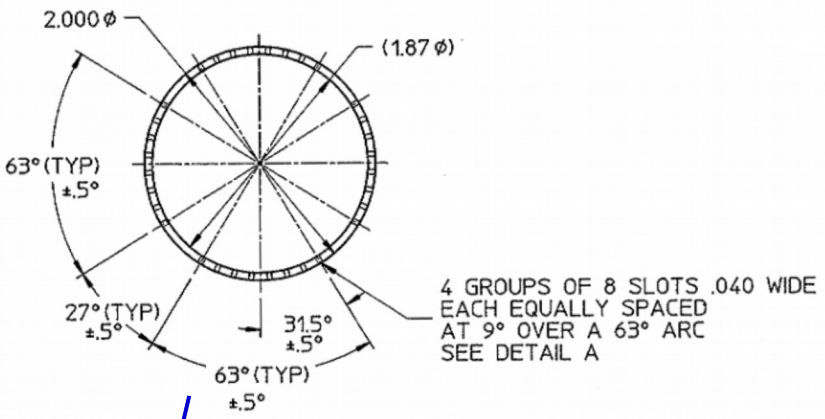
Simulation for small angle background and compare with data

setup



Beam pipe = stainless steel
0.187 inch – 2 inch

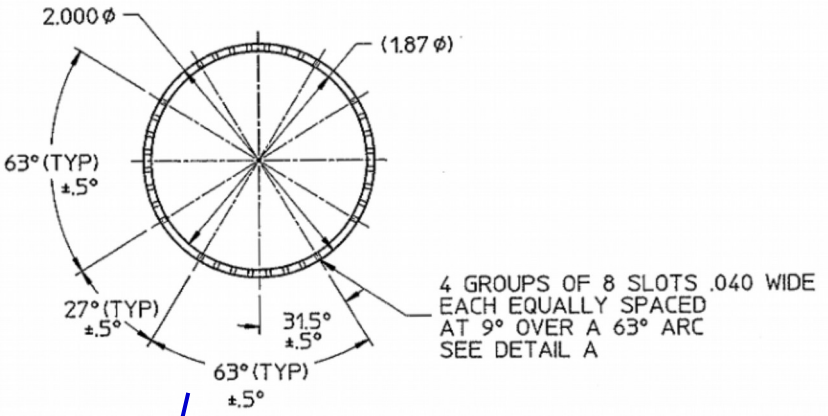
Vacuum window = aluminum foil

Target = kapton + hydrogen

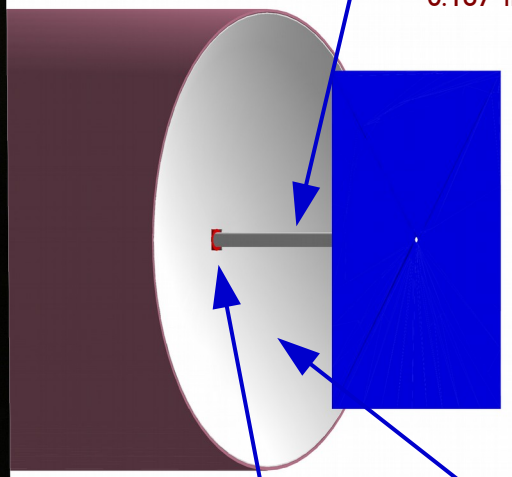
Vacuum box = aluminum

A stainless steel c-clamp

setup



Beam pipe = stainless steel
0.187 inch – 2 inch



Vacuum window = aluminum foil

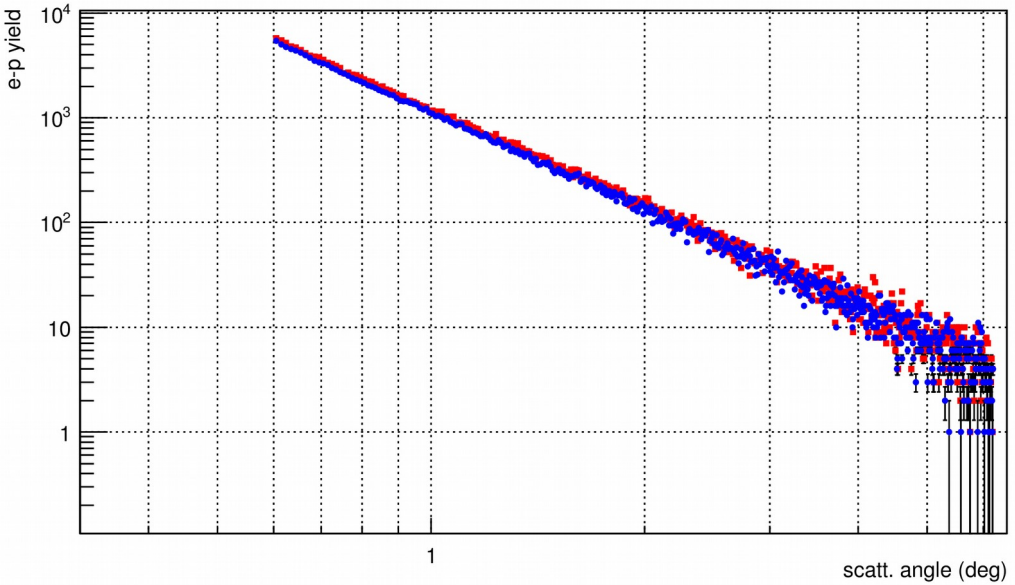
Targ

A stainless steel c-clamp

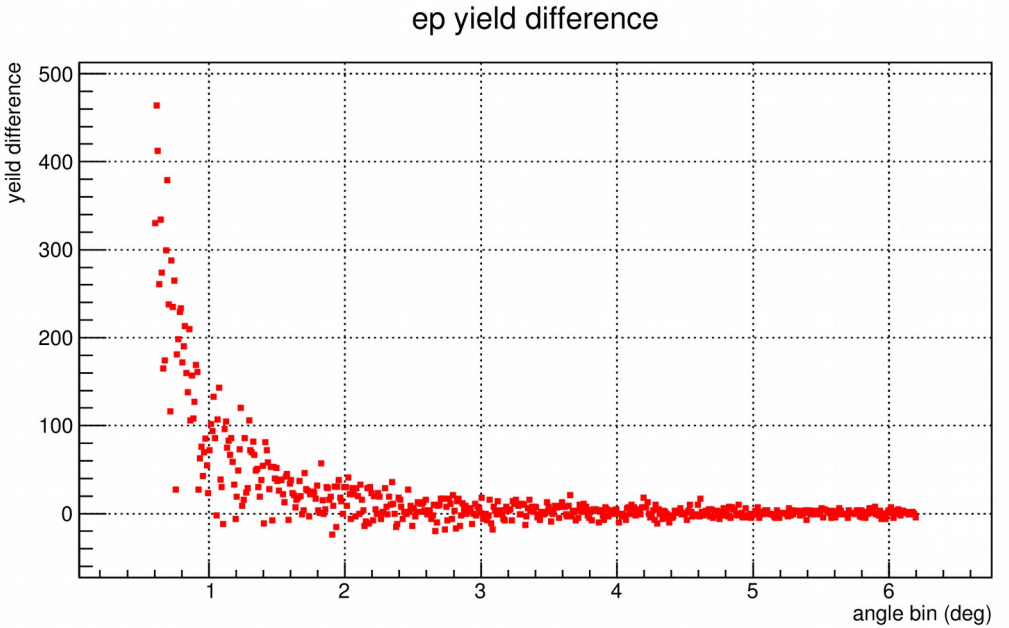
Vacuum box = aluminum

Simulation

Red = without vacuum box, beam pipe, etc, …
Blue = with vacuum box, beam pipe, etc, ...



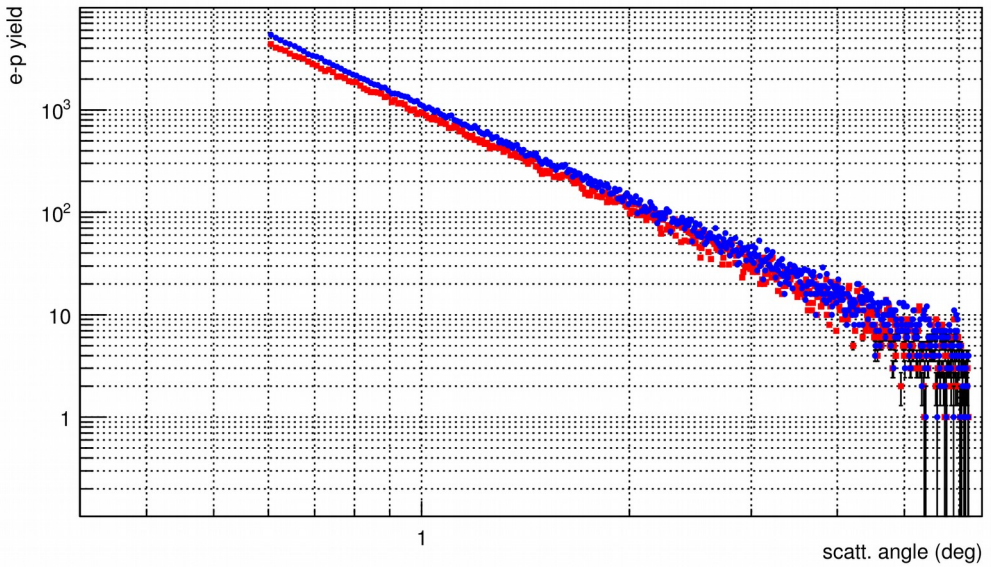
Difference relative to reference



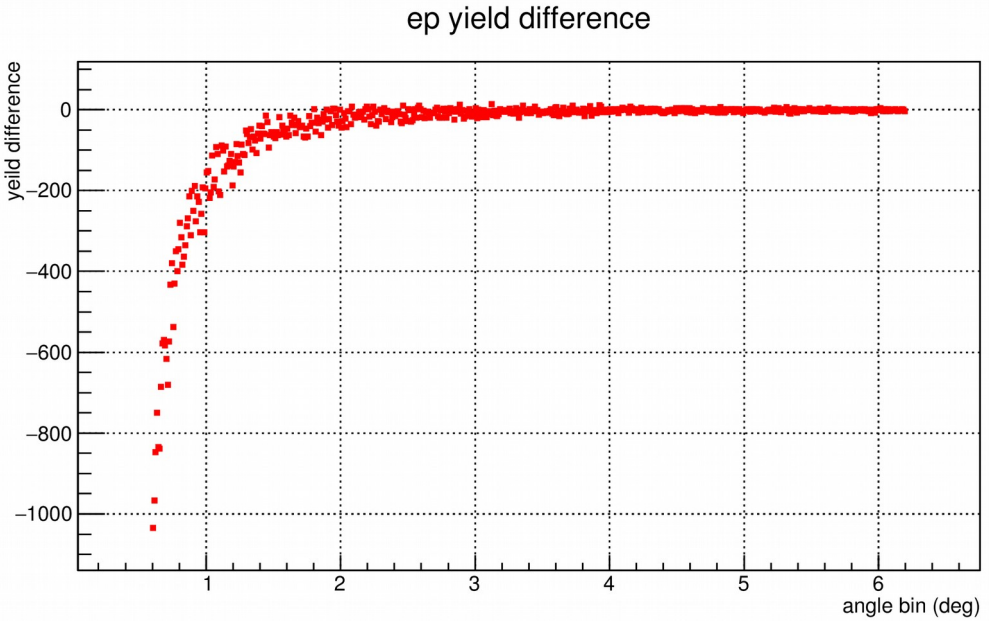
Yield drop due to multiple scattering

Simulation

Red = source at down stream 0.5 meter
Blue = target at 0. (reference)



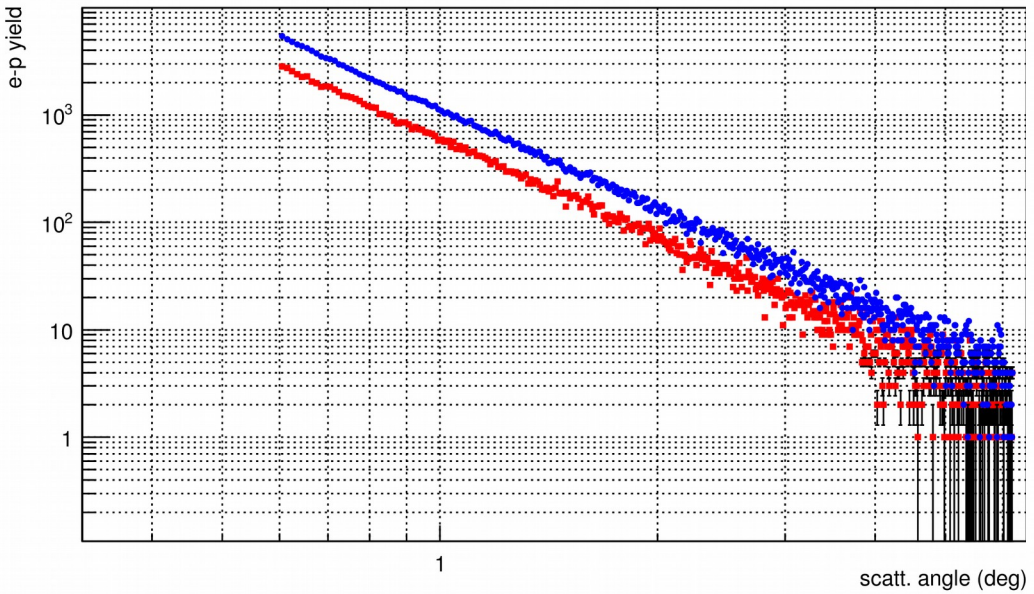
Difference relative to reference



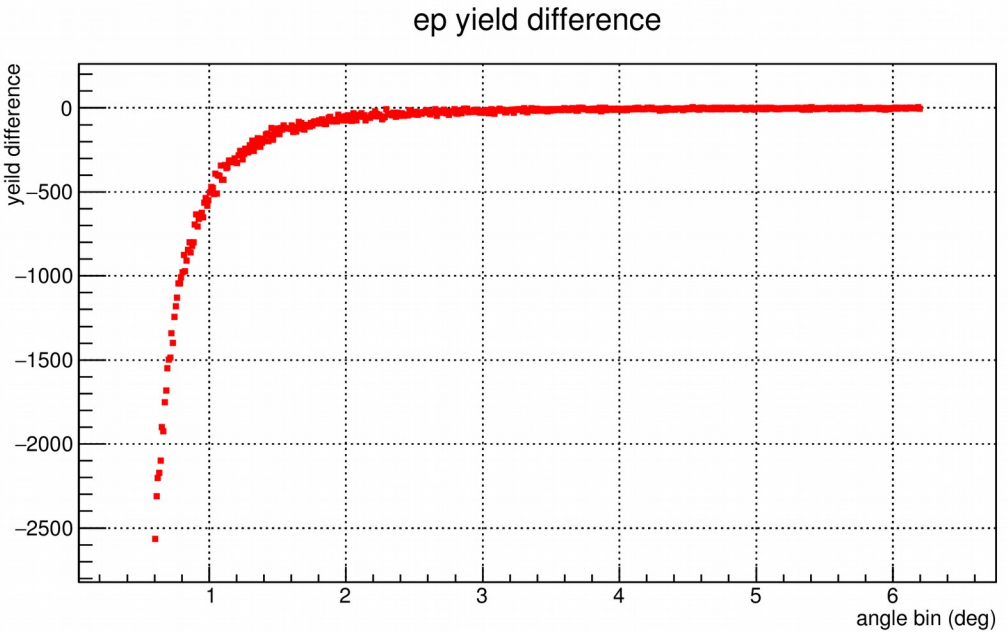
With vacuum box, beam pipe, etc...

Simulation

Red = source at down stream **1.5** meter
Blue = target at 0. (reference)



Difference relative to reference

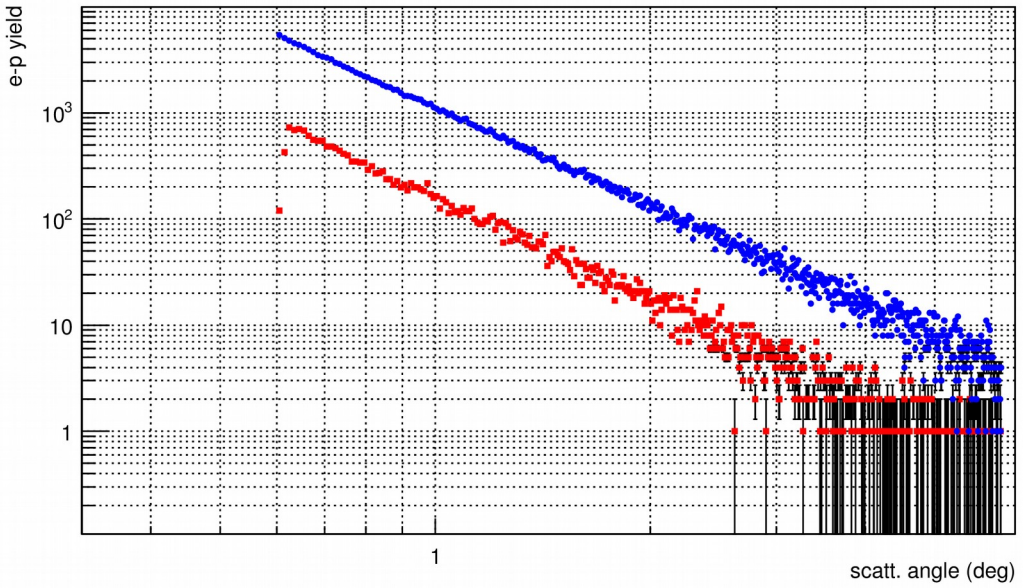


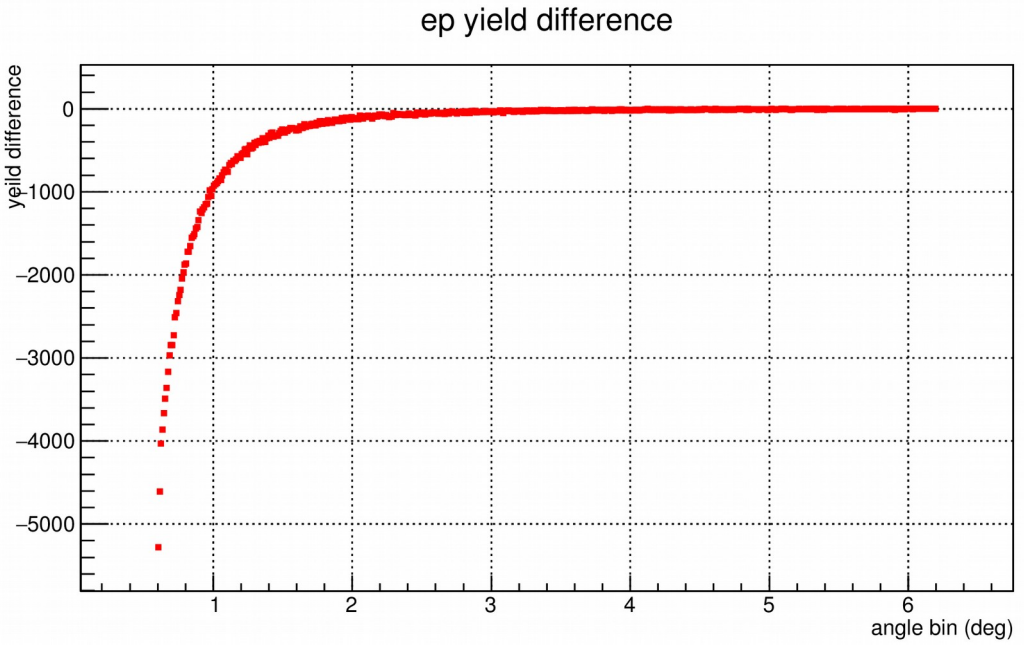
With vacuum box, beam pipe, etc...

Simulation

Red = source at down stream **3.5** meter
Blue = target at 0. (reference)

Difference relative to reference

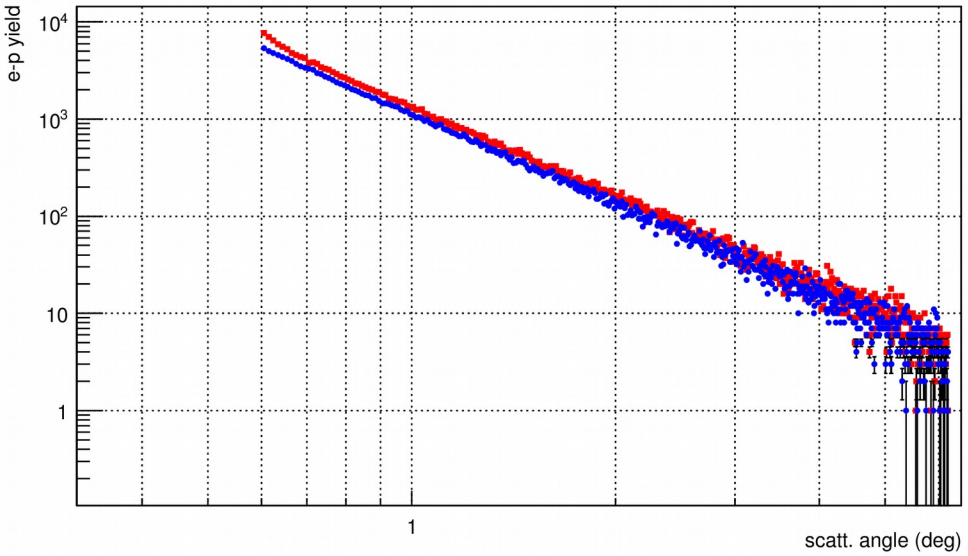




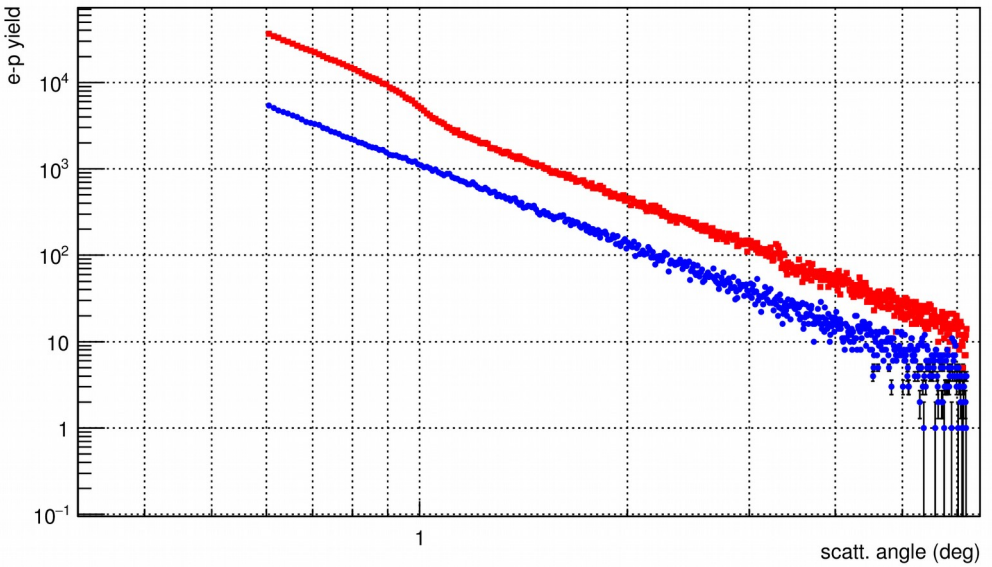
With vacuum box, beam pipe, etc...

Simulation

Red = source at up stream **0.5** meter
Blue = target at 0. (reference)



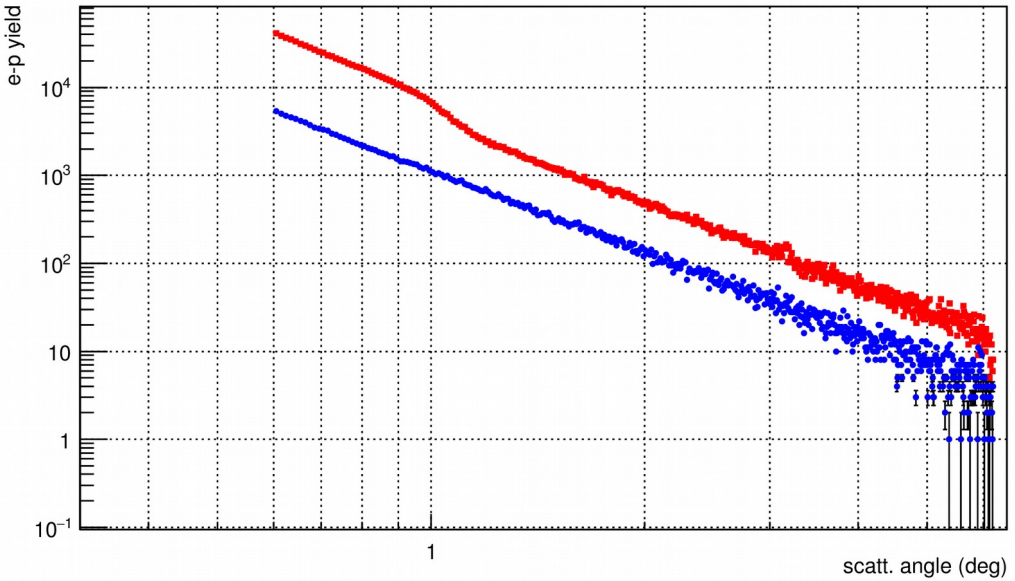
Red = source at up stream **4.5** meter
Blue = target at 0. (reference)



With vacuum box, beam pipe, etc...

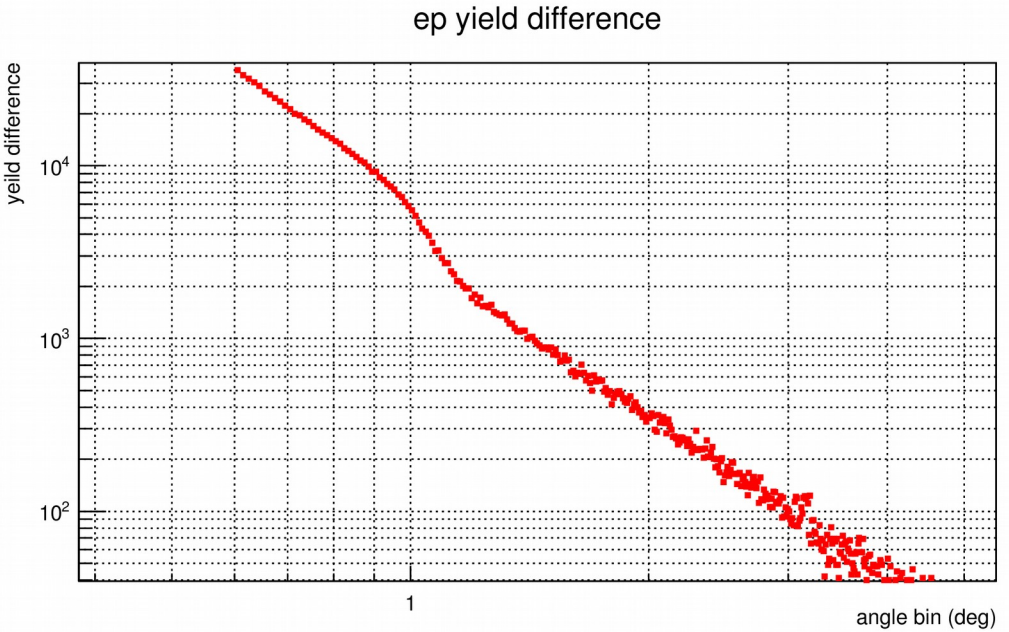
Simulation

Red = source at up stream **5.0** meter
Blue = target at 0. (reference)

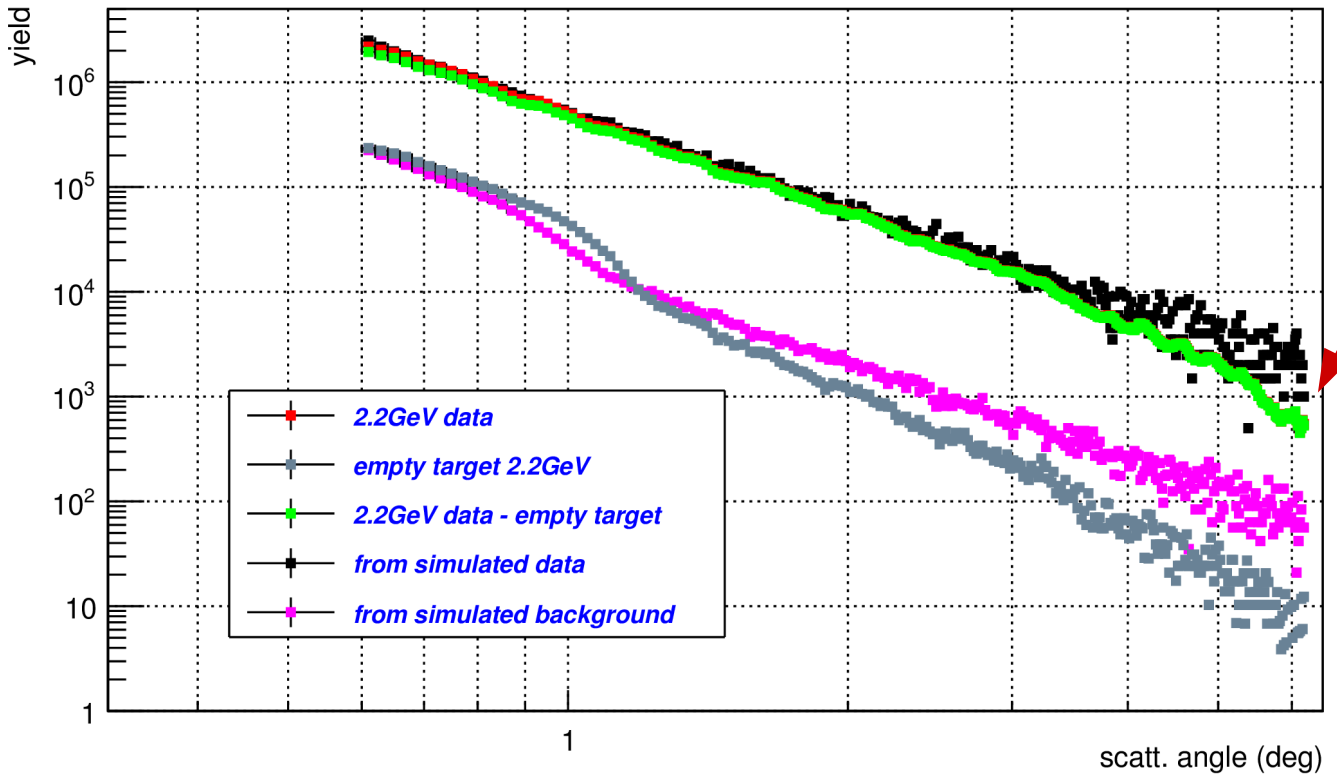


With vacuum box, beam pipe, etc...

Difference relative to reference



Compare with data



Due to geometry acceptance

Summary:

- down stream source won't introduce bump to the e-p yield
- The bump should be due to source at upstream >= 5.0 meters away, after subtraction, bump should disappear.
- Larger angle bin has lower background,

  possible reason: higher angle has better Z resolution --> better noise rejection

  possibly can be confirmed by introduce GEM and HyCal resolution into simulation
- Background: seems not so easy to simulate.