SoLID SIDIS He3 target collimator optimization

Zhiwen Zhao and Tianbo Liu

2016/12/12

Design

PAC35(2010) design

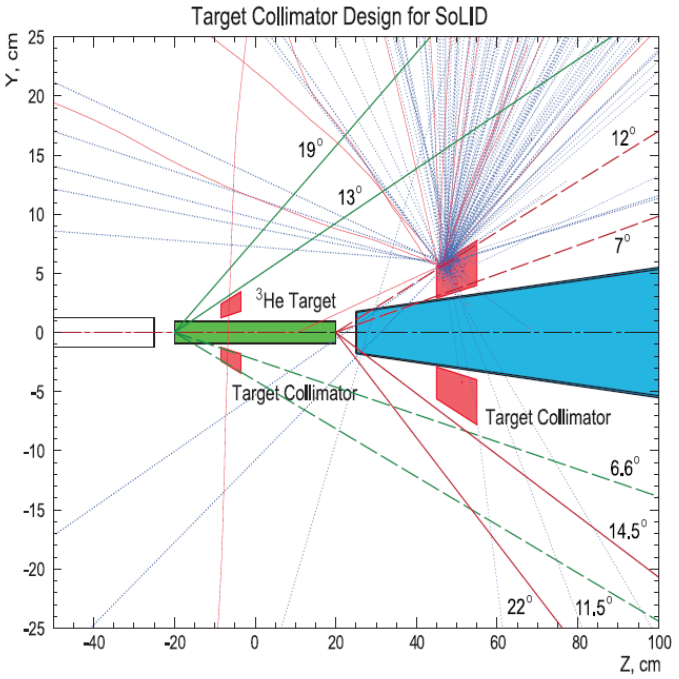


Figure 18: The target collimator is shown as red box in the plot. Their shape is "cone" which is around the beam pipe (blue). The x-axis scale is from -50 to 150 cm, while the y-axis scale is from -25 to 25 cm.

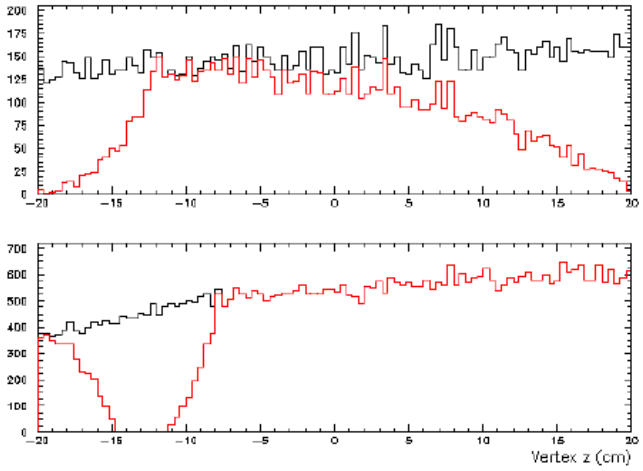


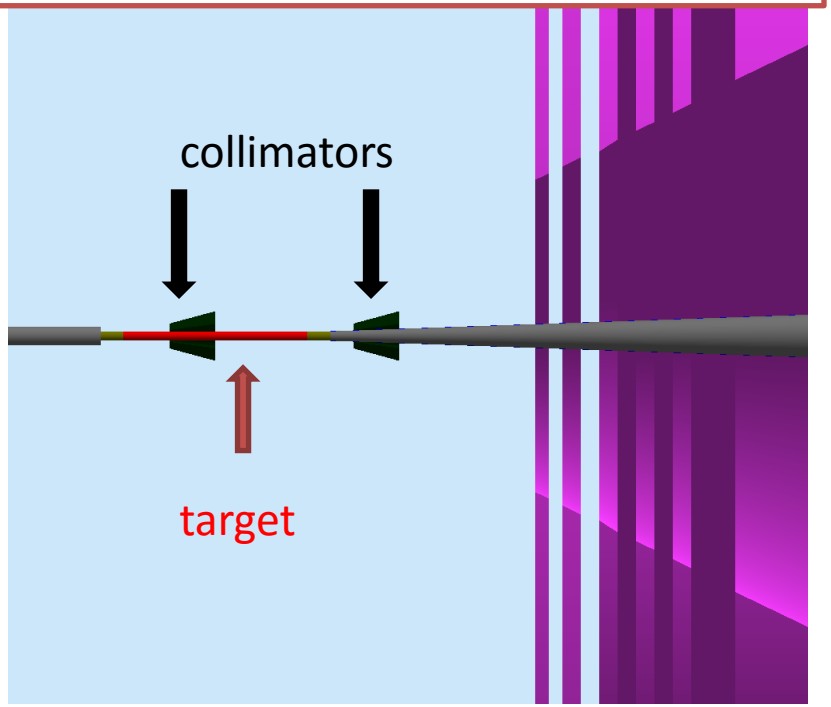
Figure 19: The acceptance effect of the target collimator. The black lines show the acceptance without the collimator and the red lines show the acceptance with the collimator. The upper panel is for the forward-angle detection and the bottom panel is for the large-angle detection. The simulated momentum range is from 0.9 GeV/c to 7.0 GeV/c at forward-angles and 3.5 GeV/c to 7.0 GeV/c at large-angles. The distribution is assumed to be uniform within the simulated momentum ranges.

Current Design

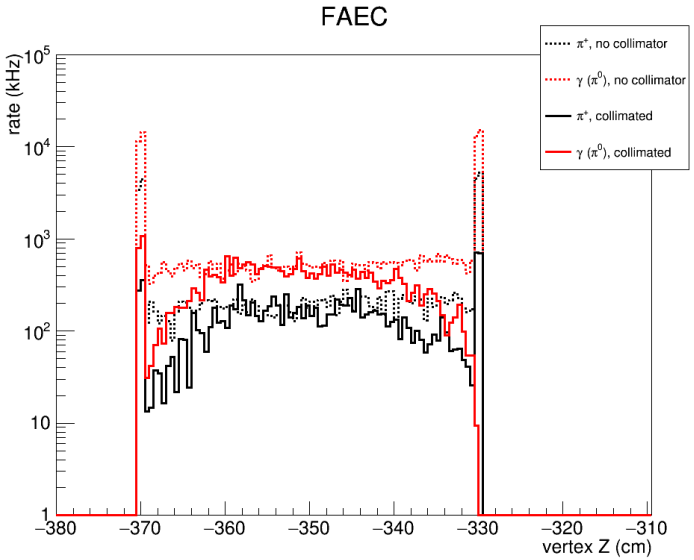
(Both block 7.5 – 15deg, 15cm away,10cm thick tungsten powder)

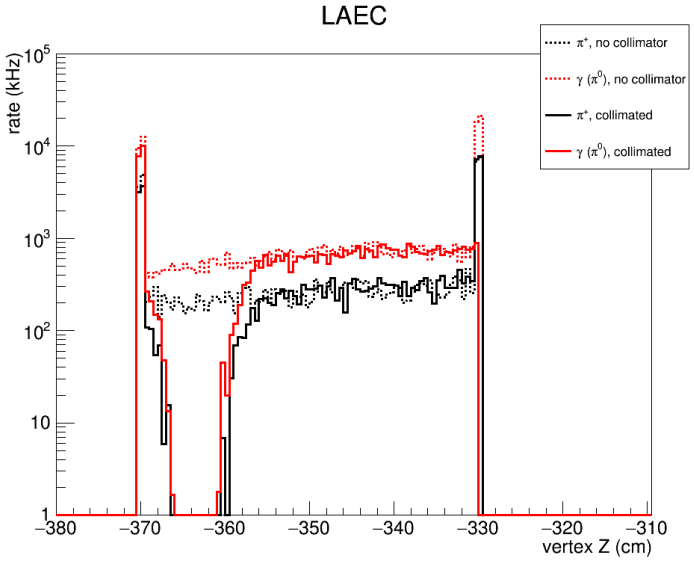
- the smaller, the less blocking of gas, so closer to windows
- Need small beam pipe downstream

- After 2015 director review, material change from pure tungsten to tungsten powder by reducing density by from 19.3 to 11.3
- The hadron trigger rate from both windows increase by about 30%



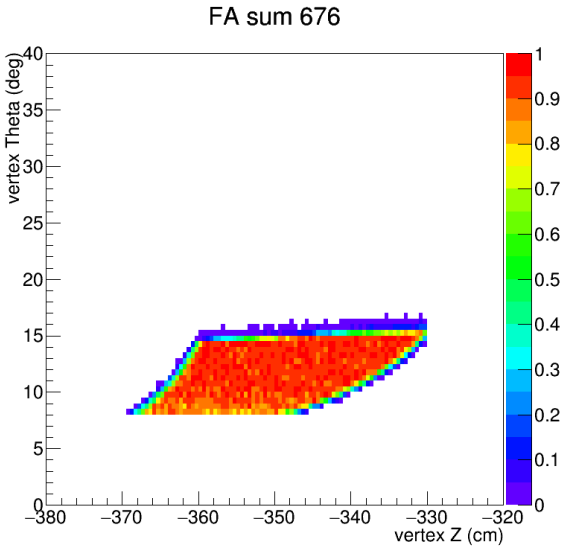
Plots shows pure tungsten blocking effect

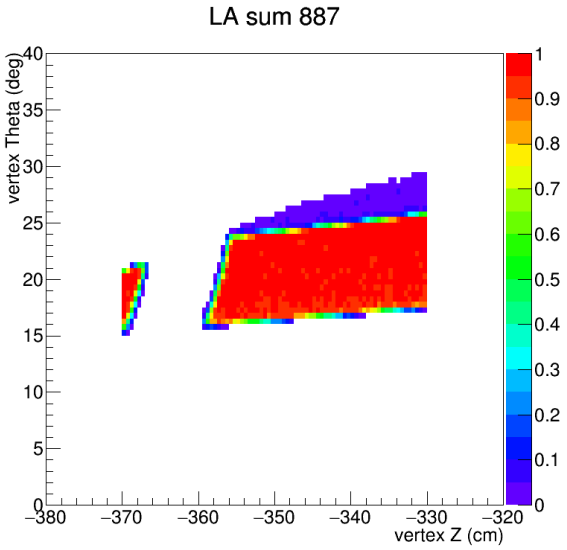


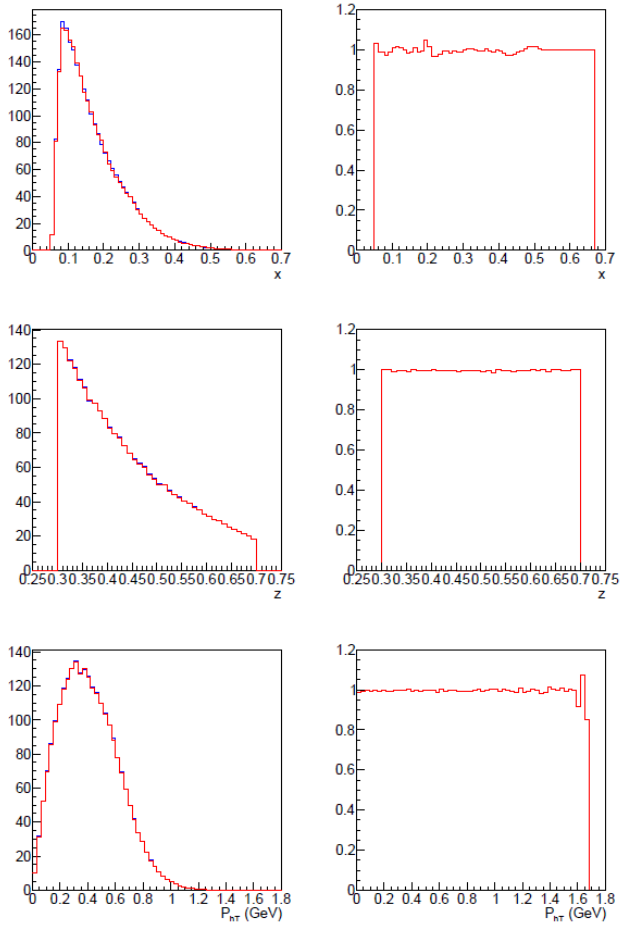


Current Collimator

(Both block 7.5 – 15deg, 15cm away,10cm thick kryptonite)

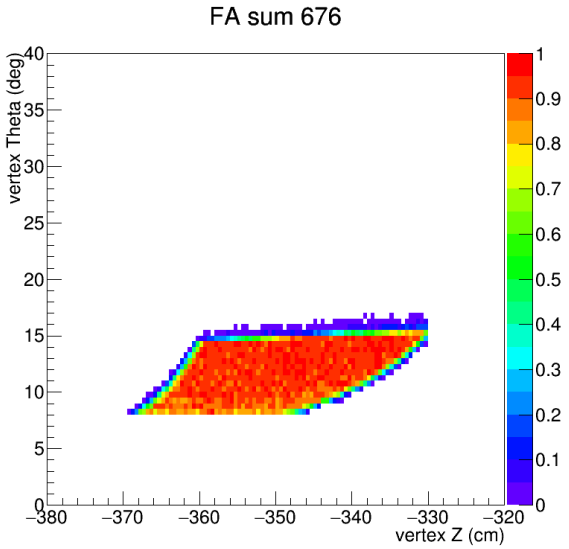


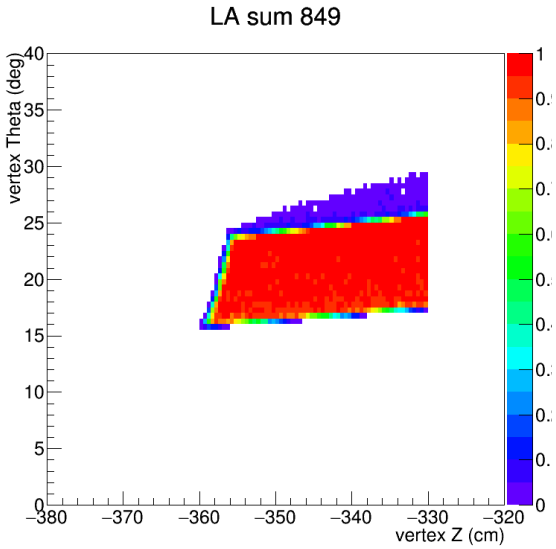


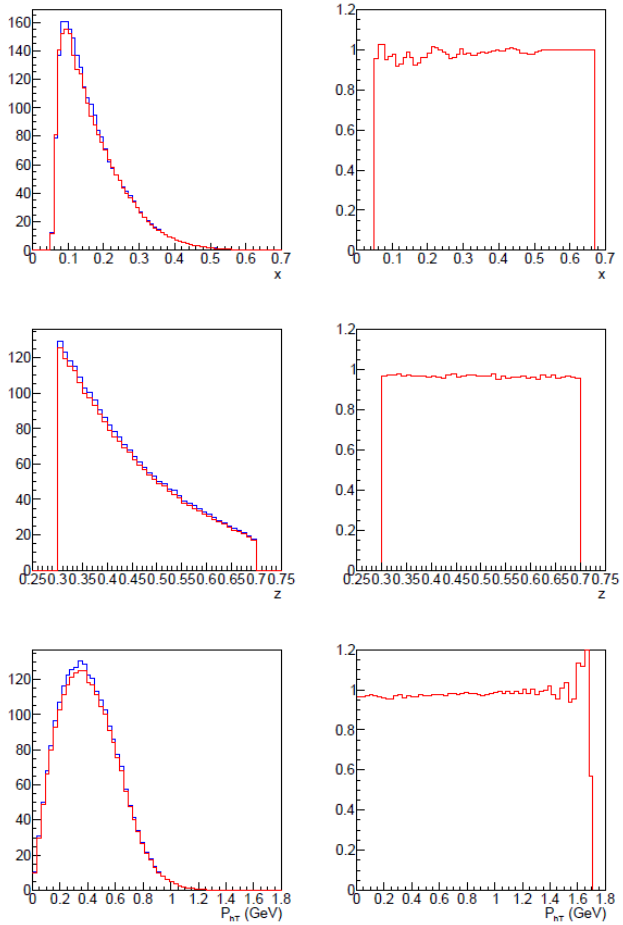


New Collimator 1

(Upstream block 7.5 – 24deg, downstream block 7.5 – 15deg , 15cm away,10cm thick kryptonite)

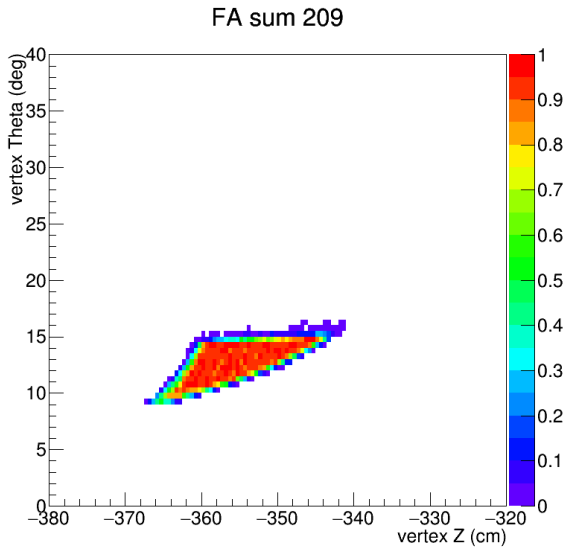


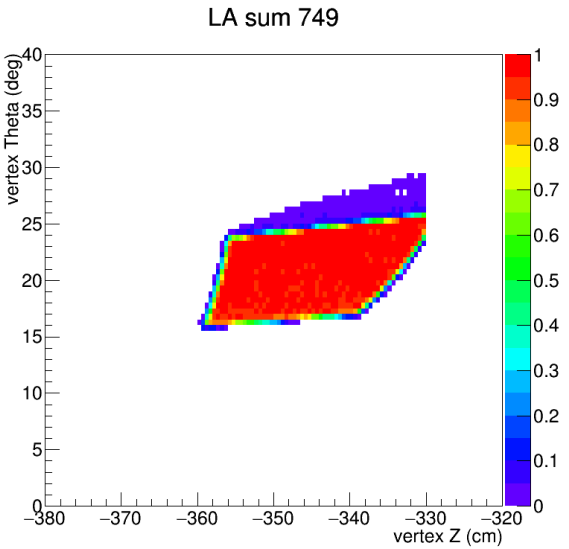


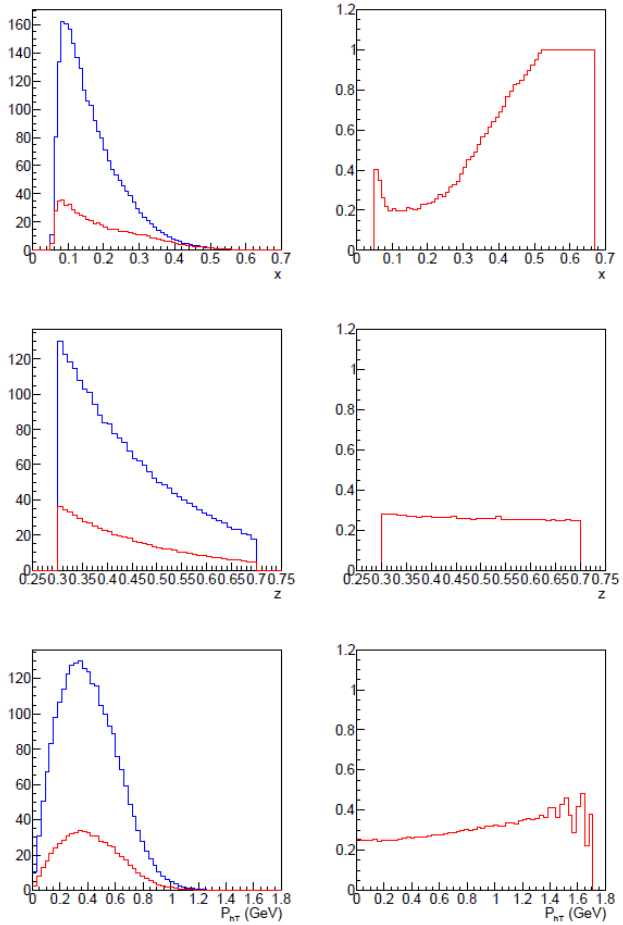


New Collimator 2

(both block 7.5 – 24deg, 15cm away,10cm thick kryptonite)

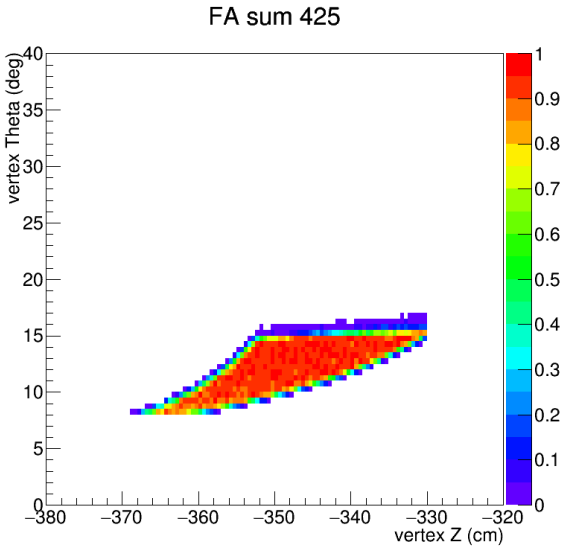


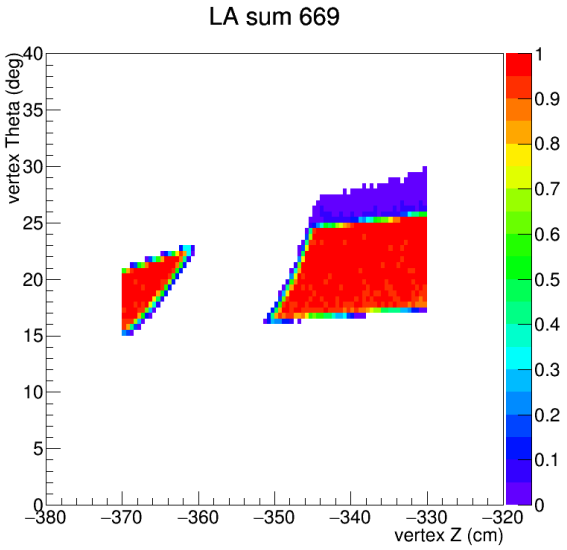


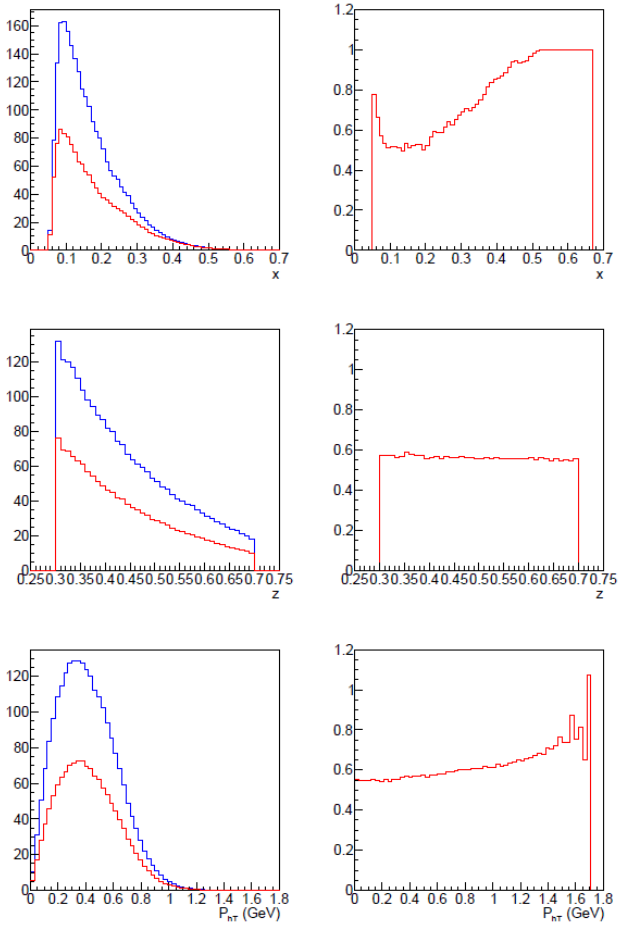


New Collimator 3

(both block 7.5 – 15deg, 30cm away,10cm thick kryptonite)

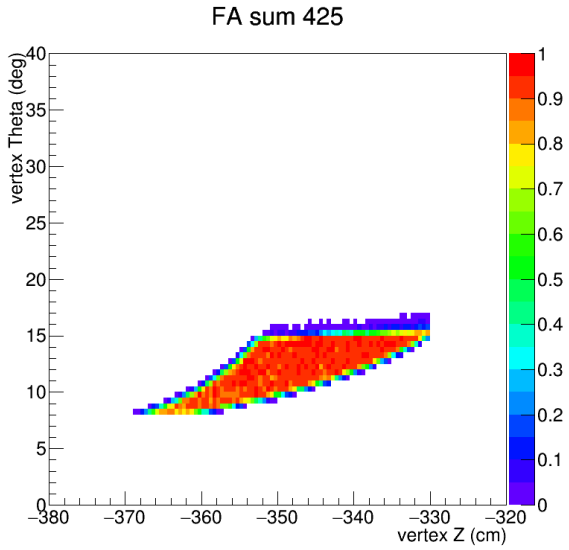


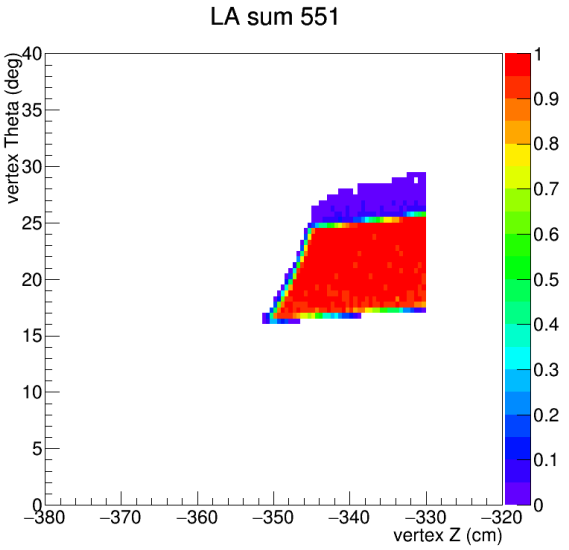


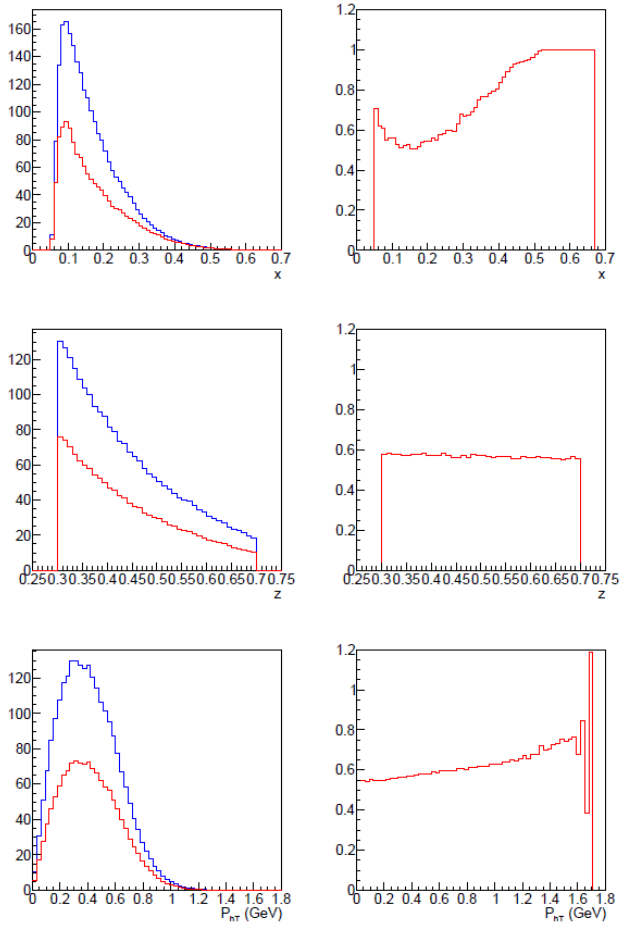


New Collimator 4

(Upstream block 7.5 – 24deg, downstream block 7.5 – 15deg, 30cm away,10cm thick kryptonite)







New Collimator 5

(both block 7.5 – 24deg, 30cm away,10cm thick kryptonite)