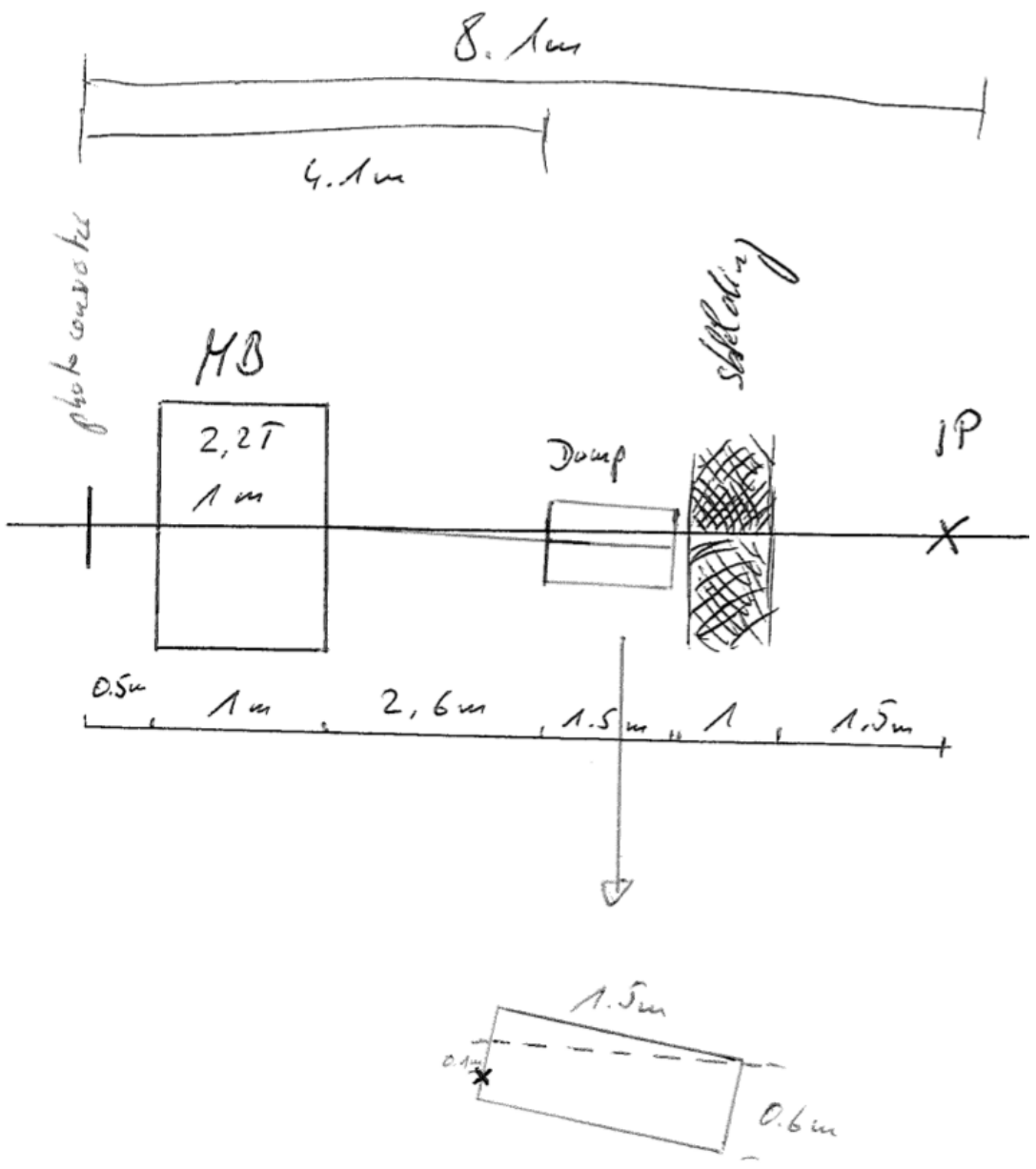
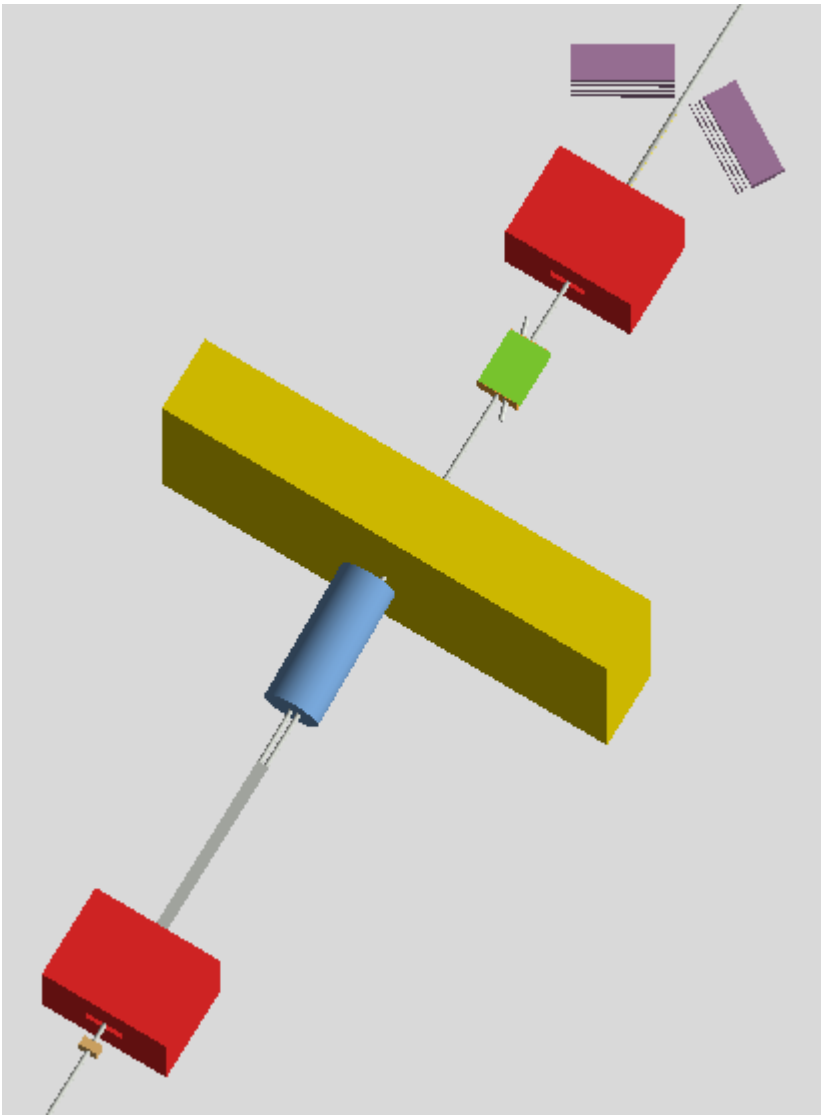
# LUXE Background Study in Simulation

Oleksandr Borysov

LUXE Meeting
July 23, 2019

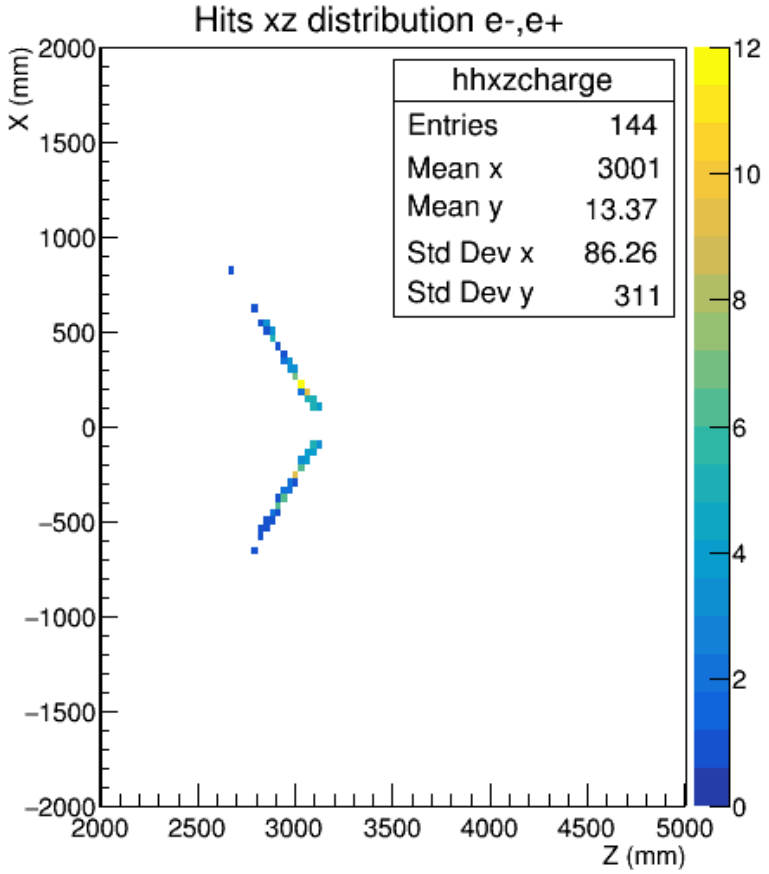
# Sketch and Geant4

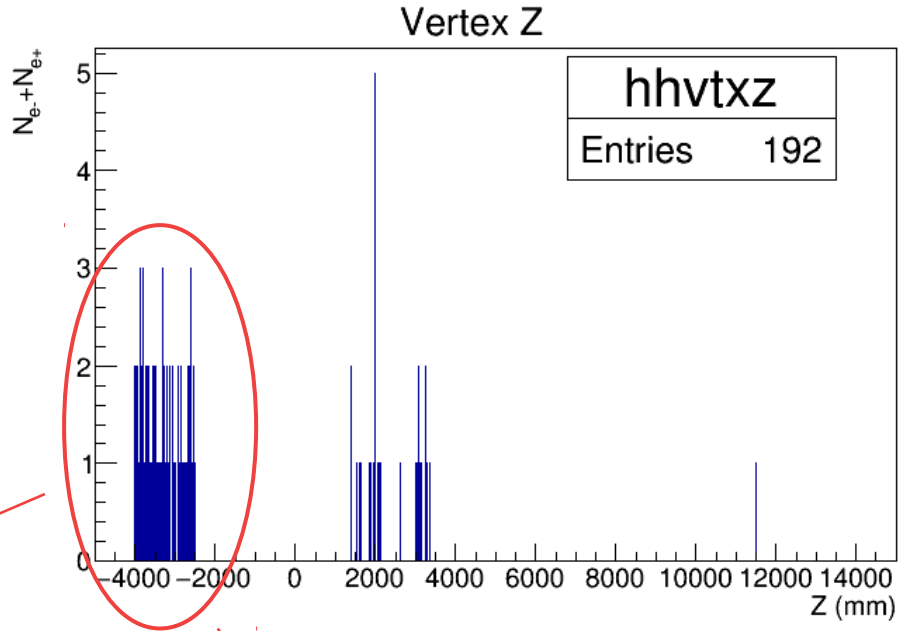


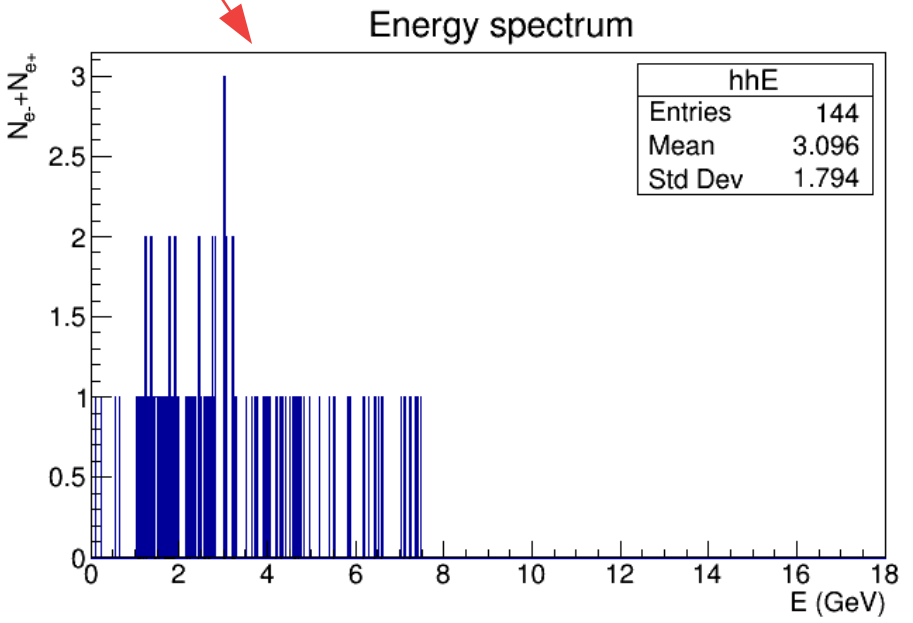



# Hits with origin in collimator

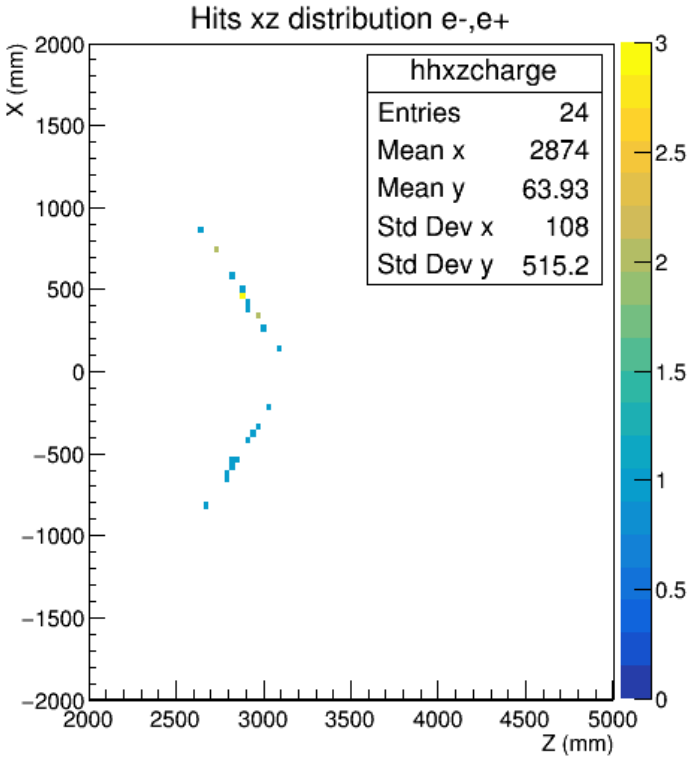
10.72 M electrons of
17.5 GeV
with 35 μm tungsten target
were simulated

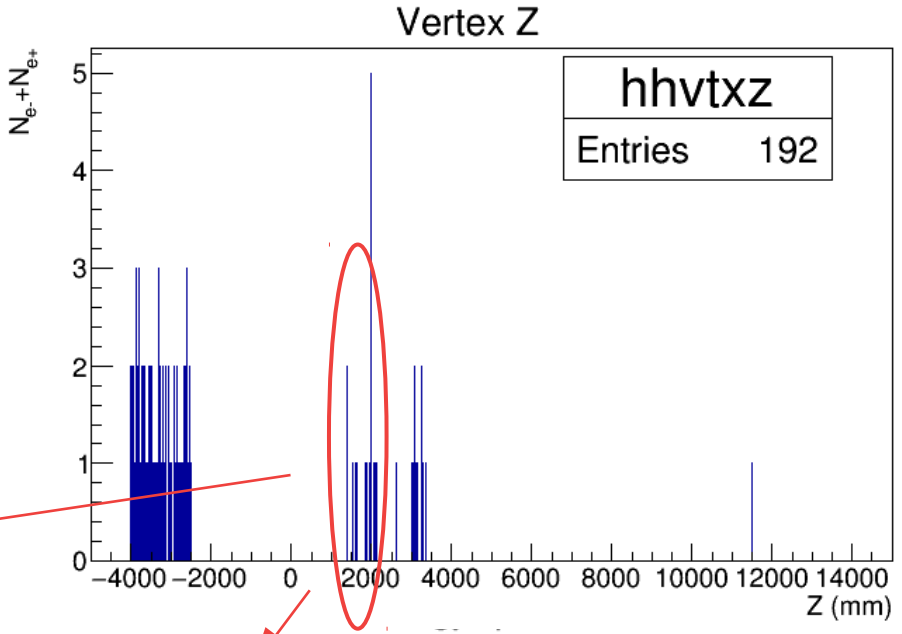


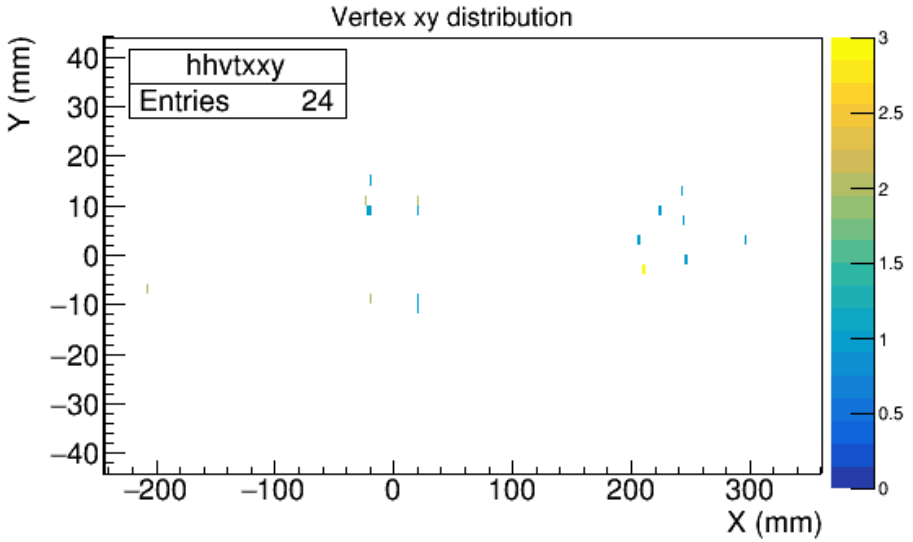



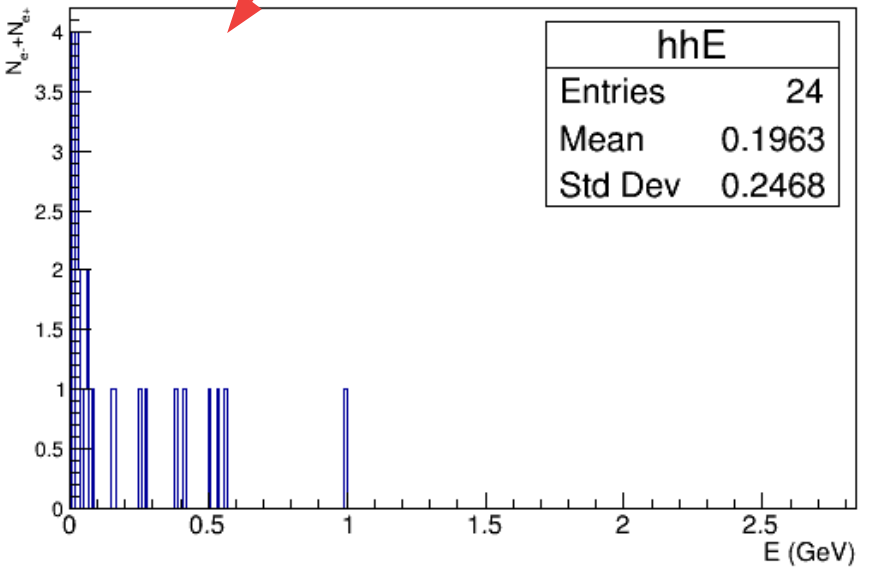



# Hits with origin in spectrometer magnet

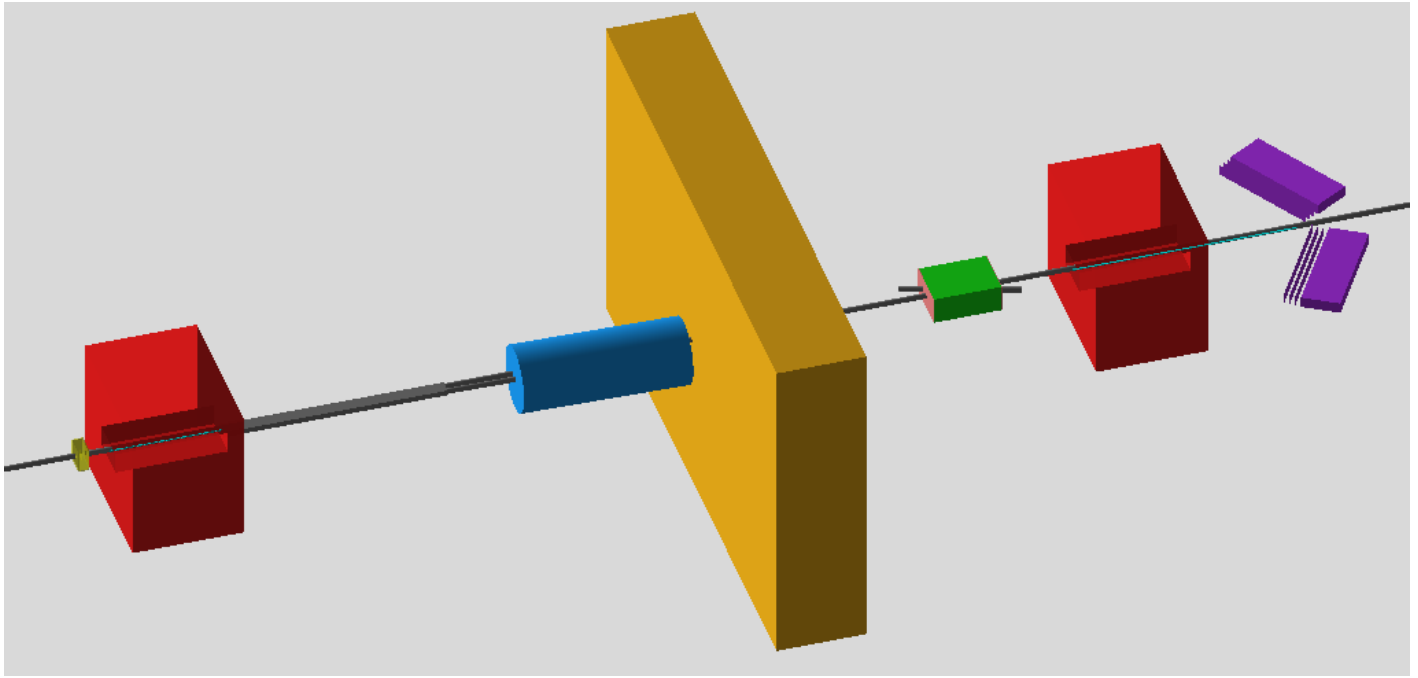


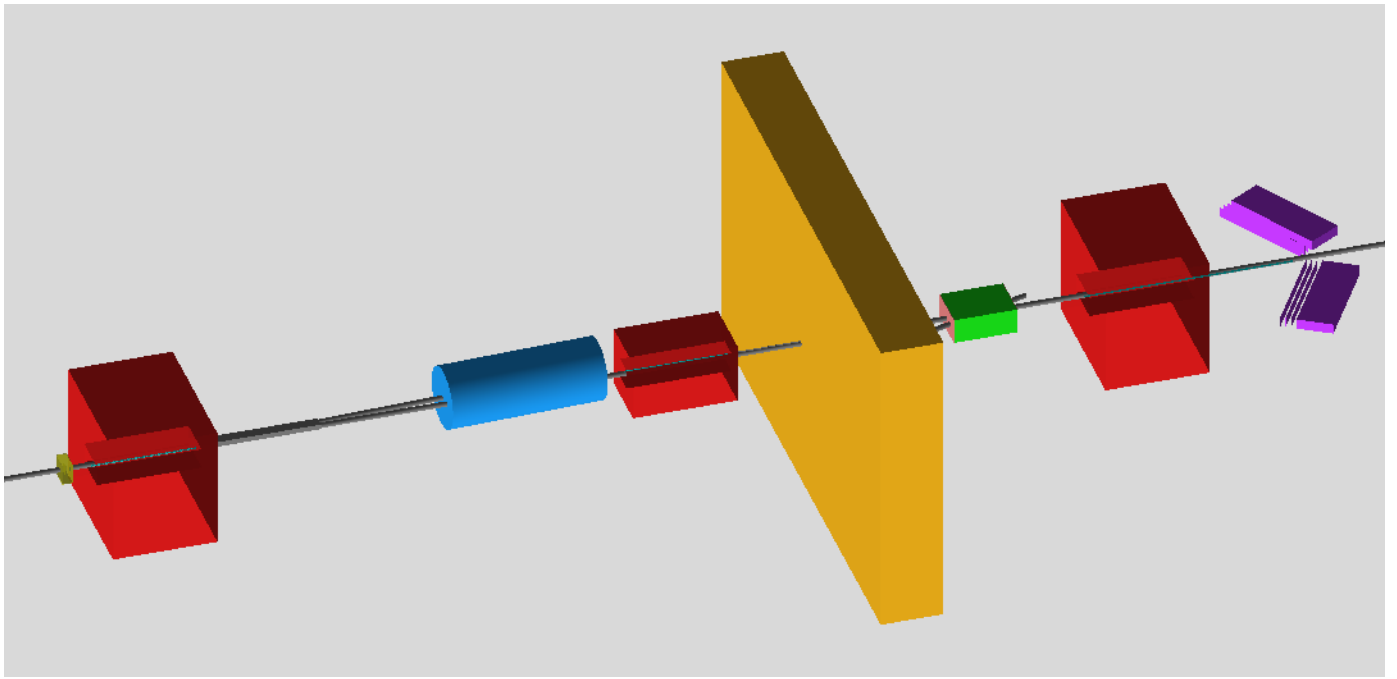



# Magnet after beam dump



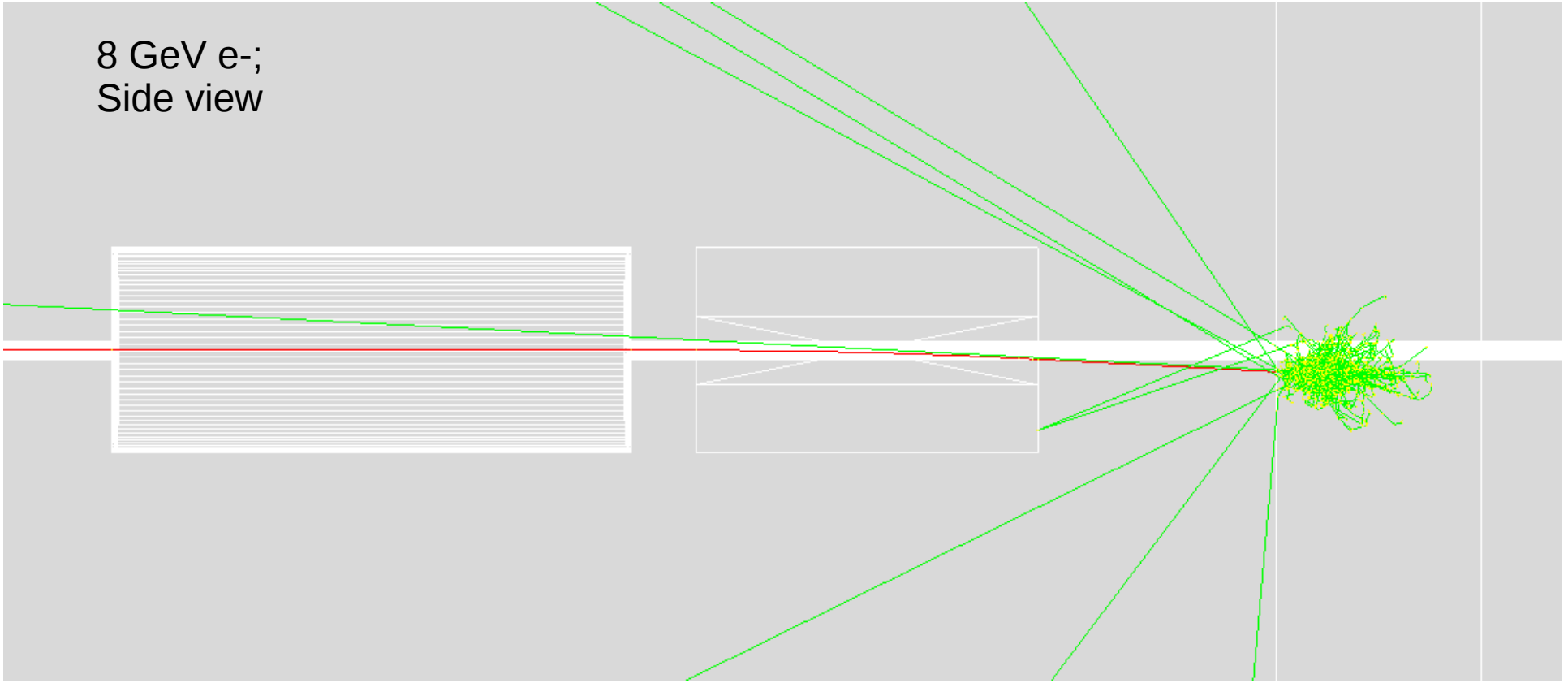


Magnet:
- Length:  1 m;
- Drift:  0.7 m;
- y = 6.3 cm, for 8 GeV

Distance
Target – IP: 9 m.

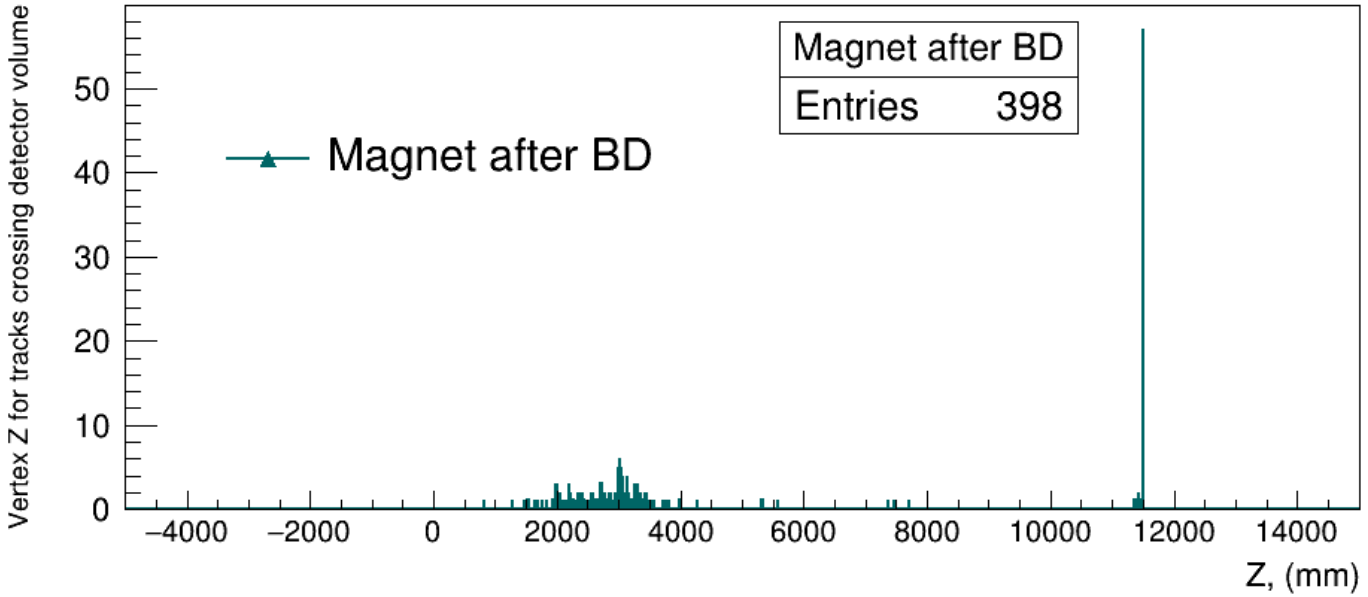
# Dipole after dump

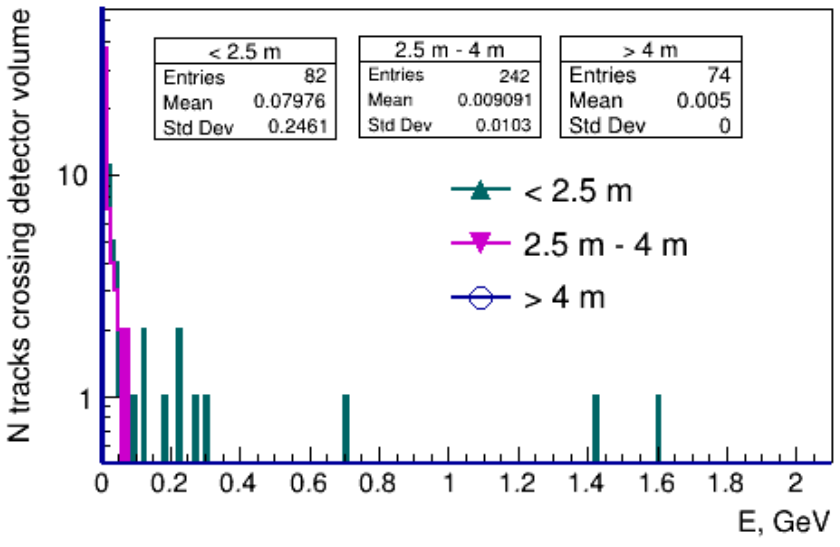
Field: 1.4 T;
Magnet length: 1m;
Drift length: 0.7m;

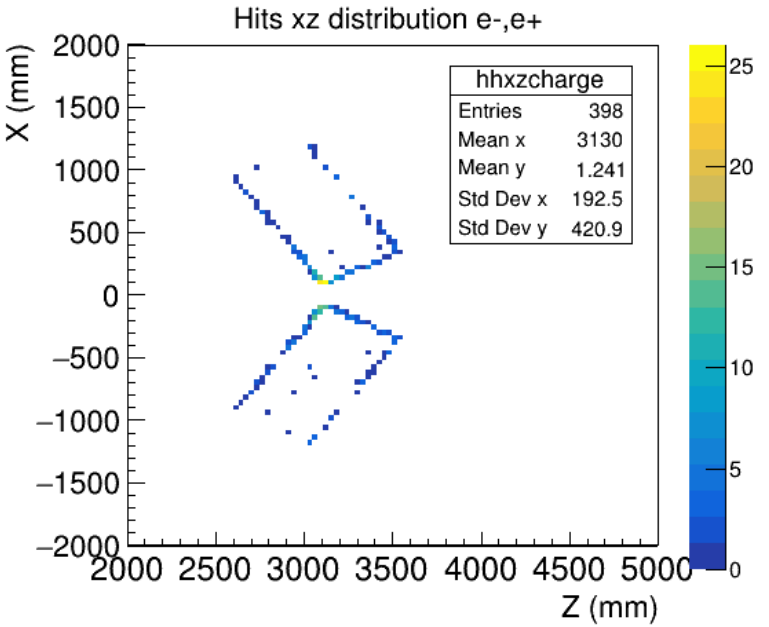


# Dipole after dump

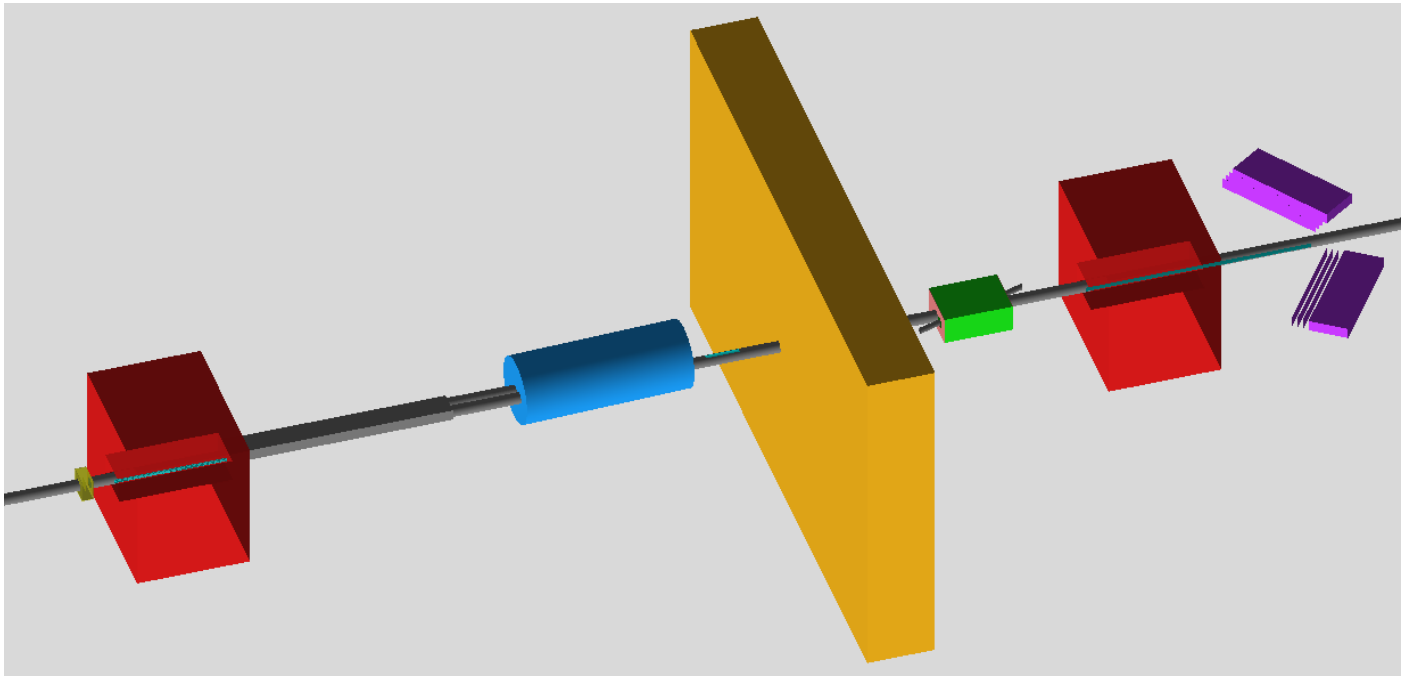
Field: 1.4 T; Magnet length: 1m; Drift length: 0.7m;
200M e- 17.5GeV

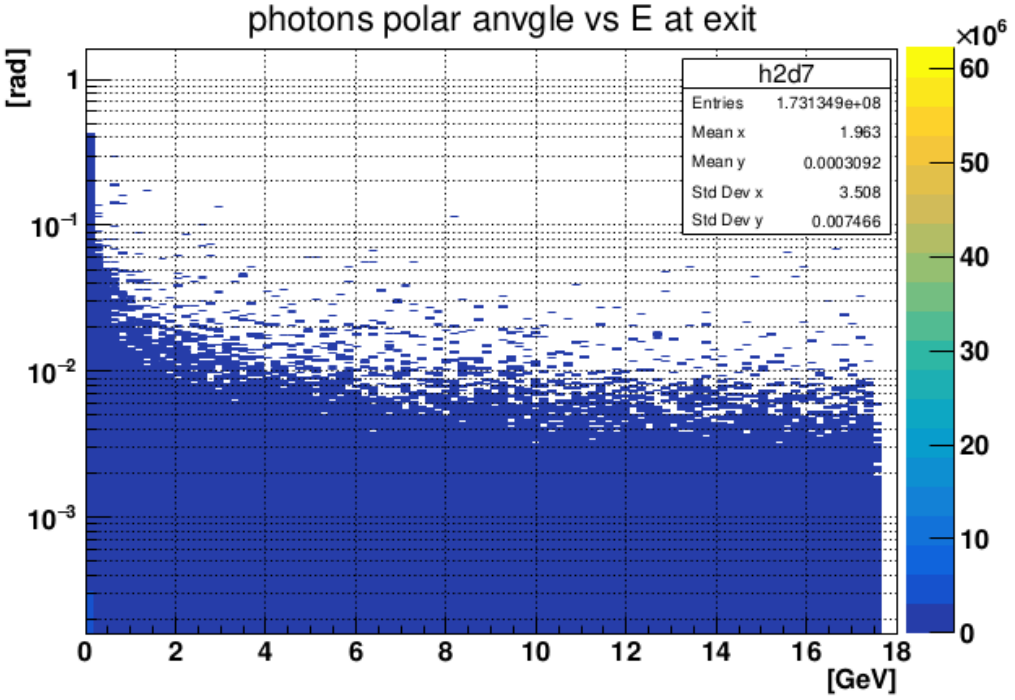


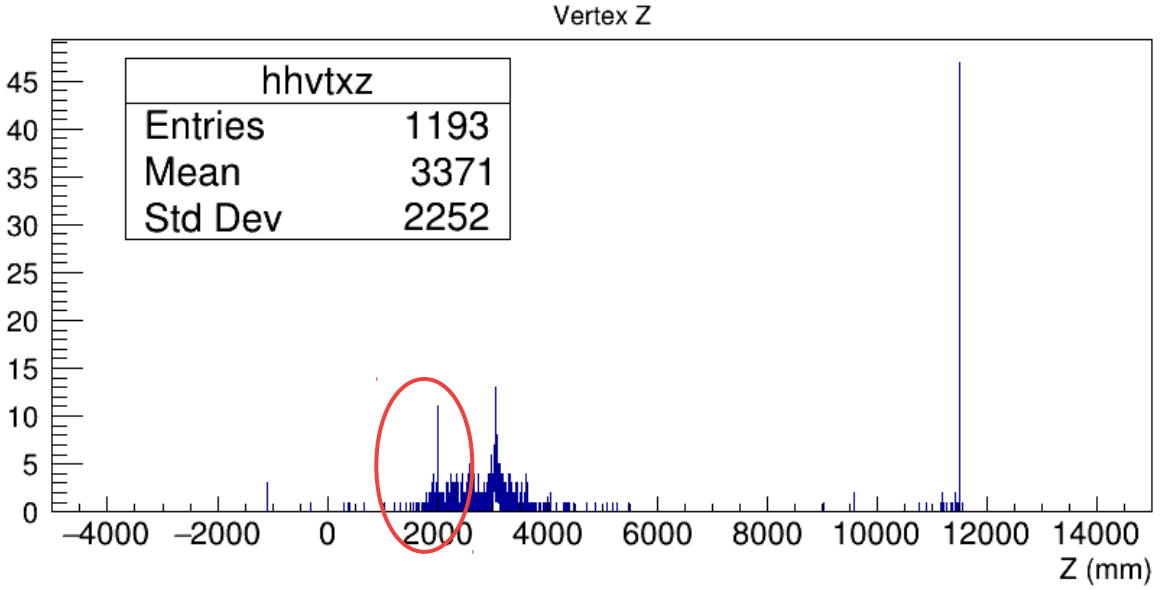
# Beam Pipe
# D = 10 cm

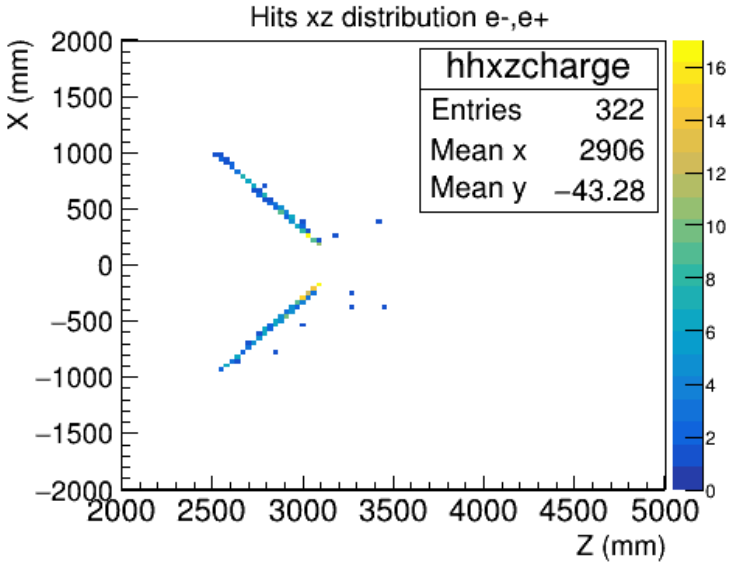


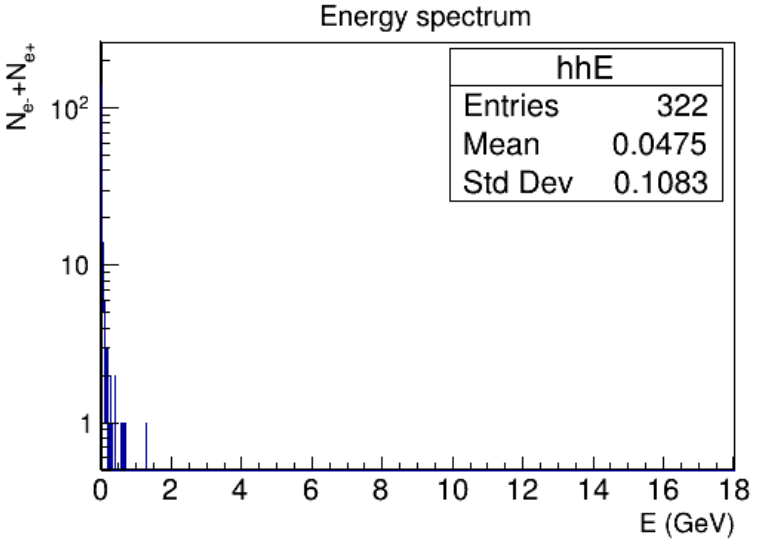


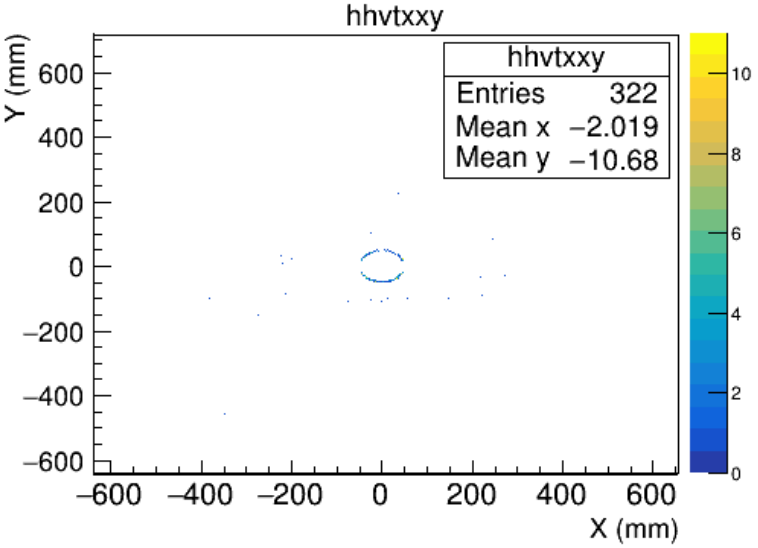
# Beam Pipe D = 10 cm. Vertexes of the e+, e- tracks entering the detector volume.

**300M e-**;
1m < Z < 2.5m; (Spectrometer magnet)



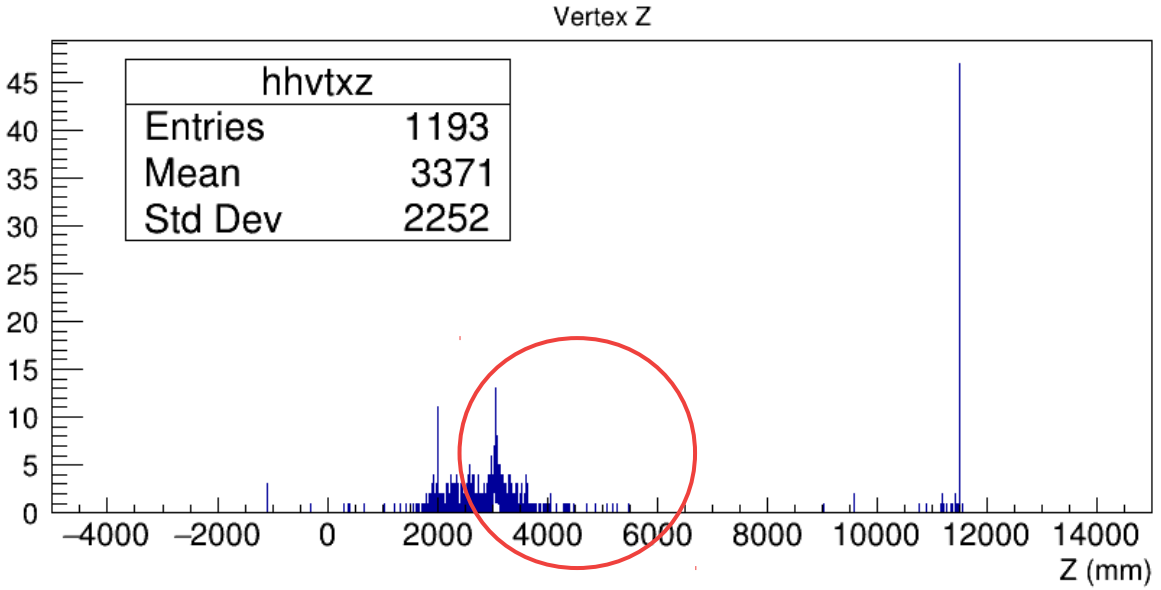



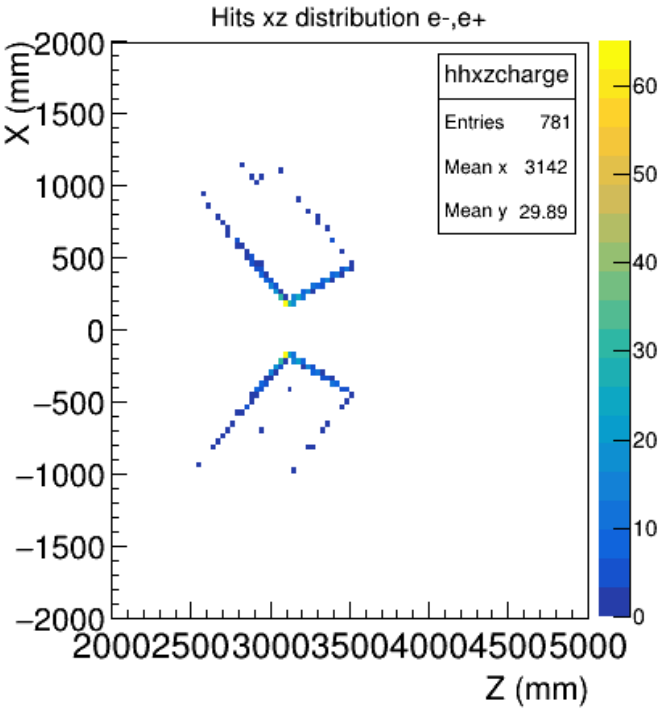



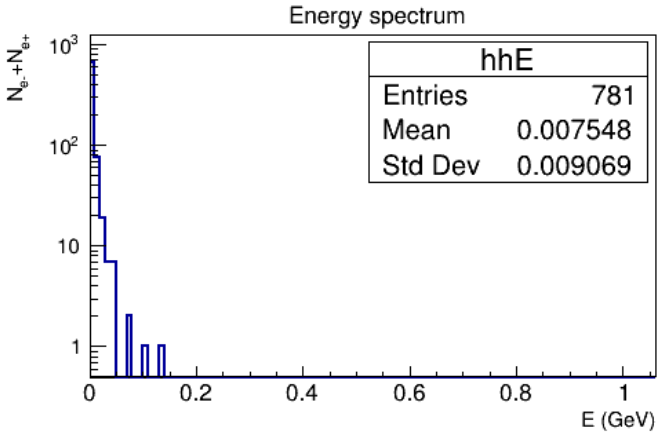



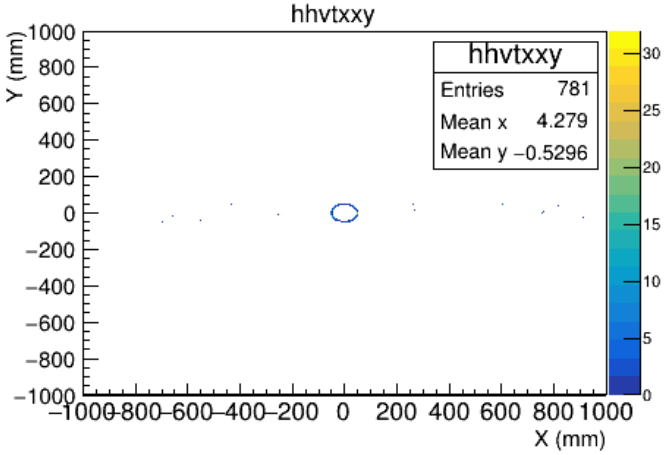
# Beam Pipe D = 10 cm. Vertexes of the e+, e- tracks entering the detector volume.

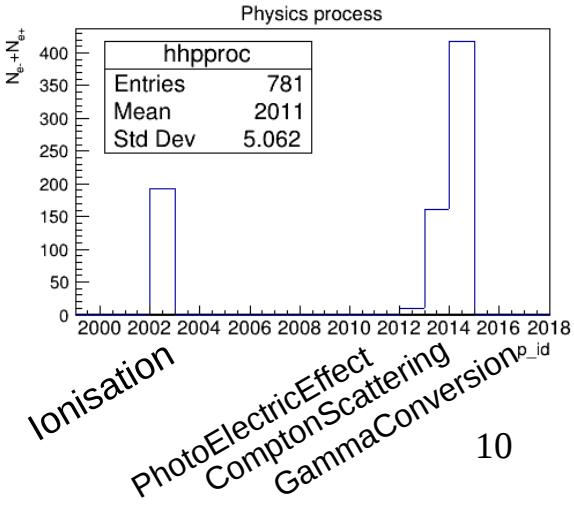
**300M e-**;
2.5m < Z < 6m; (detectors and beam pipe)



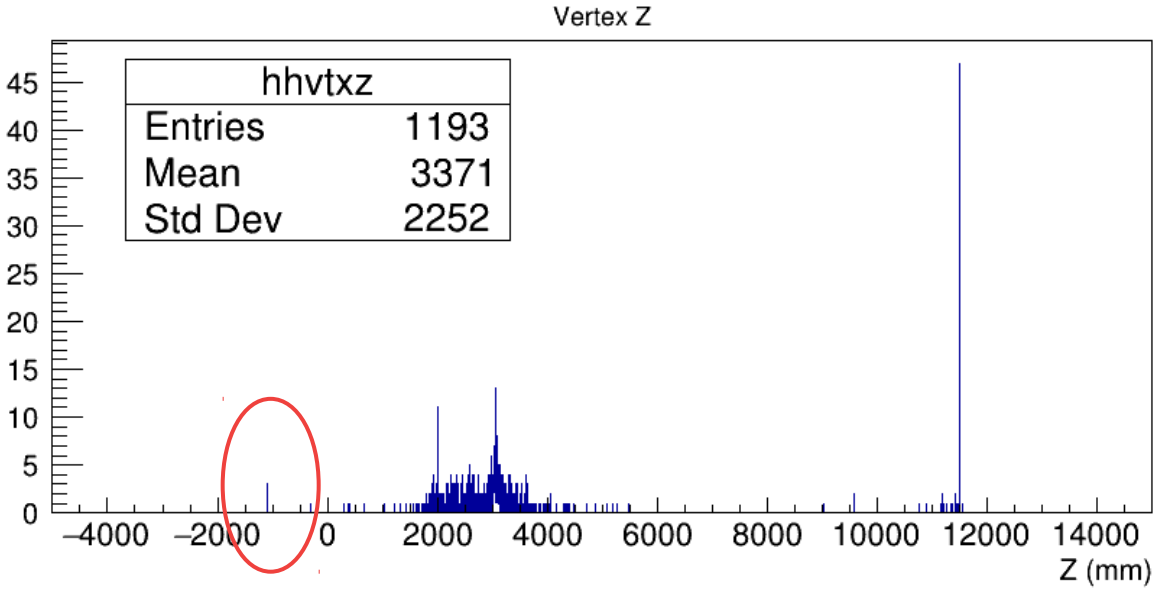



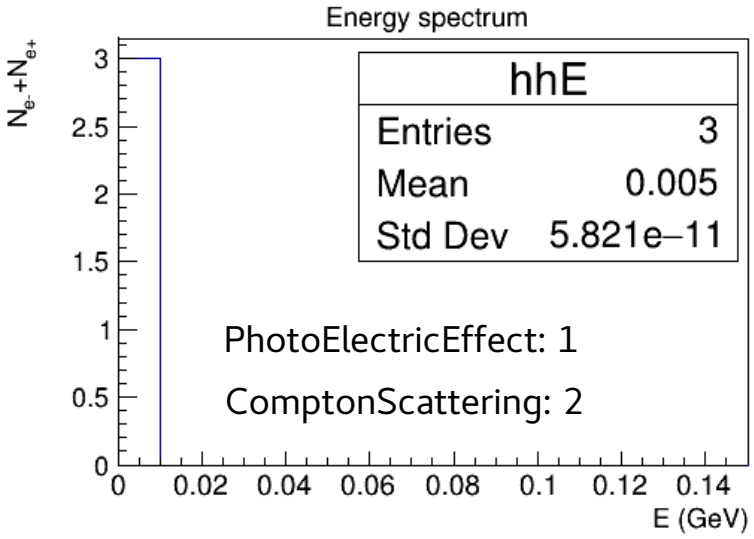



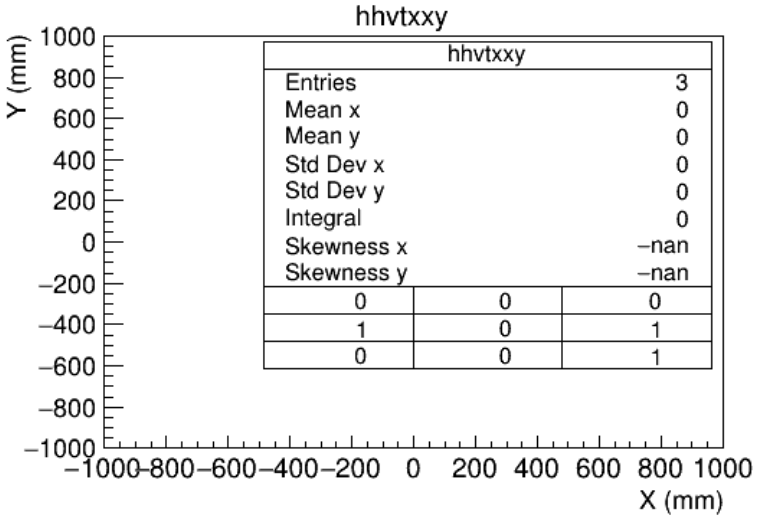



# Beam Pipe D = 10 cm. Vertexes of the e+, e- tracks entering the detector volume.

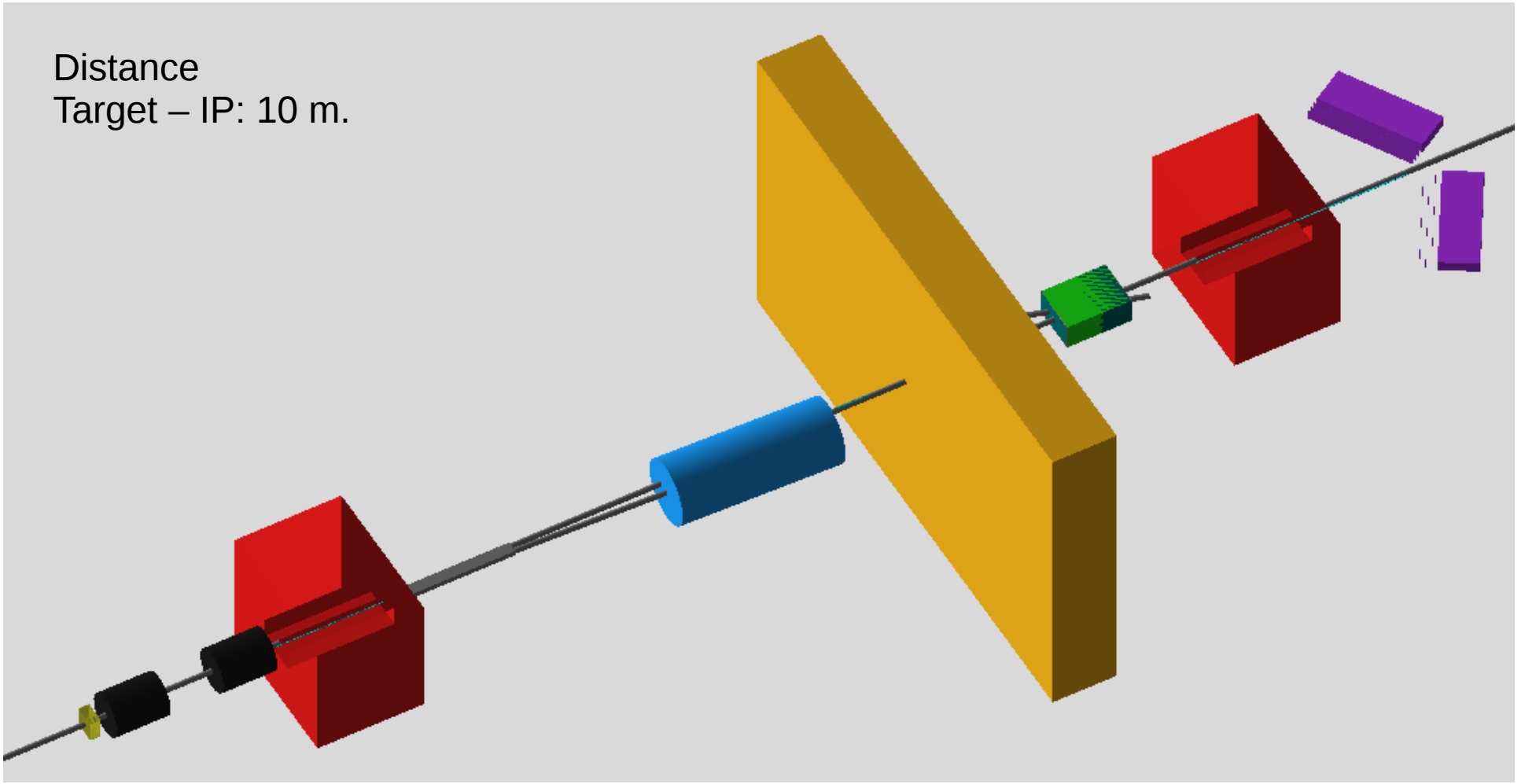
**300M e-**;
-1.2m < Z < -1m;  (Shielding)



# Two lead collimators



# Summary and Plans

- Number of electrons and positrons produced in a collimator constitute substantial background for BPPP study.
- Installing magnet after the collimator helps to eliminate the background.
- Wide beam pipe D=10cm shows significant reduction in backgrounds.
- Electrons and positrons produced in the area of spectrometer magnet can be identified and rejected
  - by the tracker in case the vertex is in metal part far from beam pipe;
  - by calorimeter for those of low energy generated close to the exit of the magnet.
- Run simulation with two collimators between the target and dump magnet, similar to the geometry simulated in Fluka by Gianluca.
- Tune geometrical parameters of the setup in accordance with real technical requirements.