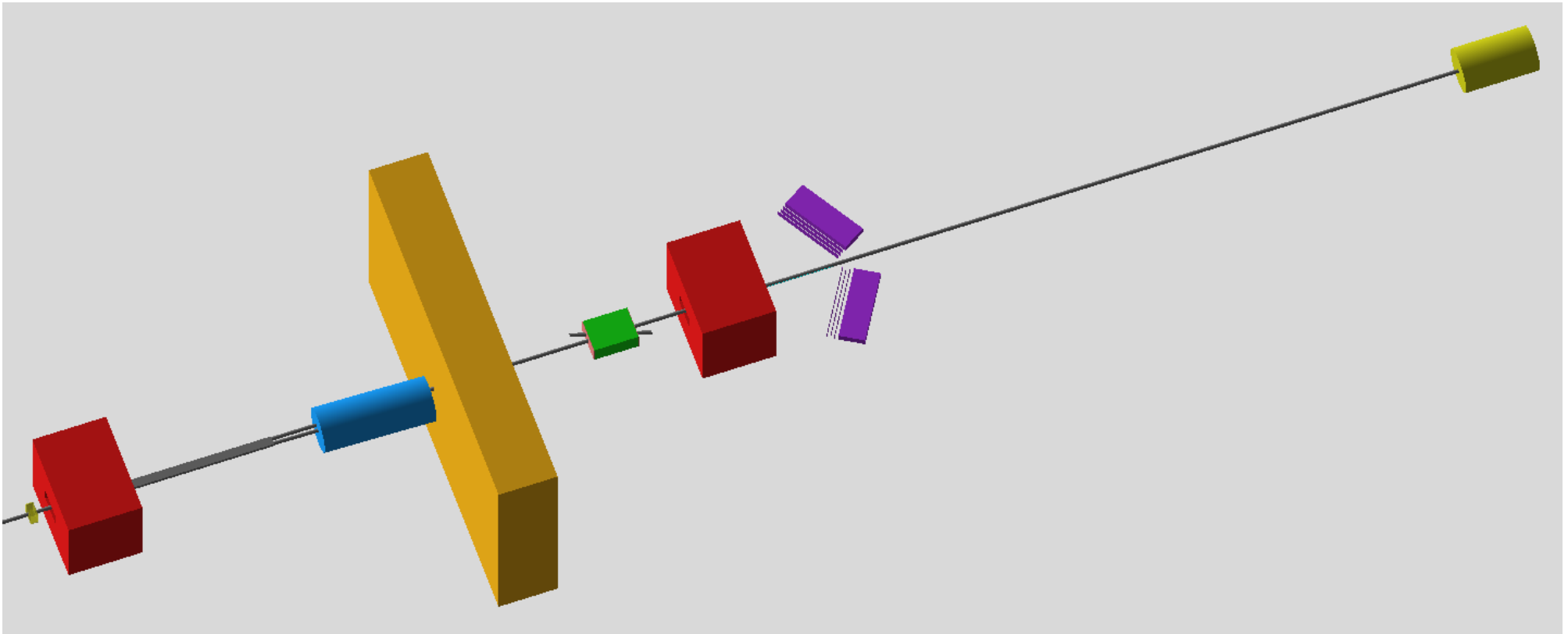# Update on LUXE Background Study in Geant4 Simulation

Oleksandr Borysov

LUXE Meeting
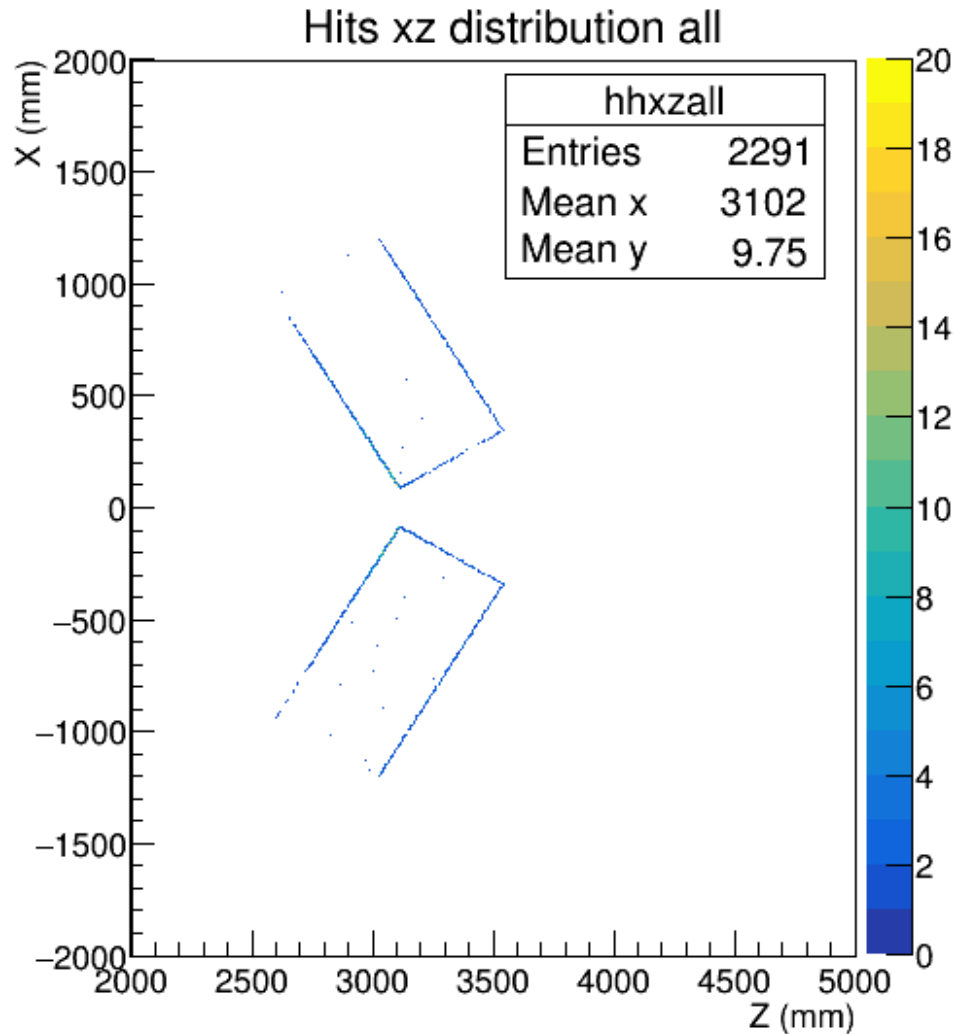July 2, 2019

LUXE geometry in Geant4

- Check background in OPPP detectors: trackers and calorimeters;

- Optimize detectors position, shielding, beam pipes and windows;

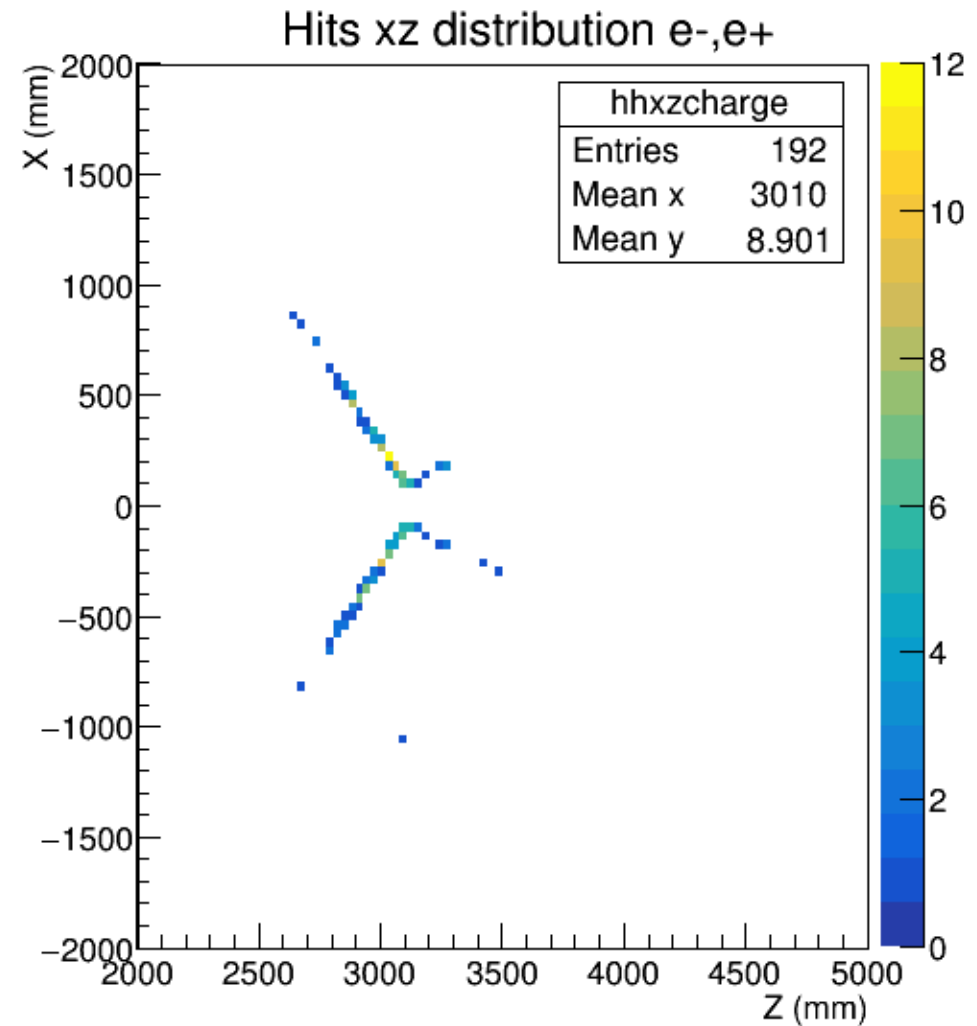- Establish a benchmark in a simple geometry for comparison with more detailed implementation.

Track in detector volume

10.72M e-
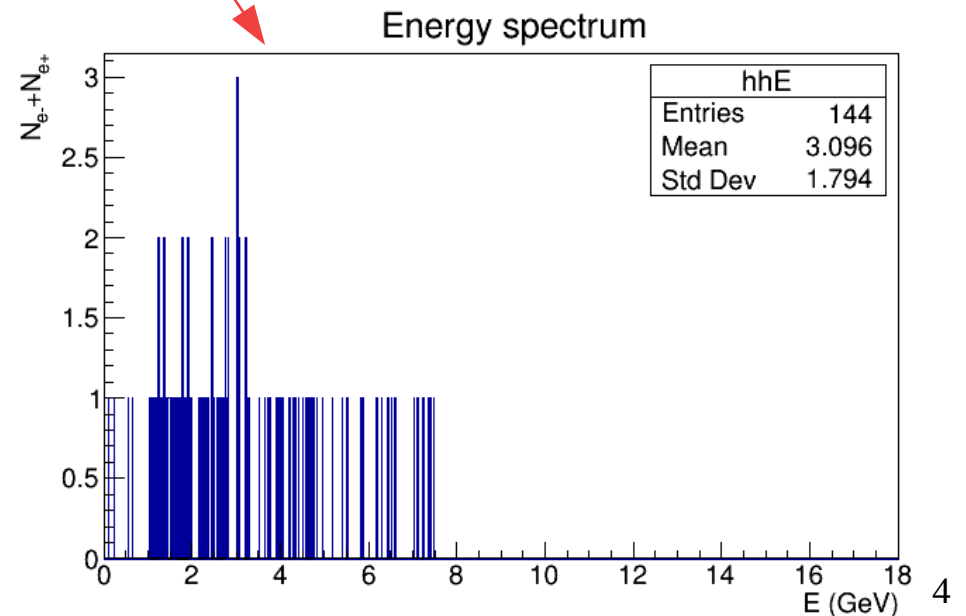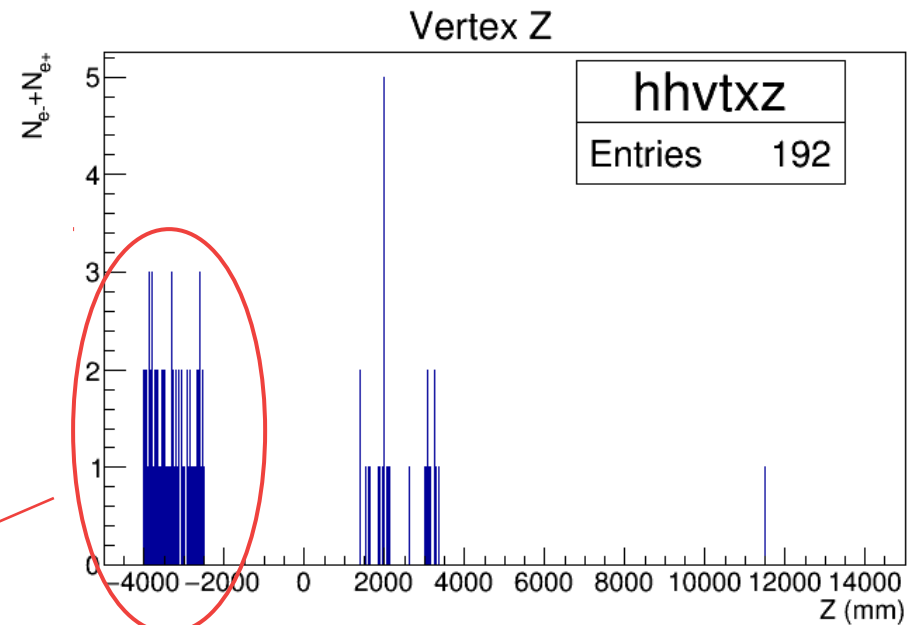
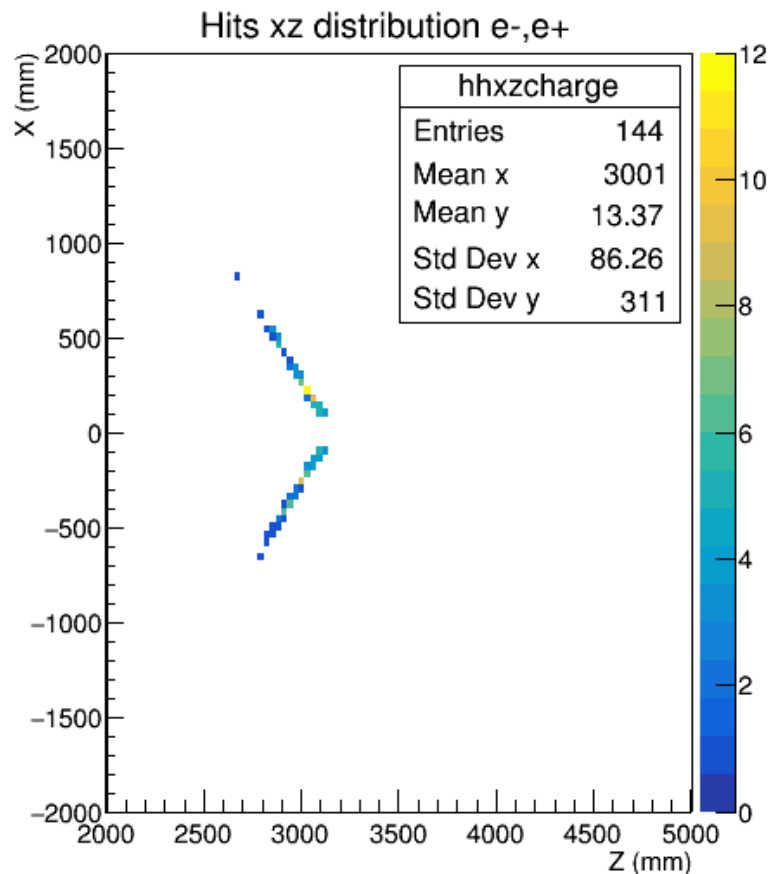All tracks entering detector container volume
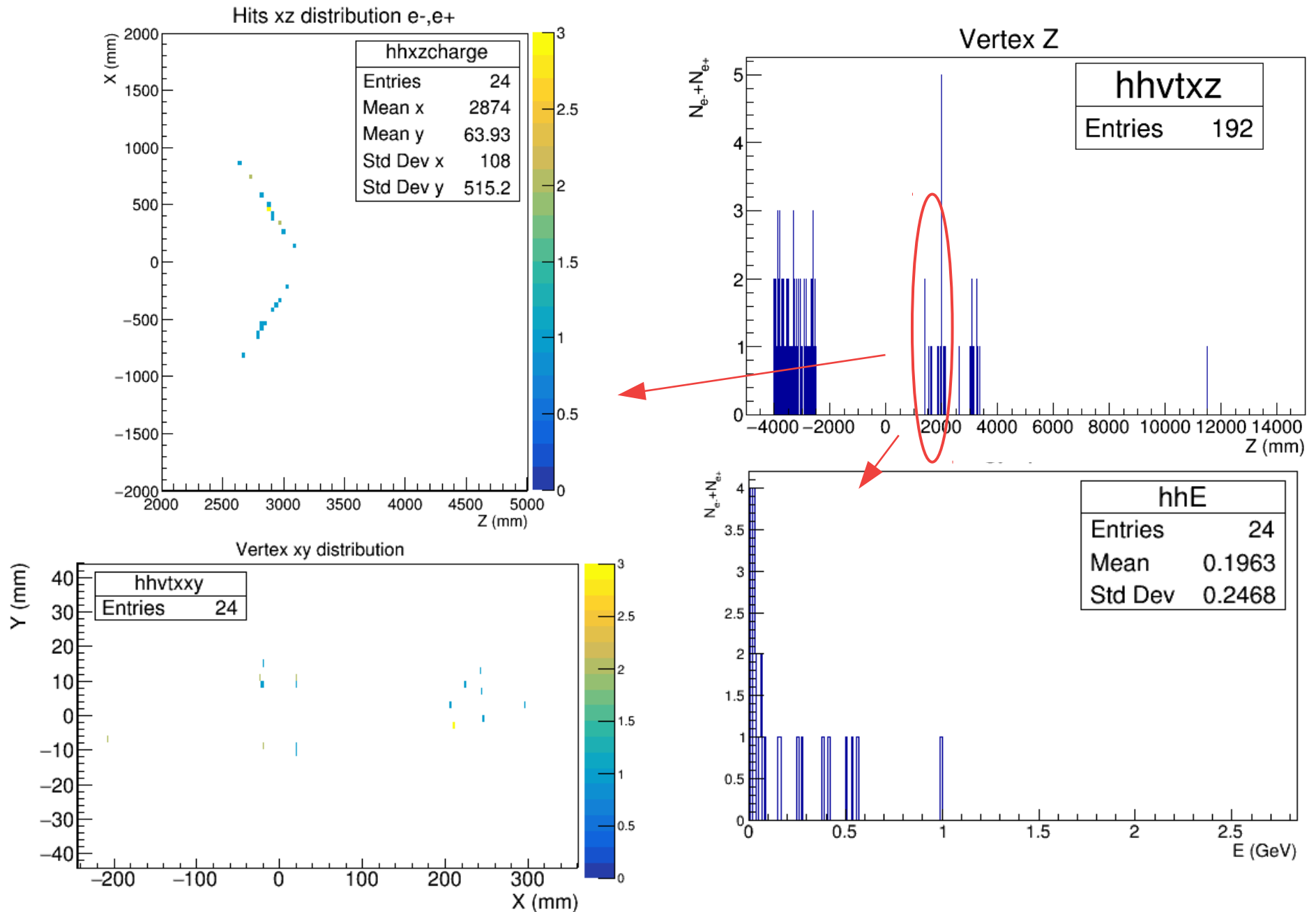
e+e- tracks entering detector container volume

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

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.

- Consider simpler solution: remove material (wider beam pipe, enlarge the distance between target and IP to better position beam dump,...)

- 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.

- Comparison results with Fluka simulations made by Gianluca.

- Tune geometrical parameters of the setup in accordance with real technical requirements.
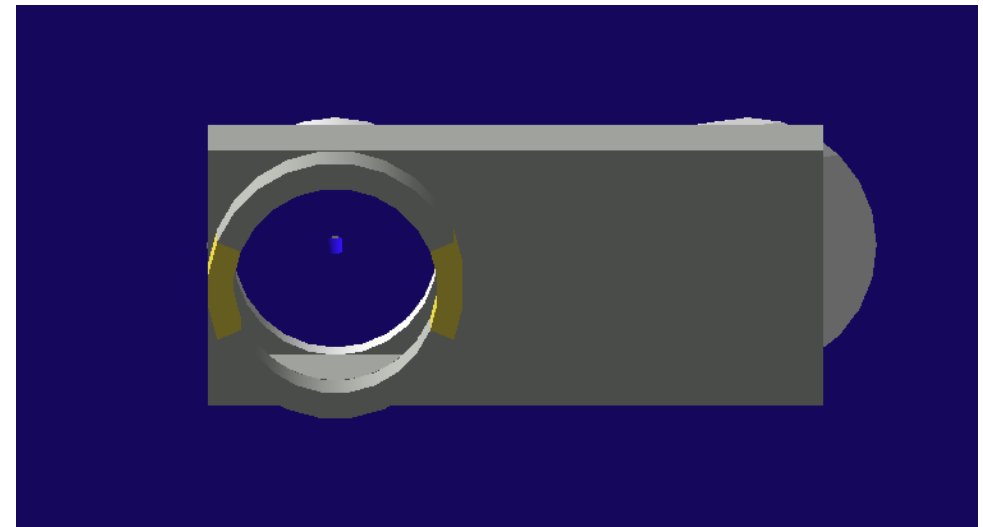
Backup

Sketch and Geant4
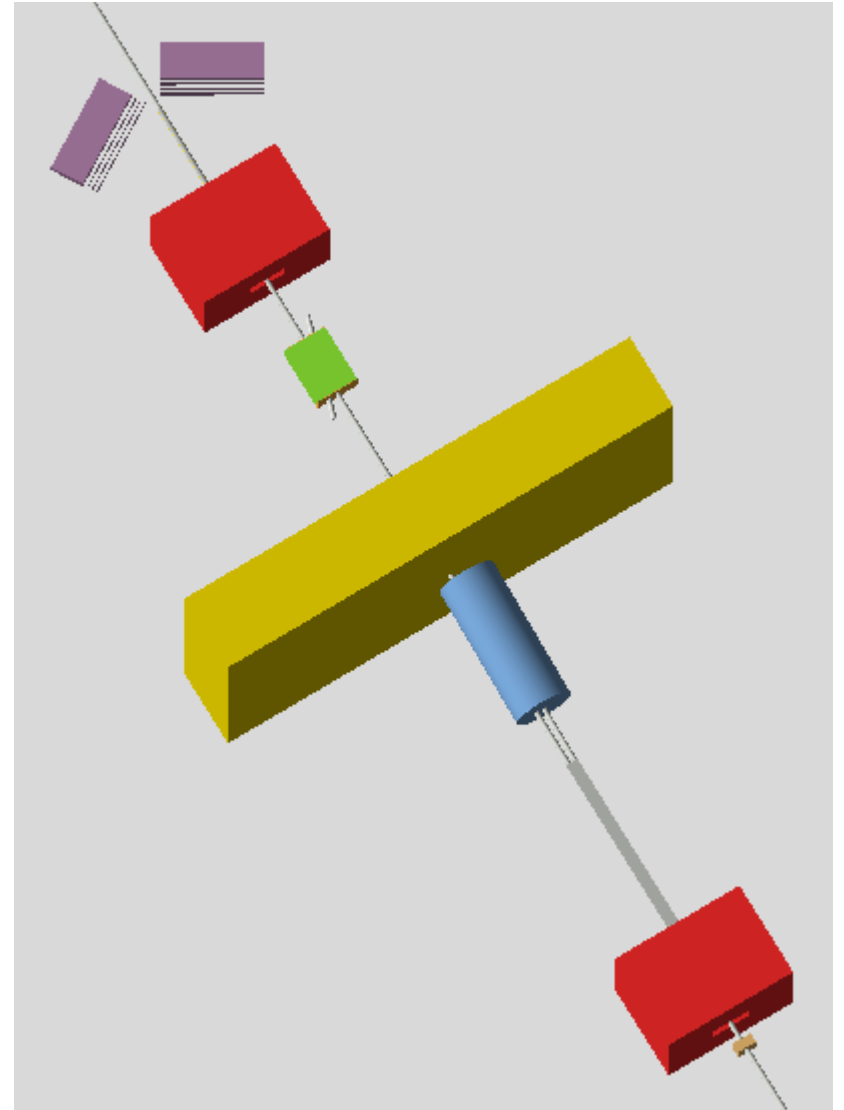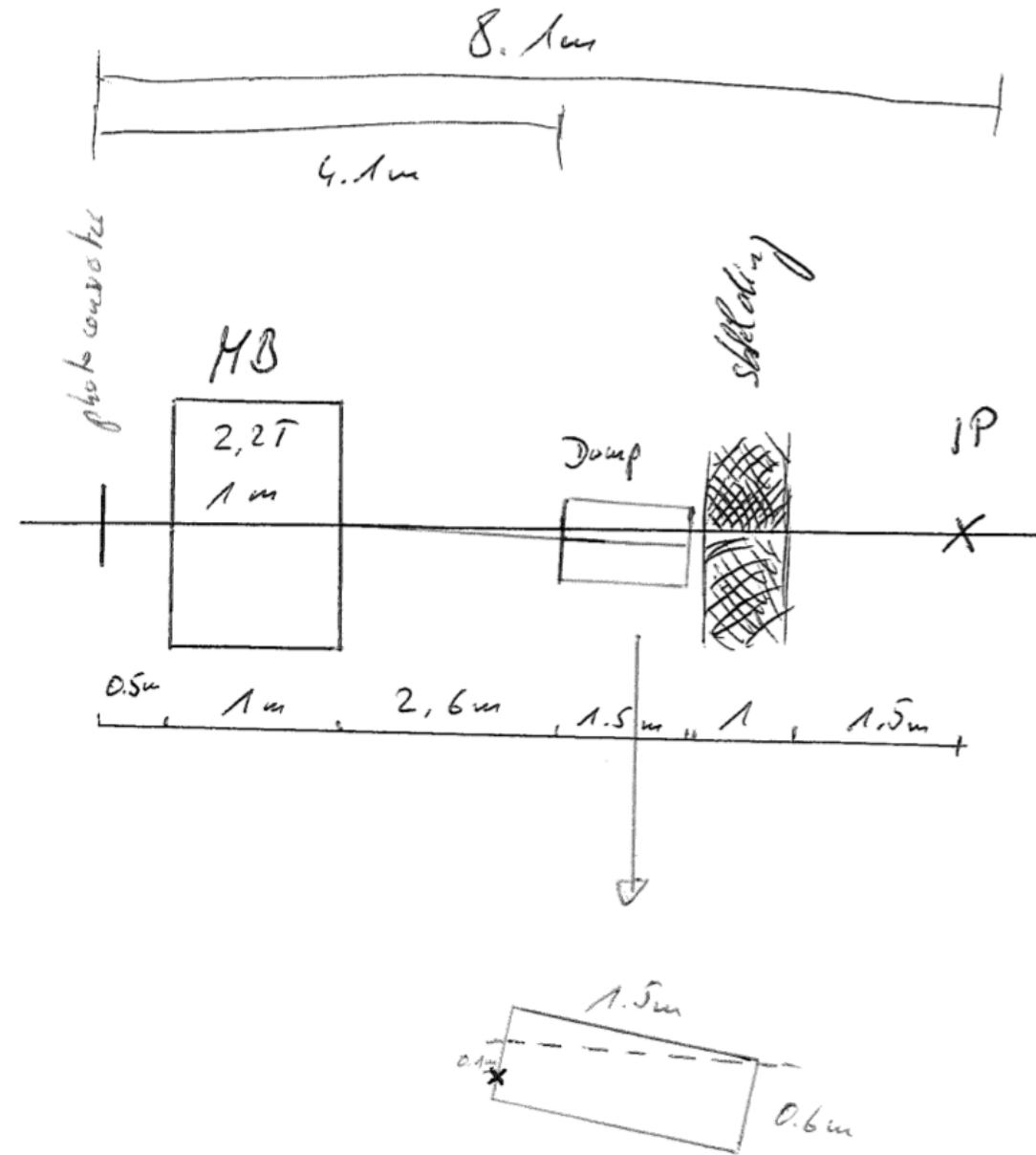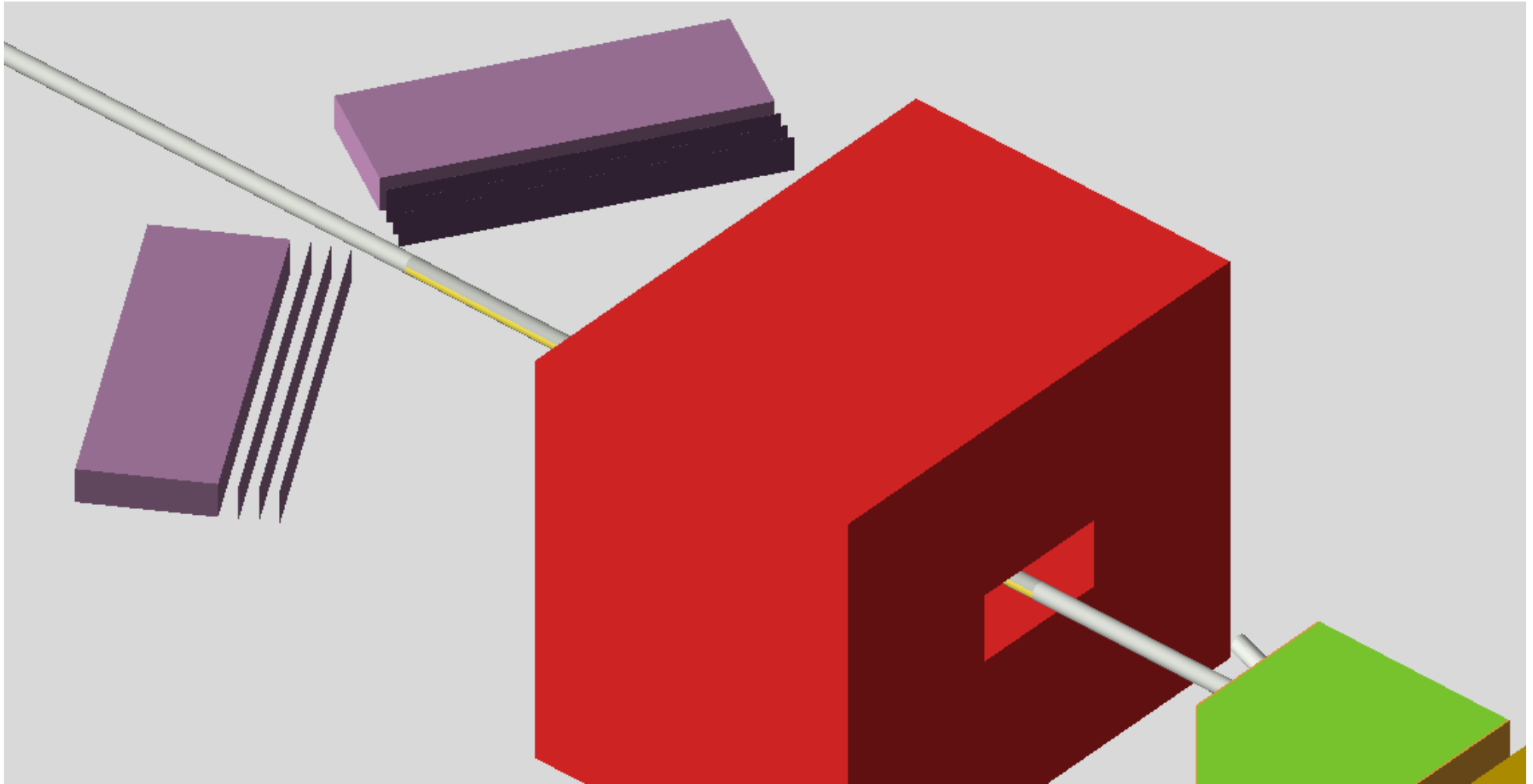
Beam Dump with Hole for Photons
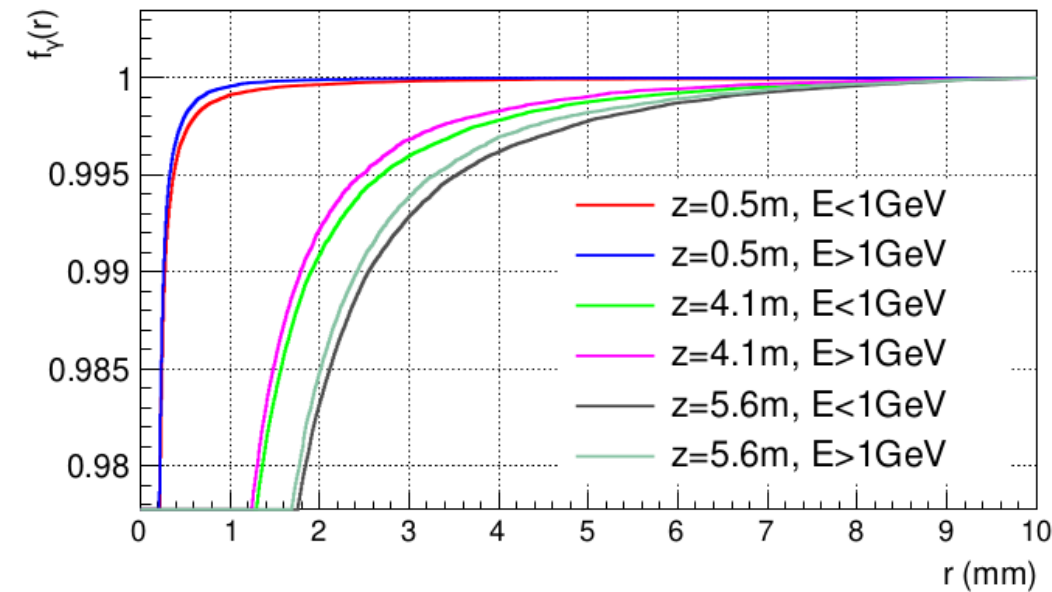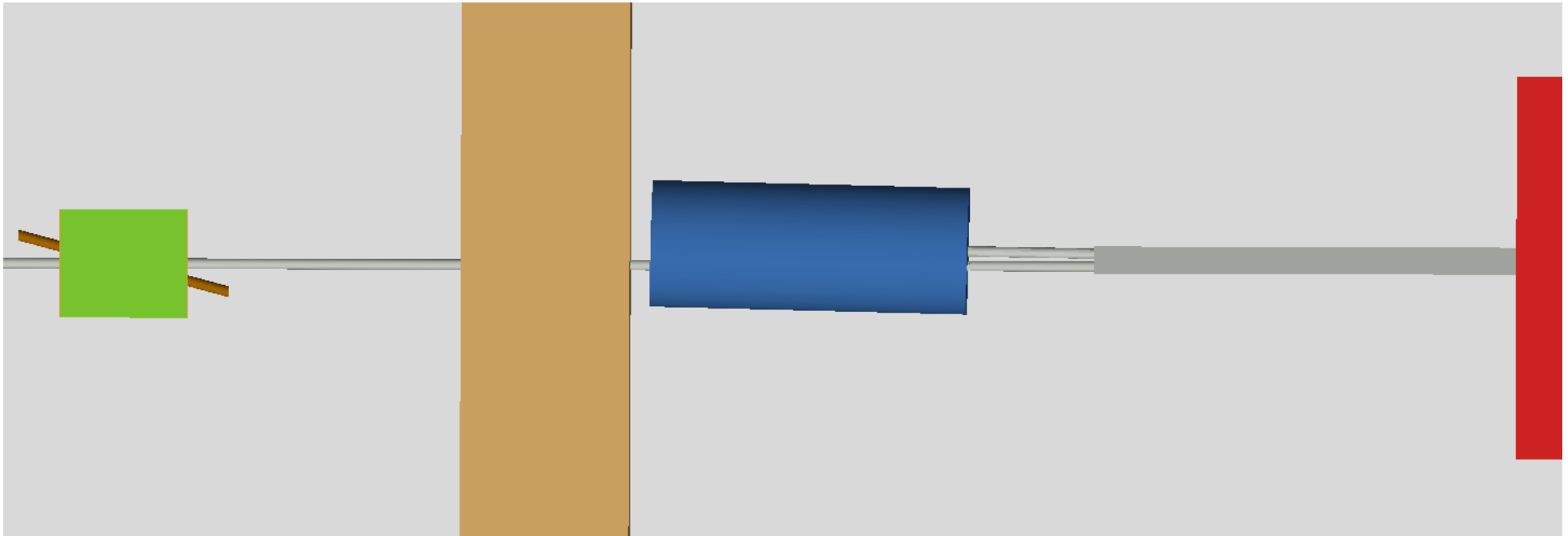
Fraction of photons inside the circle as a function of its radius for different distances from the target

Front view of the beam dump through the beam pipe
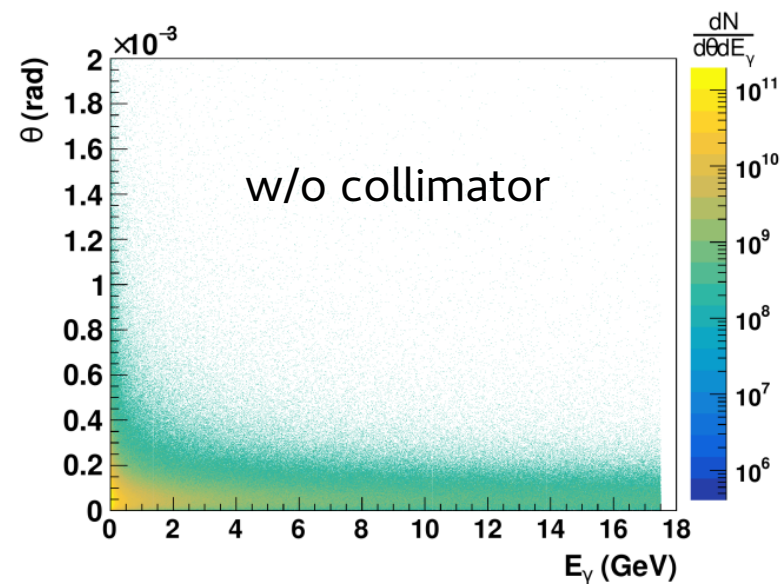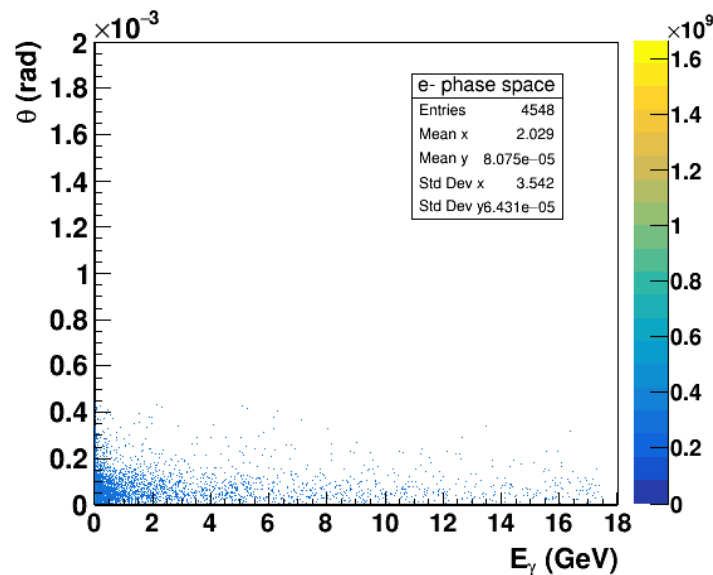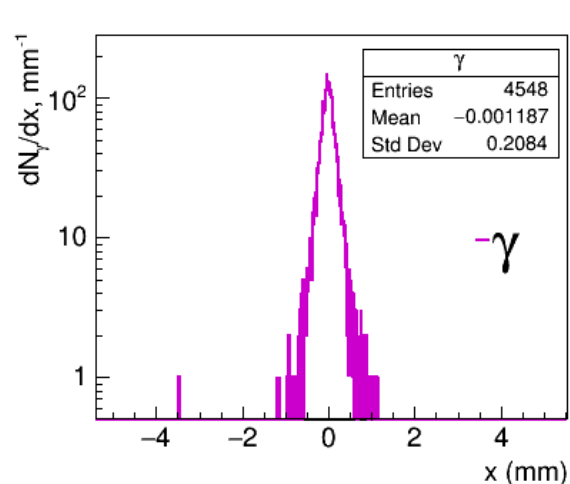
Tracking Planes

50k e-

Simulated 50k events recording any track that enters detectors volume
1 was registered;

```
********************************************************************************************************
*    Row    *         pdg *           E *        vtxx *        vtxy *        vtxz *          px *          py *          pz *
********************************************************************************************************
*         0 *         -11 * 1.1105072 * 0.6417944 * -1.773730 * -3752.636 * 0.4198077 * 0.0007512 * 1.0286506 *
********************************************************************************************************
```

Bremsstrahlung photons 22.5 m from the collimator (beam dump)

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Sketches of Bremsstrahlung Area