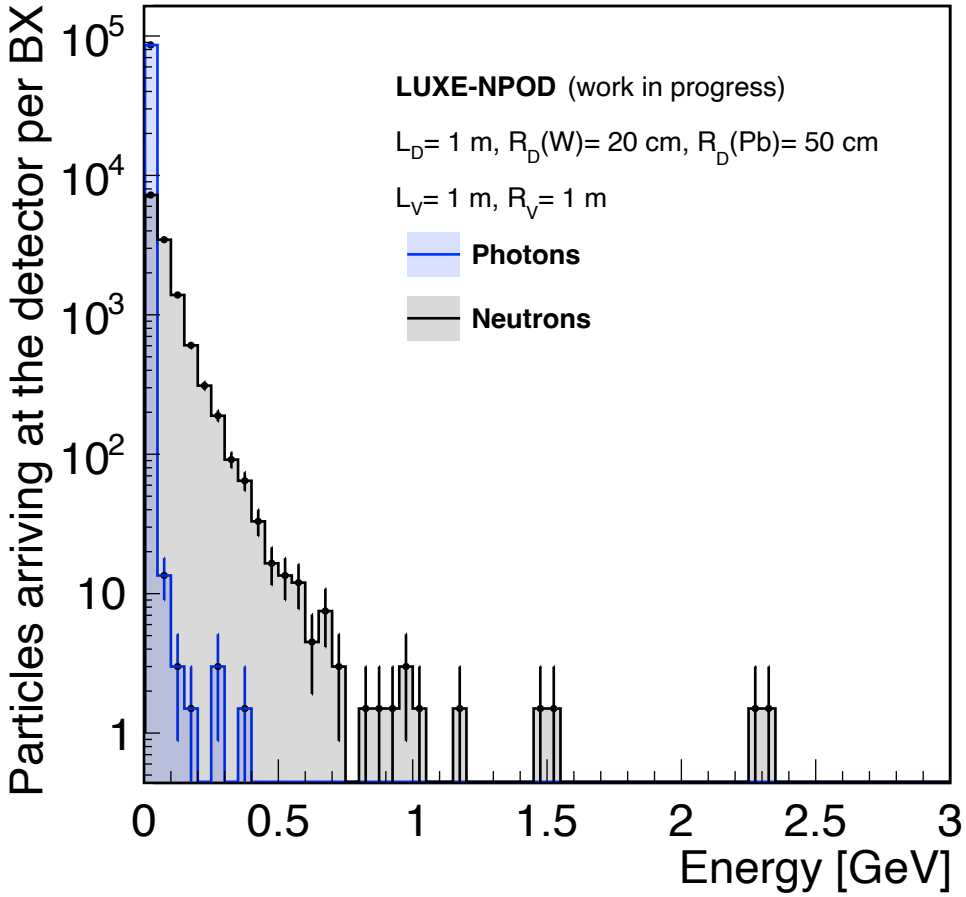
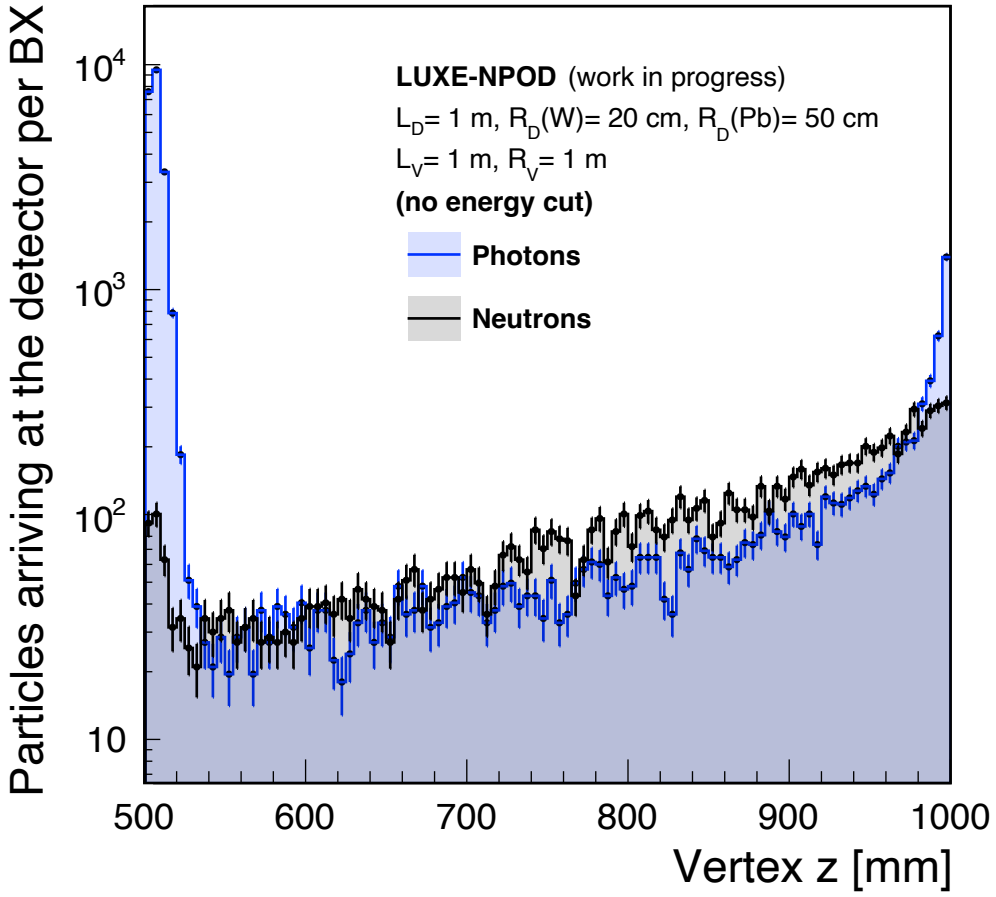
NPOD lxsim

- Dump geometry:
  - Tungsten dump, radius 20 cm, length 1 m
  - Lead dump wrap, radius 50 cm, length 1m
  - Enclosing concrete wall
  - No air insert, no hole in the front
- Physics list: `QGSP_BERT_HP`
- Simulated a total of 10 BXs



NPOD Background: neutrons & photons

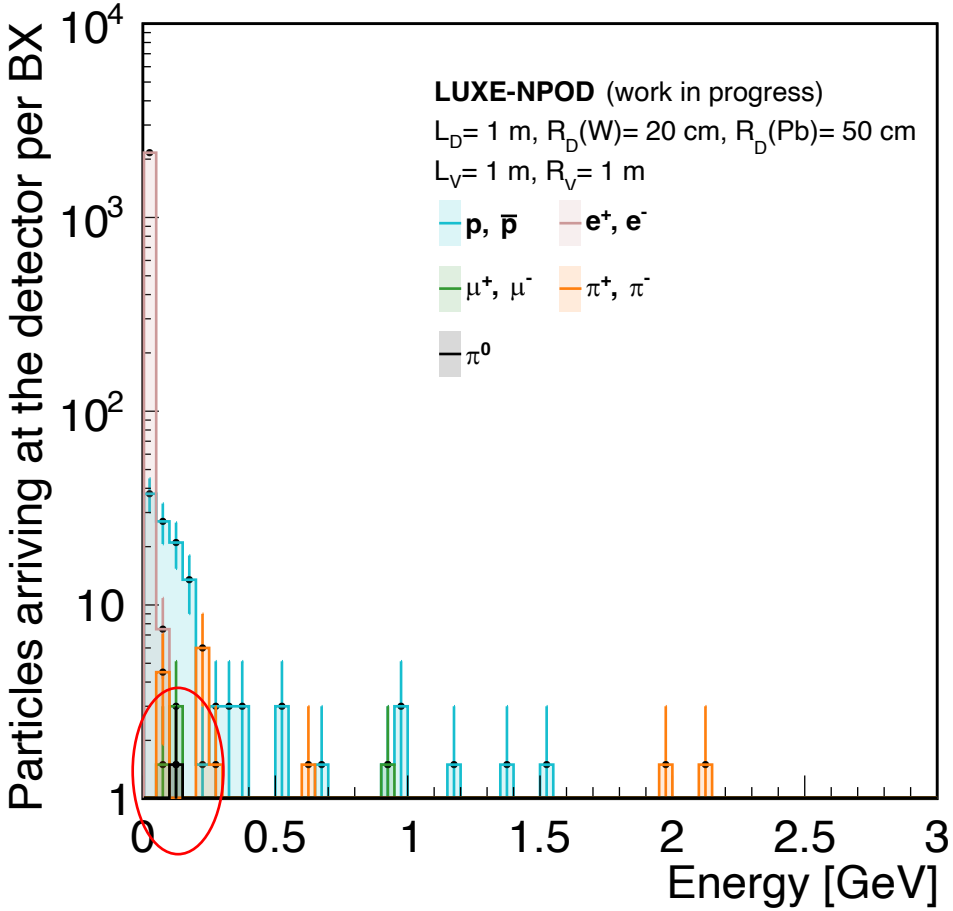


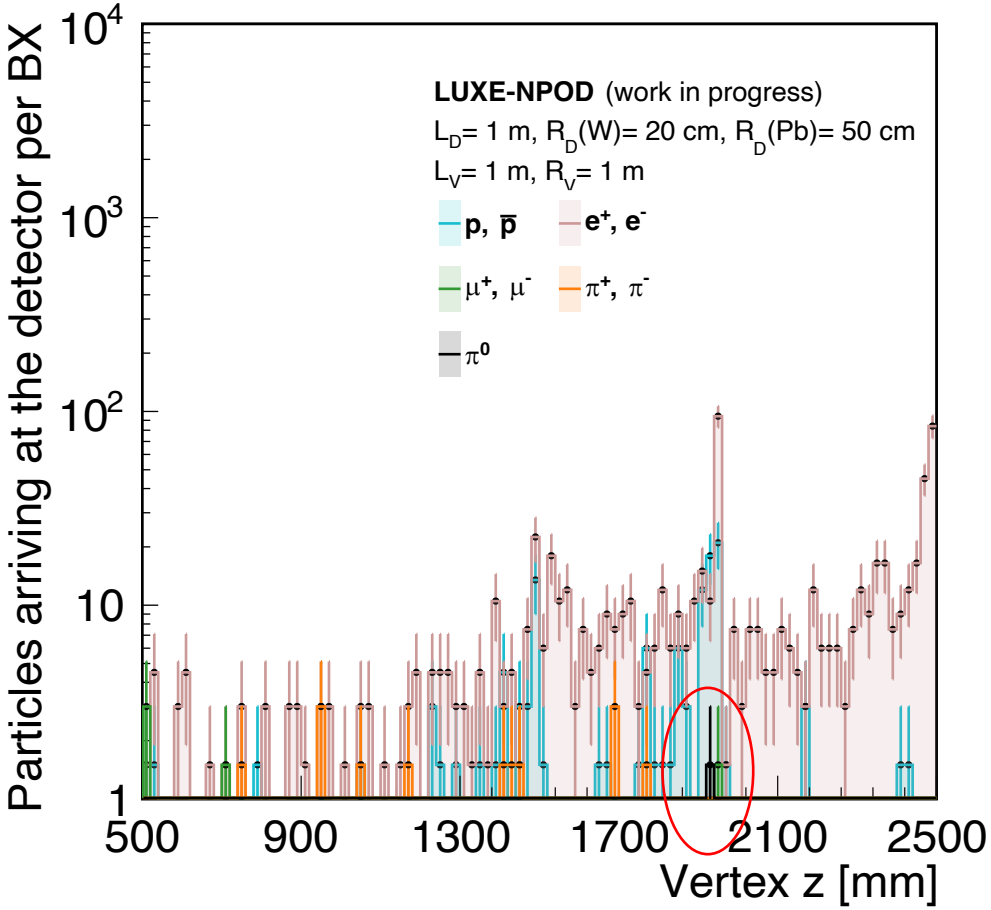


(Simulated 10 BXs)

NPOD Background: long-lived particles

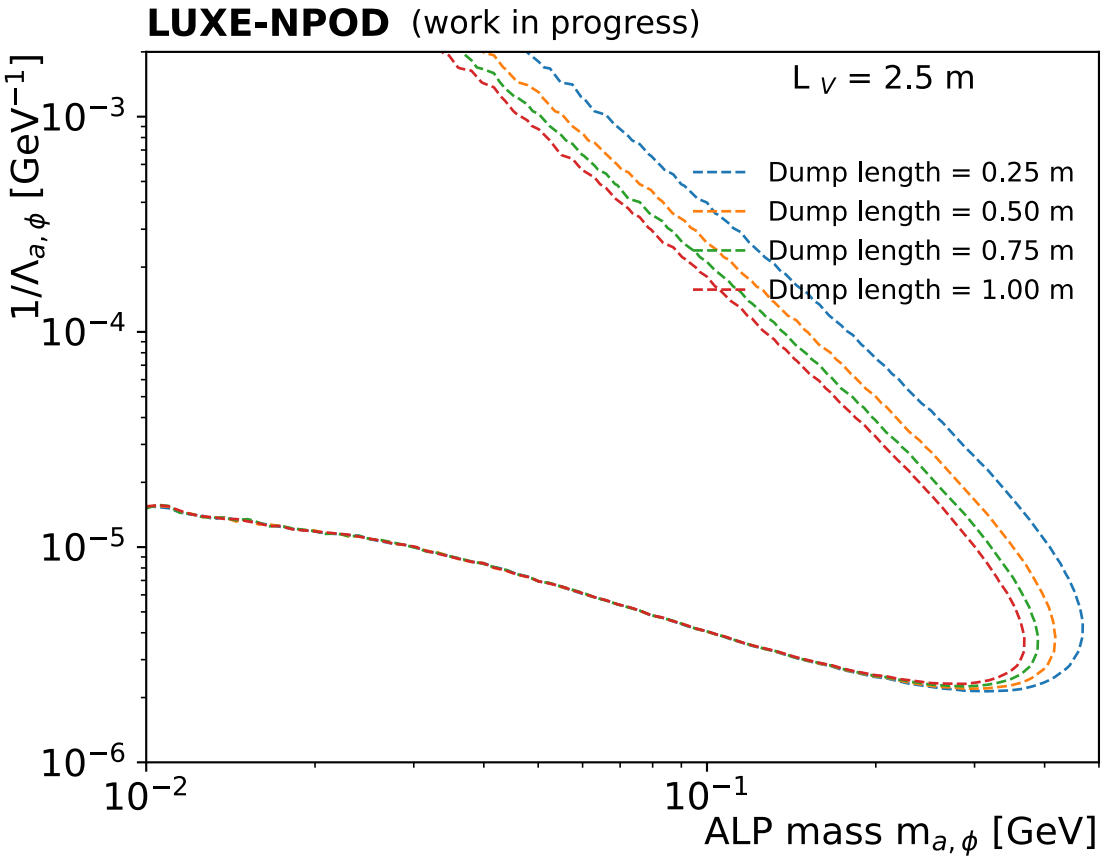
- Looked for long-lived mesons, only few π^0 were found

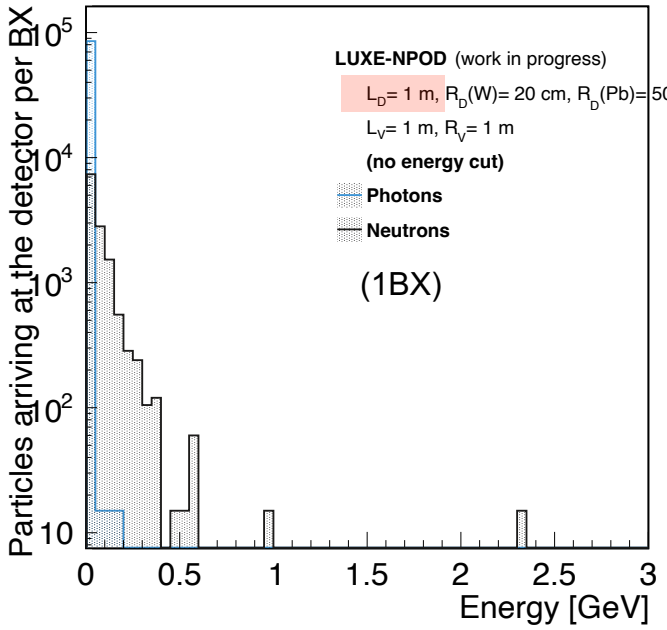


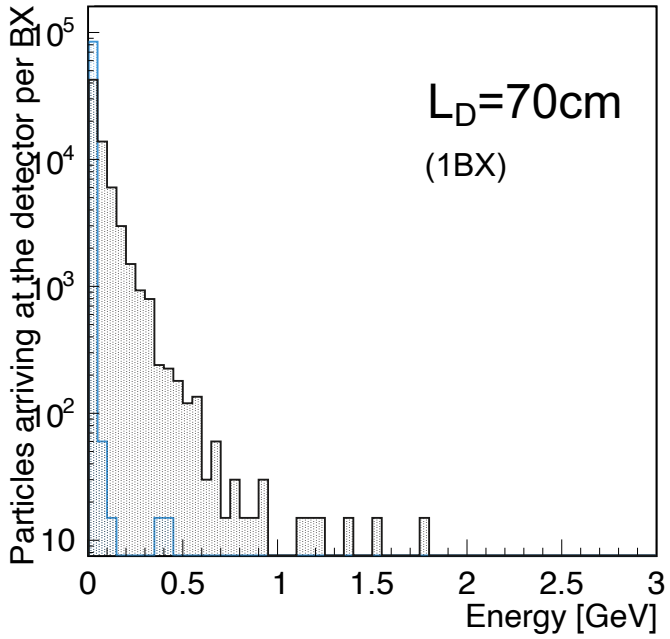


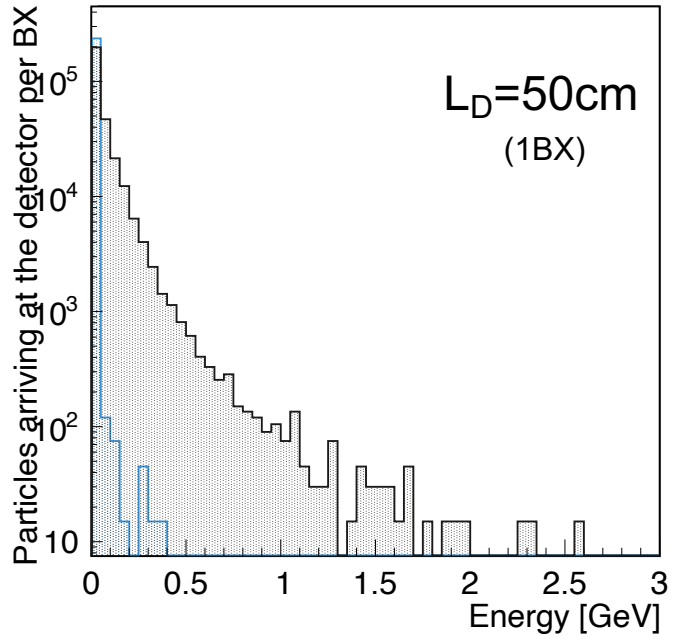
(Simulated 10 BXs)

Possibility of shorter dump?





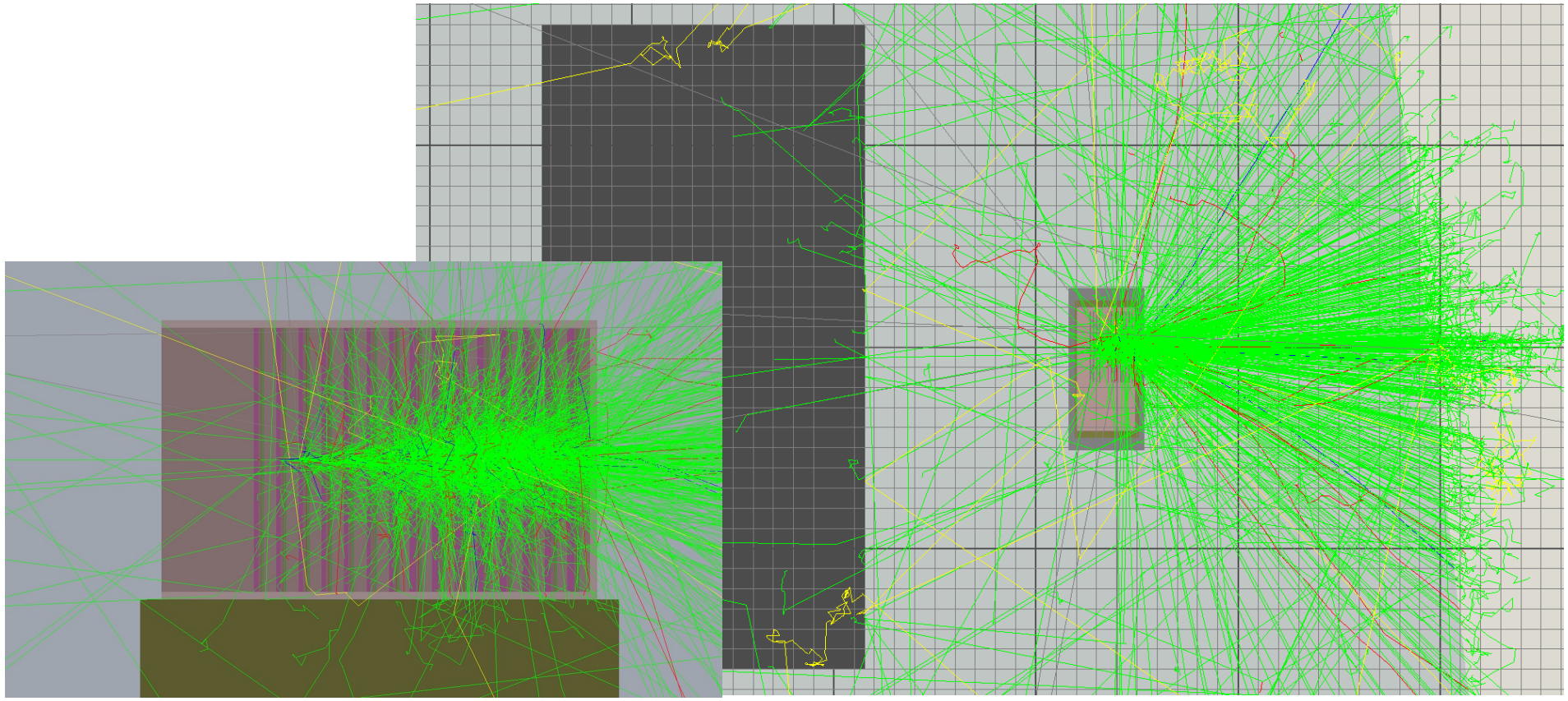




Signal enhanced for shorter dump ($R_{D\ (W+Pb)}$= 50cm), but increased background from neutrons

G4 simulation with ECAL as BSM calo

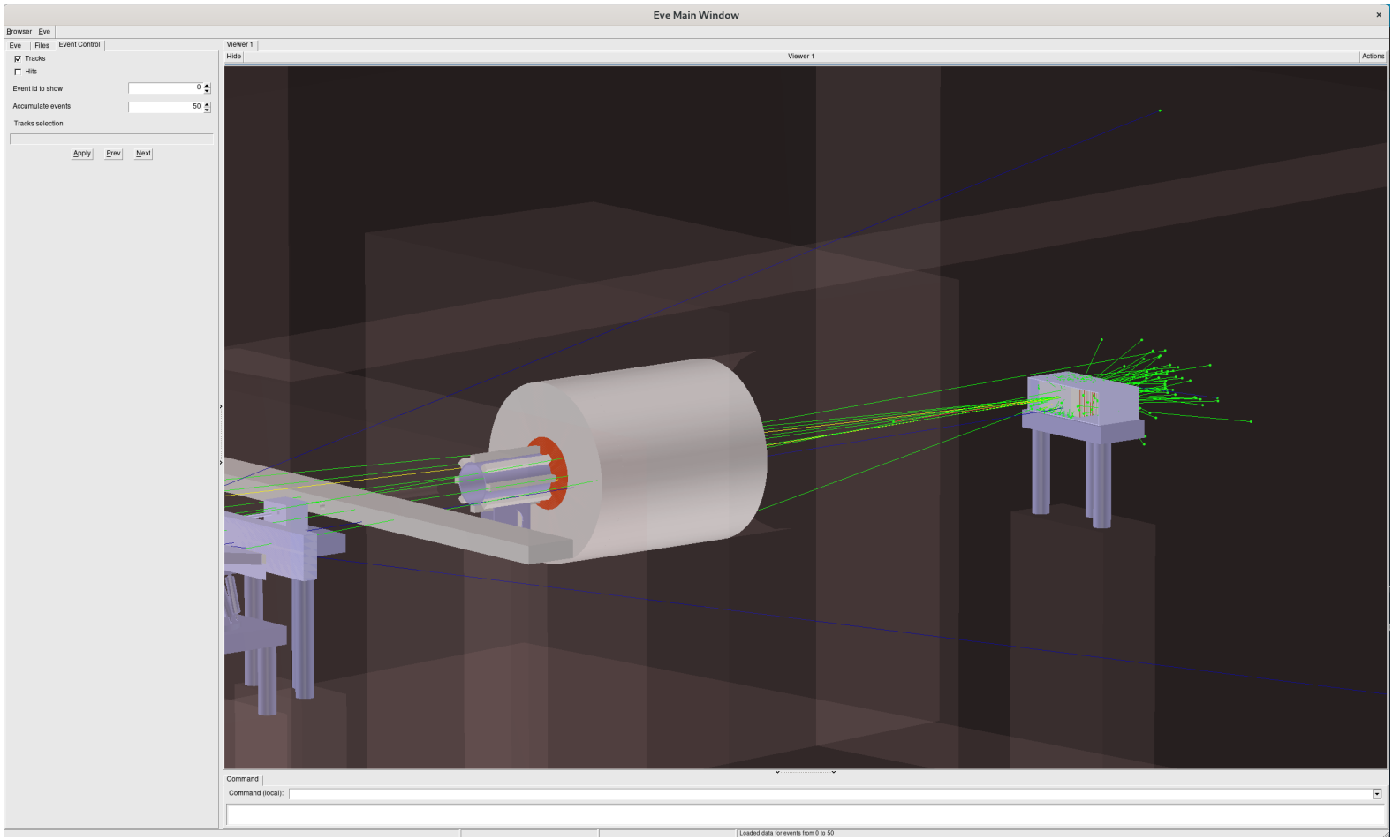
One photon event in calice Ecal, G4 display



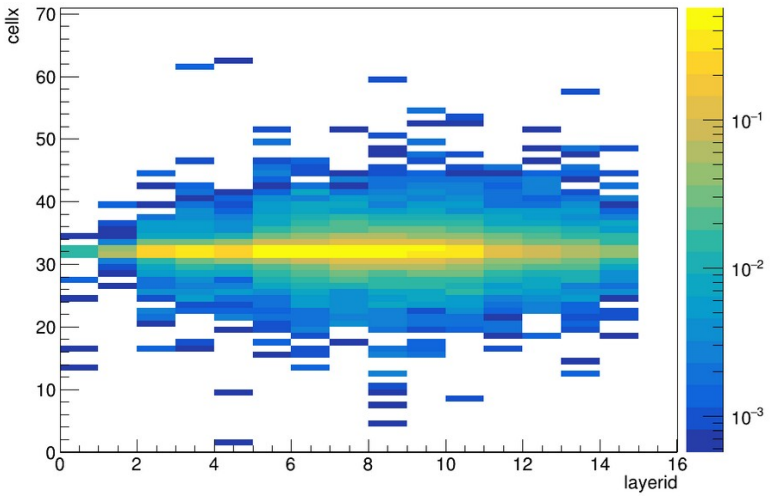
(plots from Sasha)

G4 simulation with ECAL as BSM calo

50 test events with photons of 10 GeV in front of calice ECal

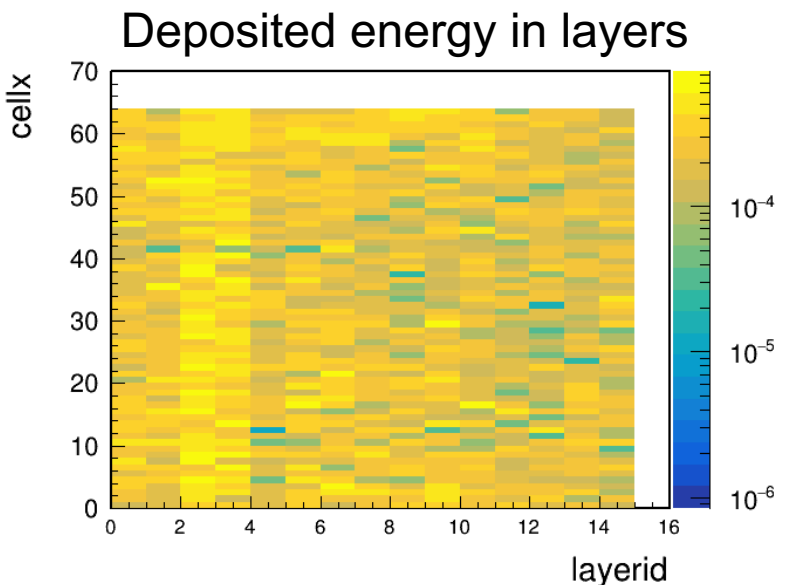


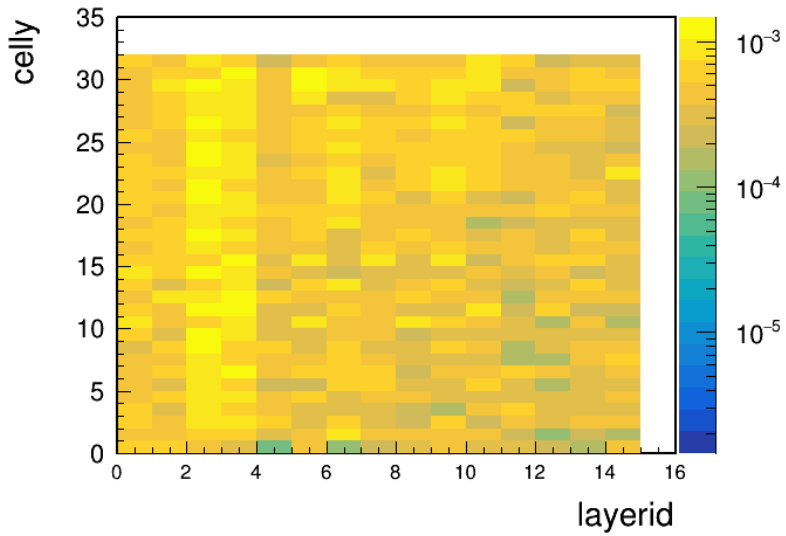
Deposited energy in layers

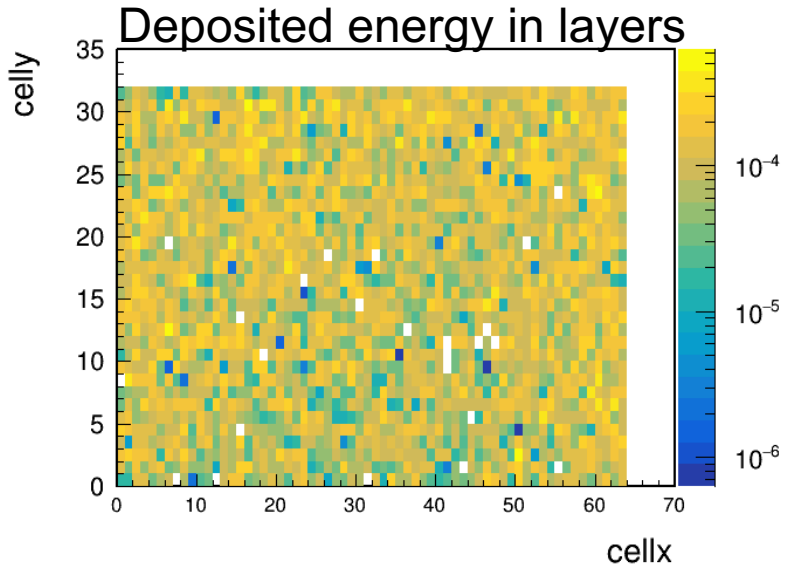


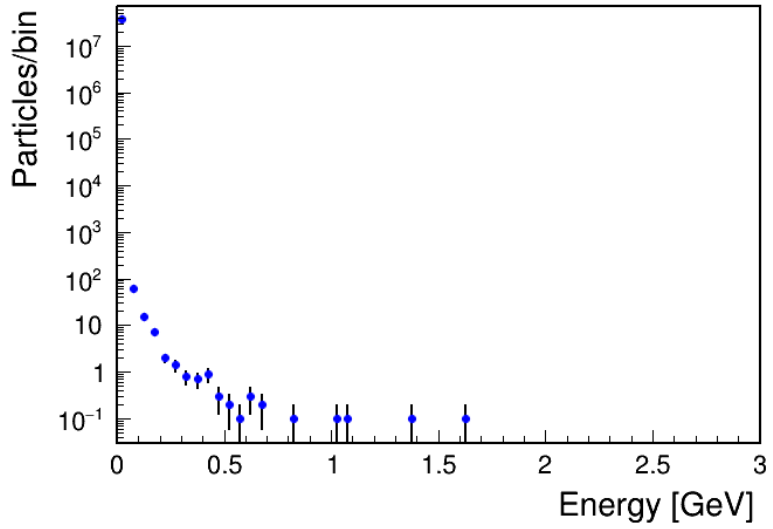
(plots from Sasha)

1BX background with ECAL as BSM calo









Outlook

- Ongoing g4 simulations for background and signal using ECAL-E as LUXE-NPOD calorimeter
- Ongoing photon reconstruction with Graph Neural Network
- Comparison of g4 background simulations with FLUKA?

Backup