

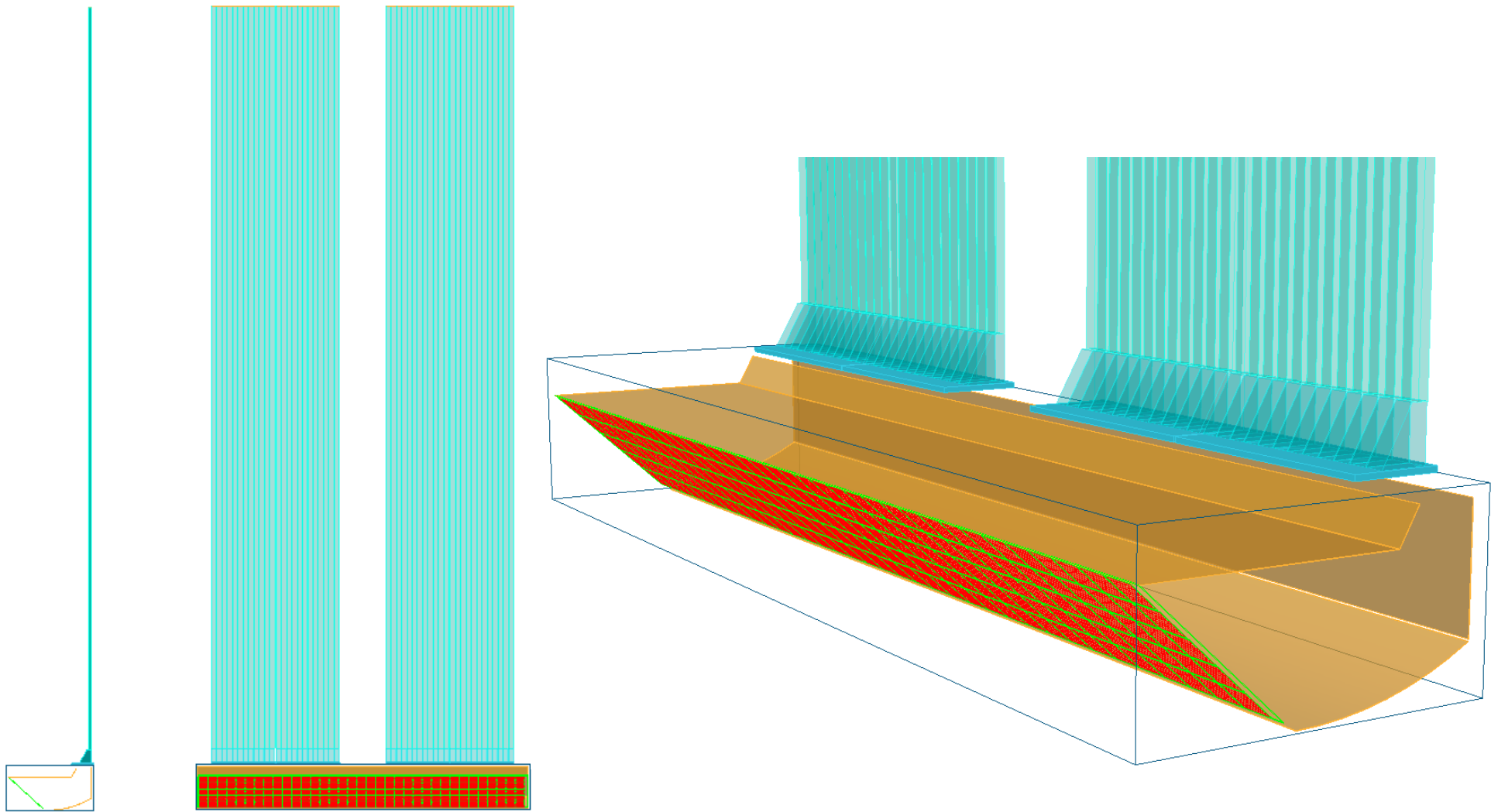
# Status of gluexdirc simulations with Geant4

- Geometry
- Focusing
- LUT reconstruction
- Source code

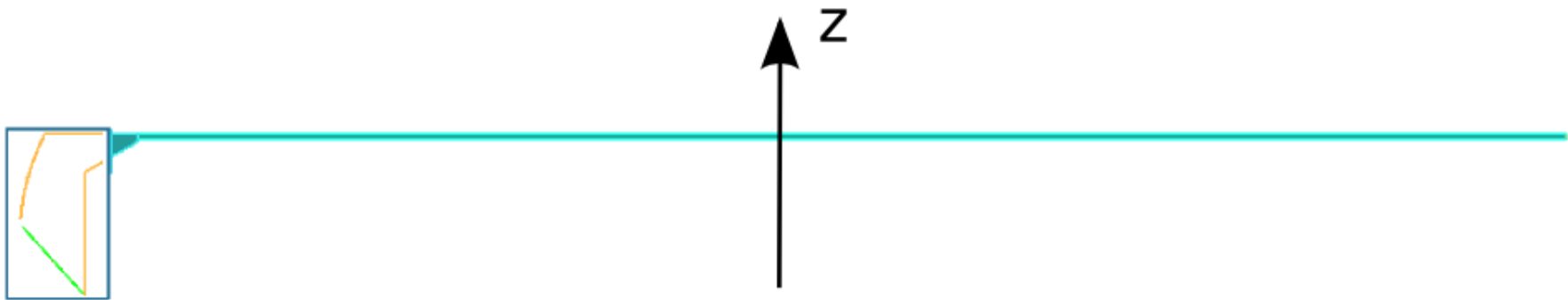
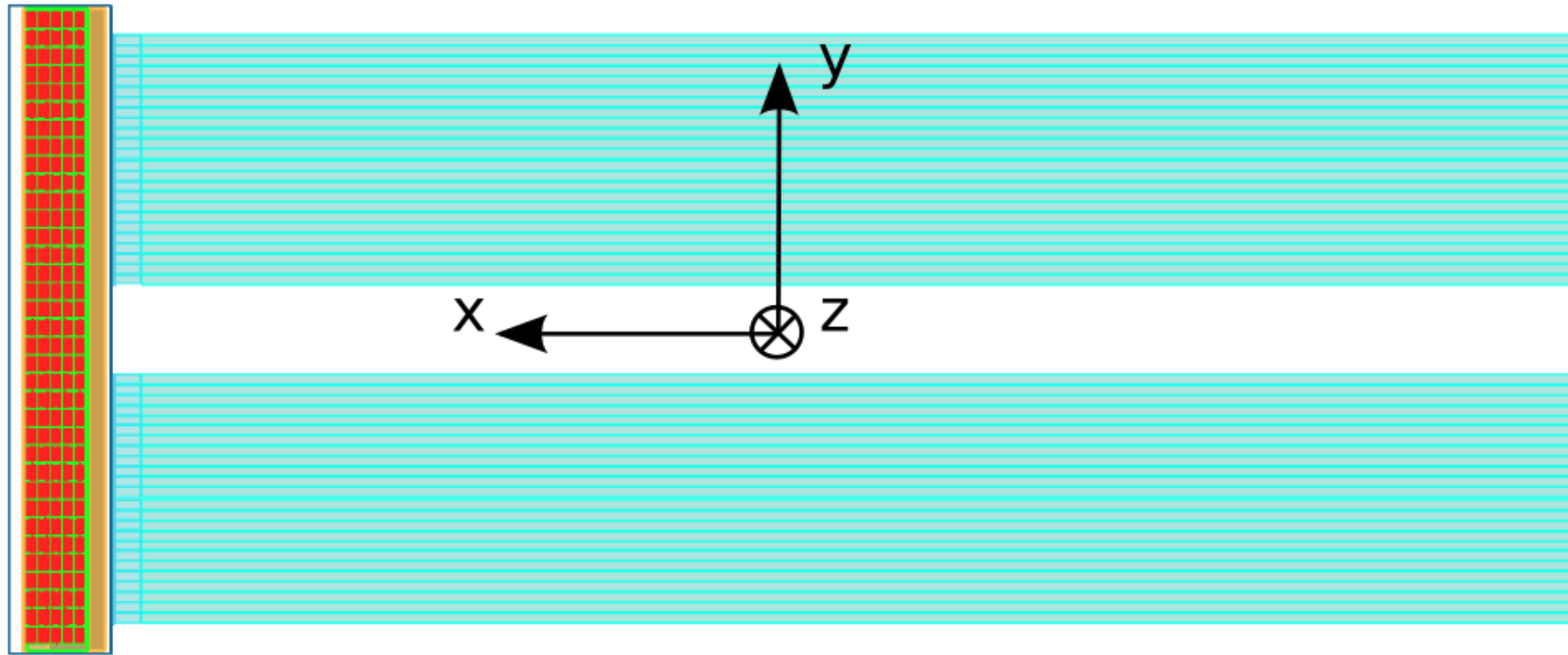
Roman Dzhygado



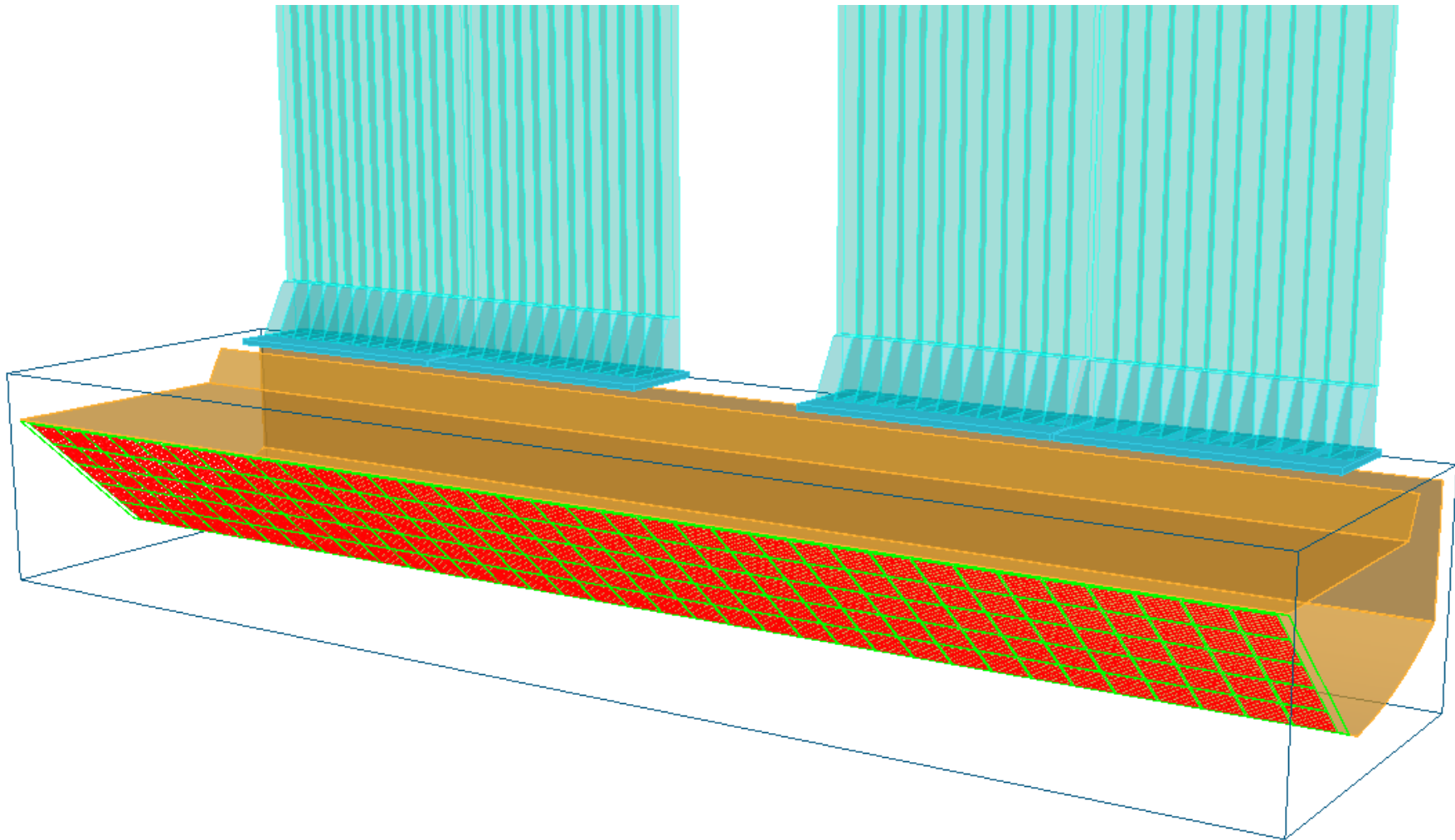
# Geant4 geometry



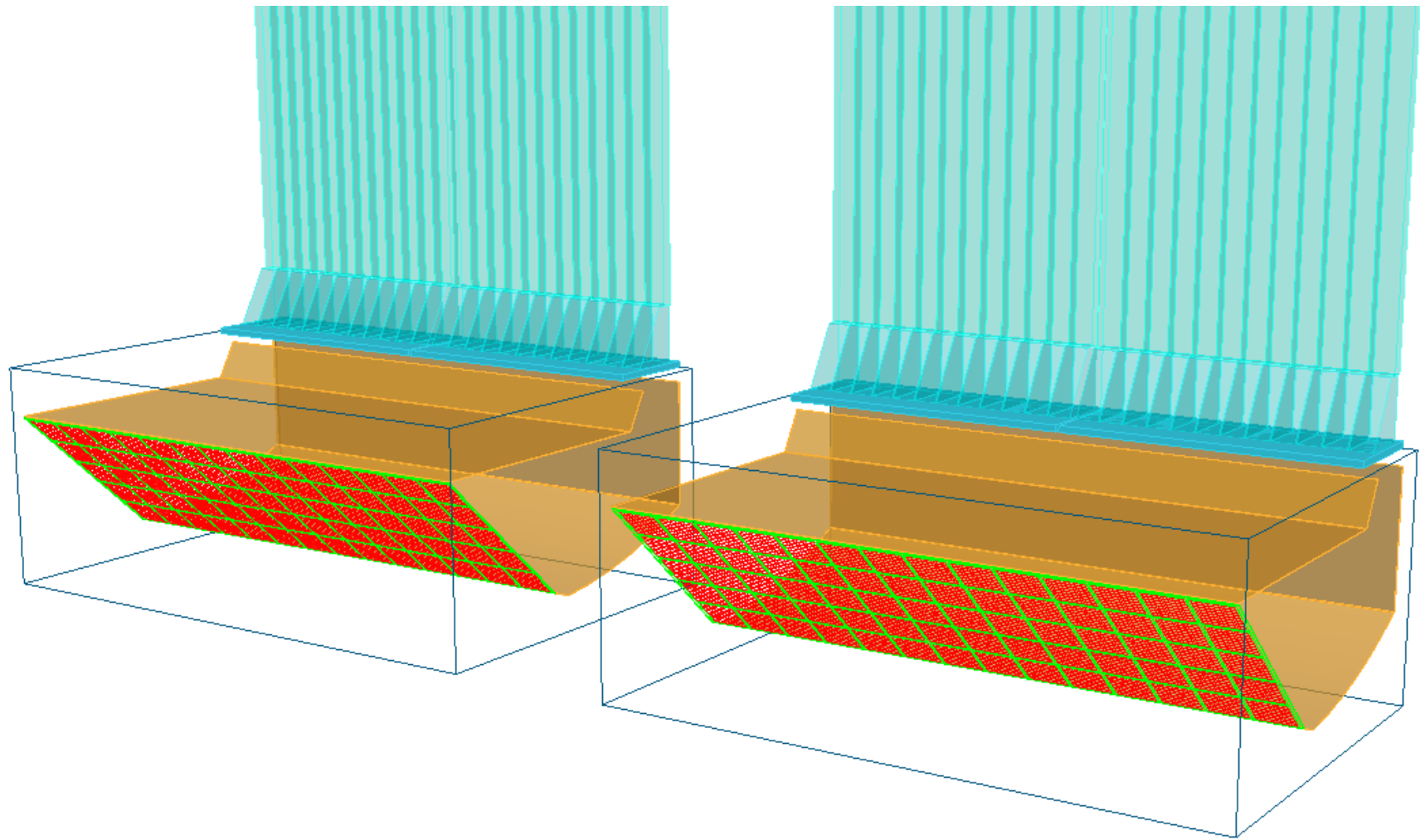
# Geant4 geometry



# Geant4 geometry

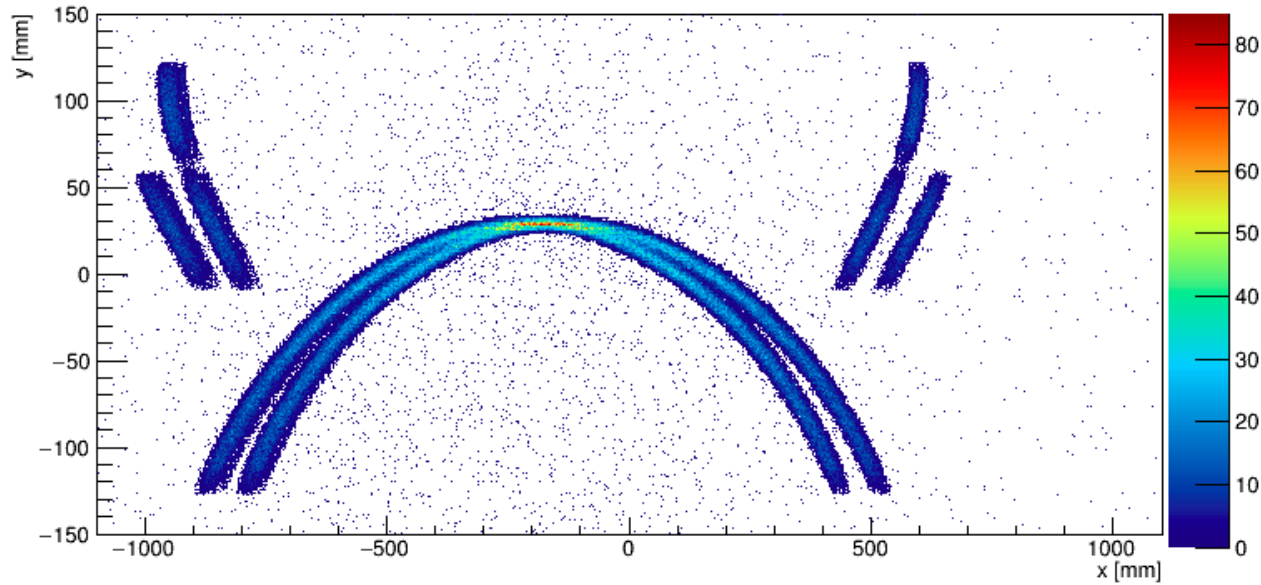


# Geant4 geometry

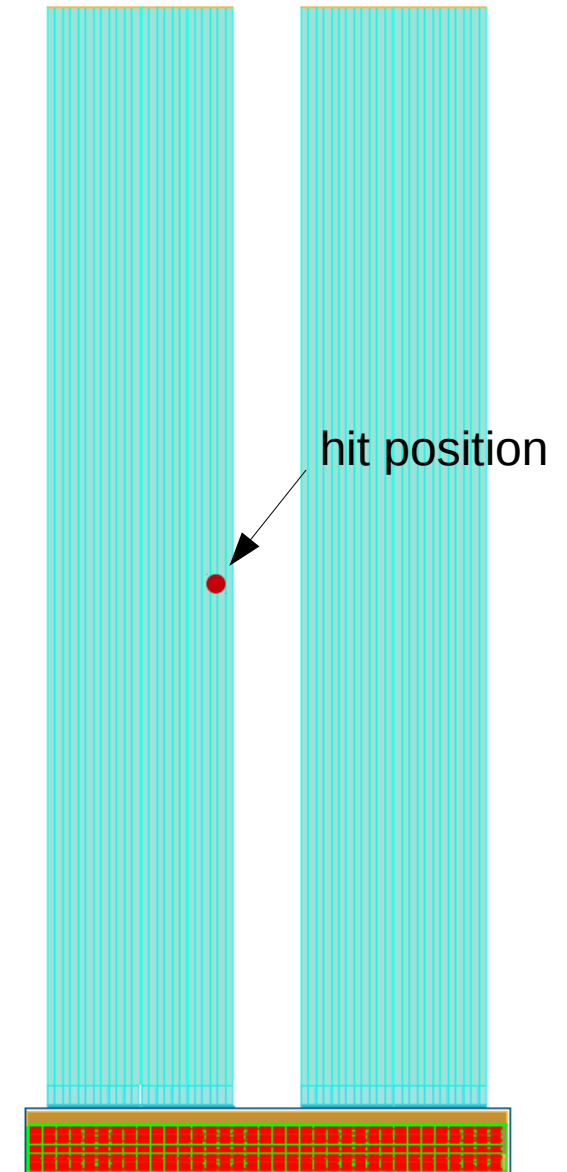
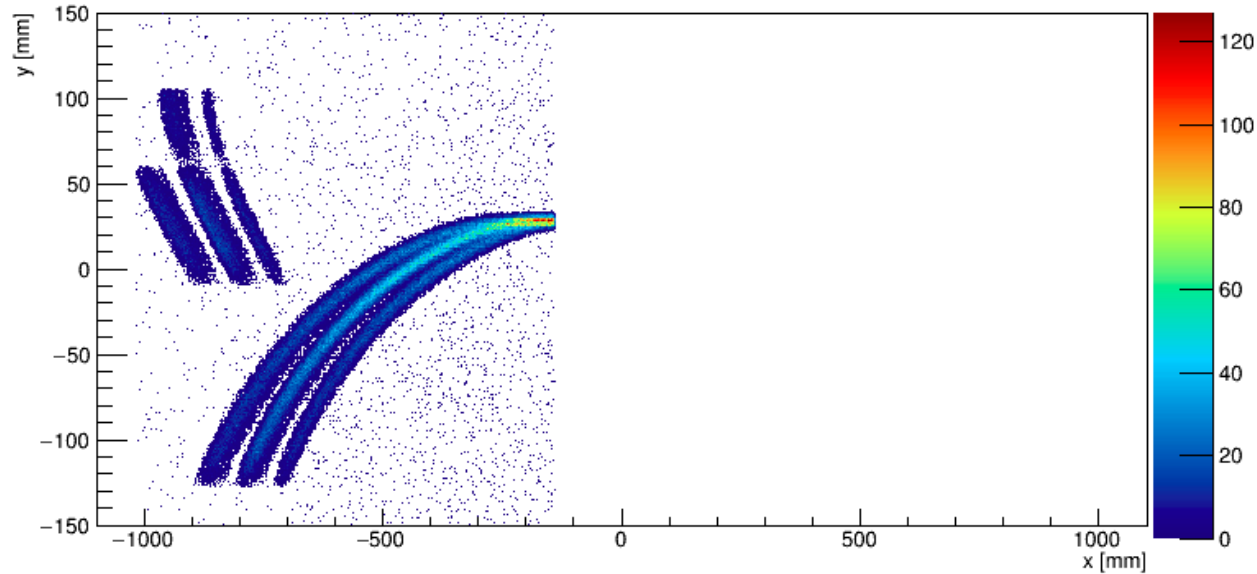


# Hit pattern

$\theta=1.64$ ,  $\varphi=86.07$ ,  $R=800$ ,  $T=16^\circ$ ,  $N=421186$

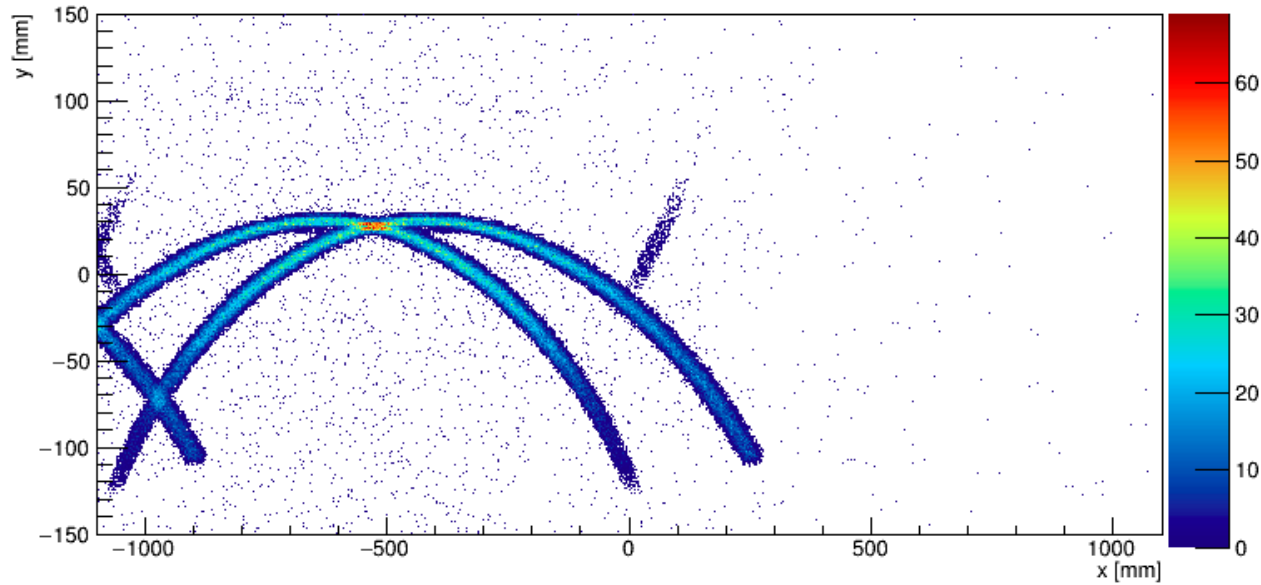


$\theta=1.64$ ,  $\varphi=86.07$ ,  $R=800$ ,  $T=16^\circ$ ,  $N=342844$

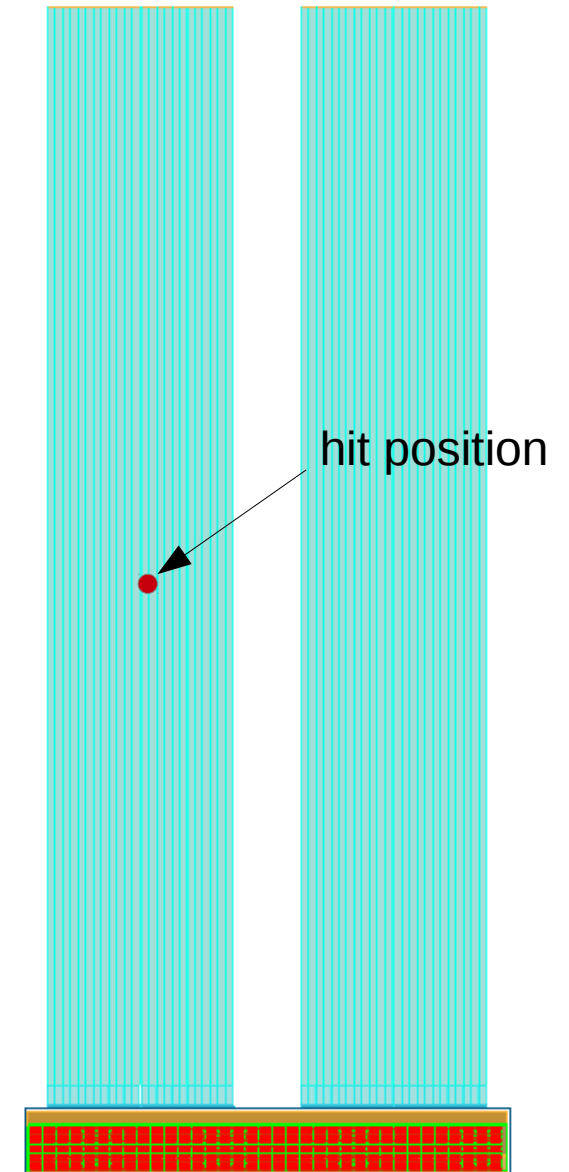
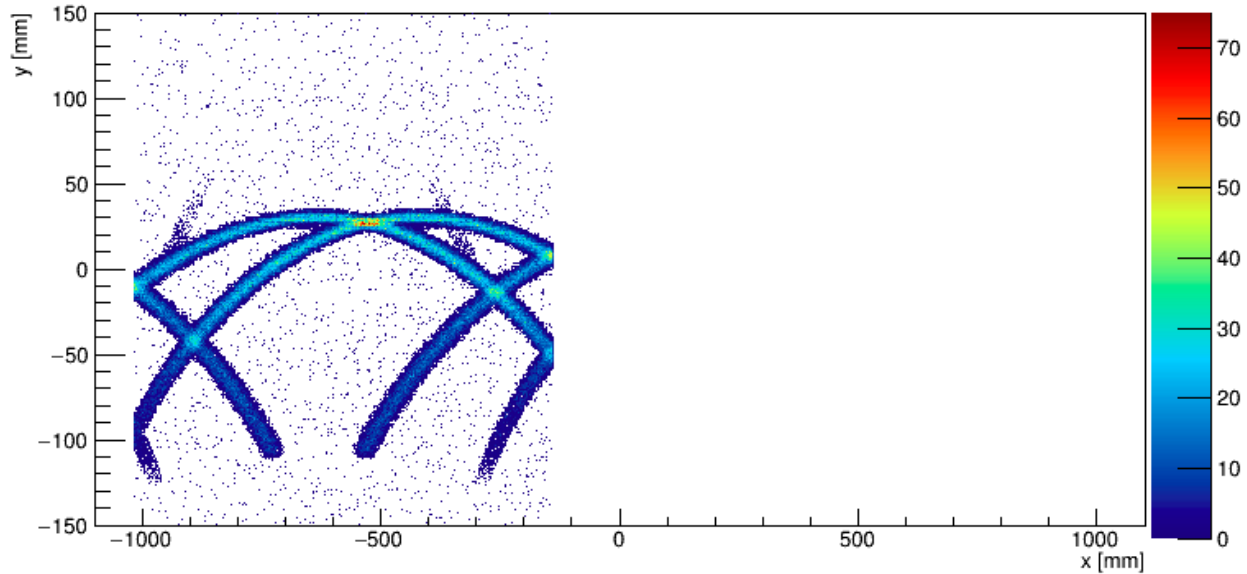


# Hit pattern

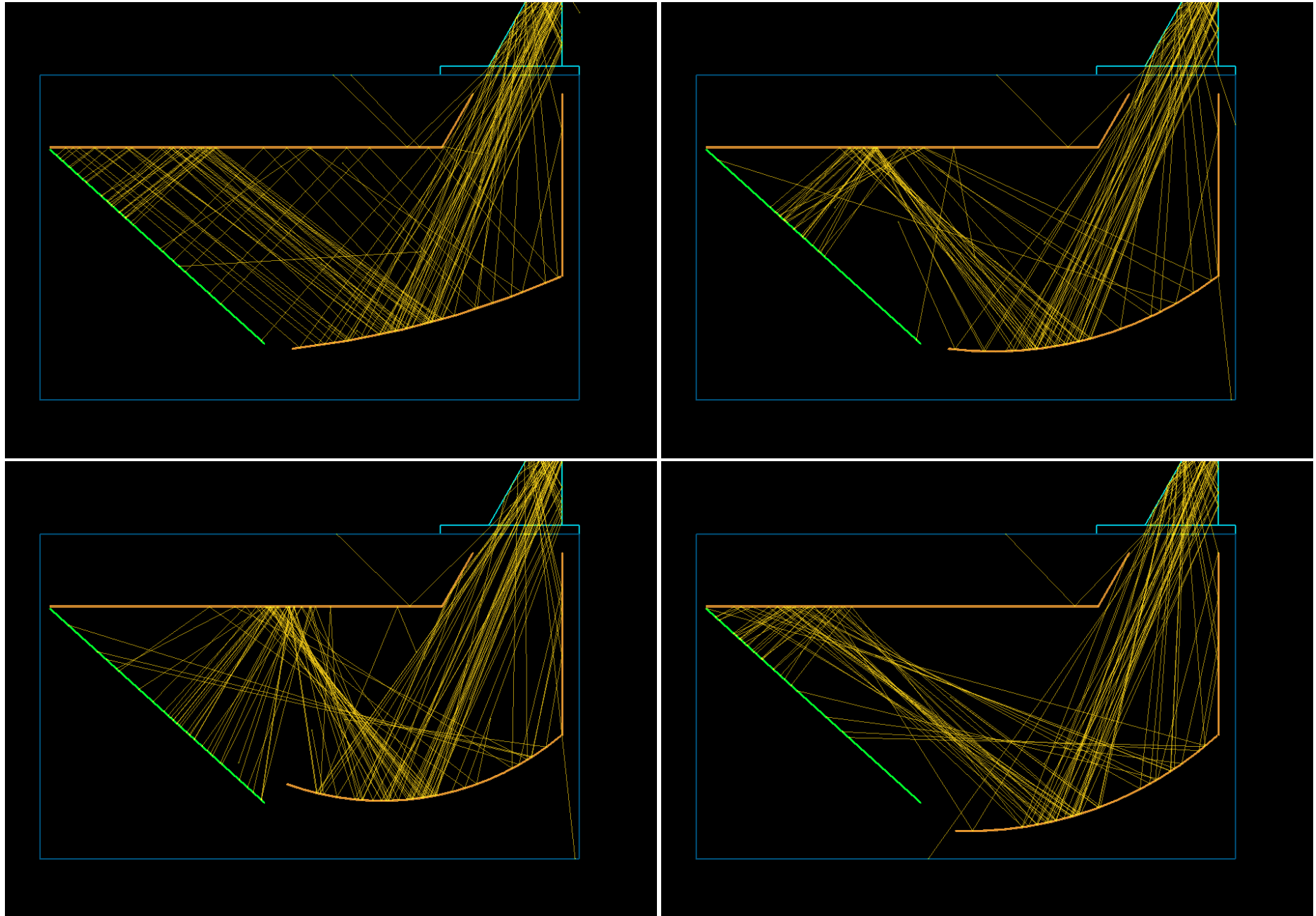
$\theta=5.49$ ,  $\varphi=88.83$ ,  $R=800$ ,  $T=16^\circ$ ,  $N=315230$



$\theta=5.49$ ,  $\varphi=88.83$ ,  $R=800$ ,  $T=16^\circ$ ,  $N=285432$



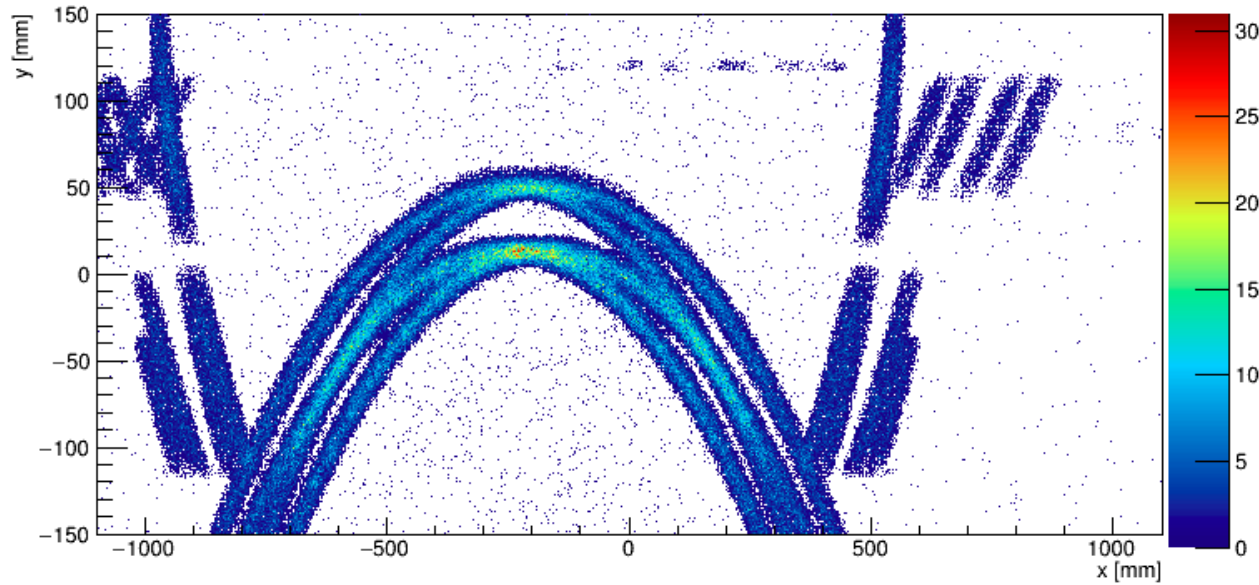
# Focusing mirror





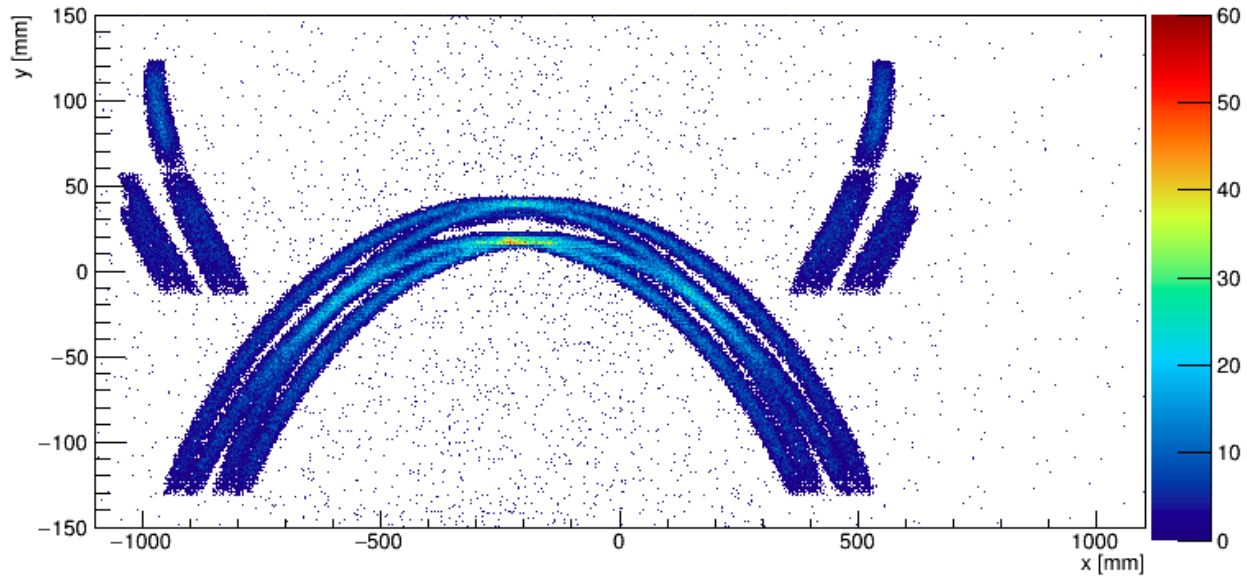
# Focusing mirror. Hit pattern

$\theta=2.70$ ,  $\varphi=130.70$ ,  $R=1900$ ,  $T=16^\circ$ ,  $N=369711$



$R = 1.9 \text{ m}$

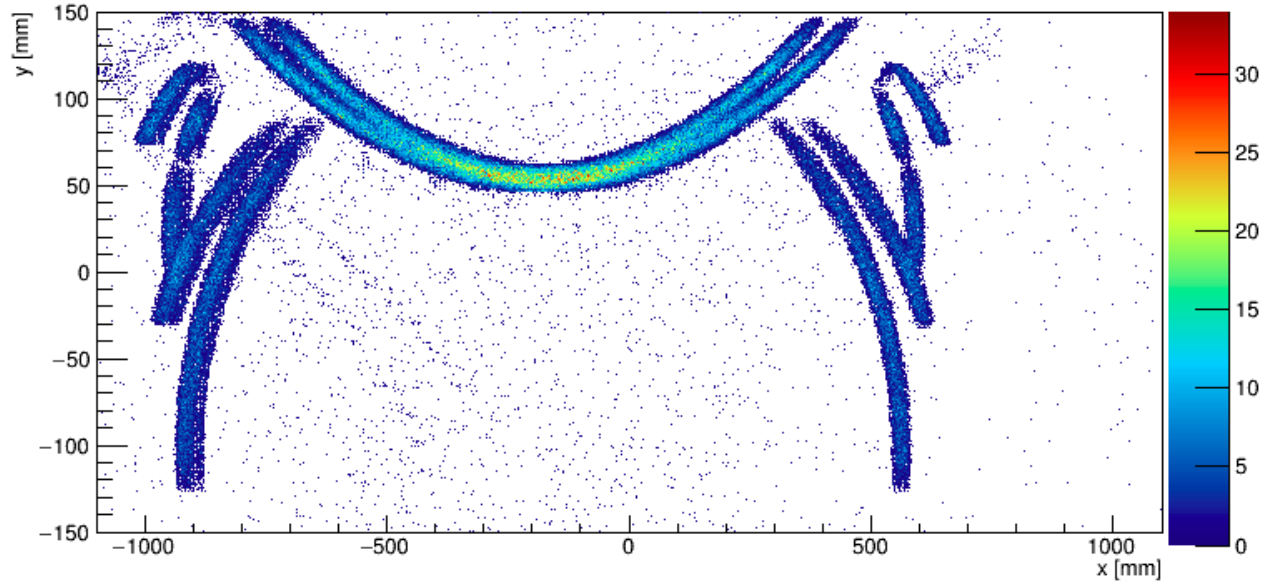
$\theta=2.70$ ,  $\varphi=130.70$ ,  $R=820$ ,  $T=16^\circ$ ,  $N=392668$



$R = 0.82 \text{ m}$

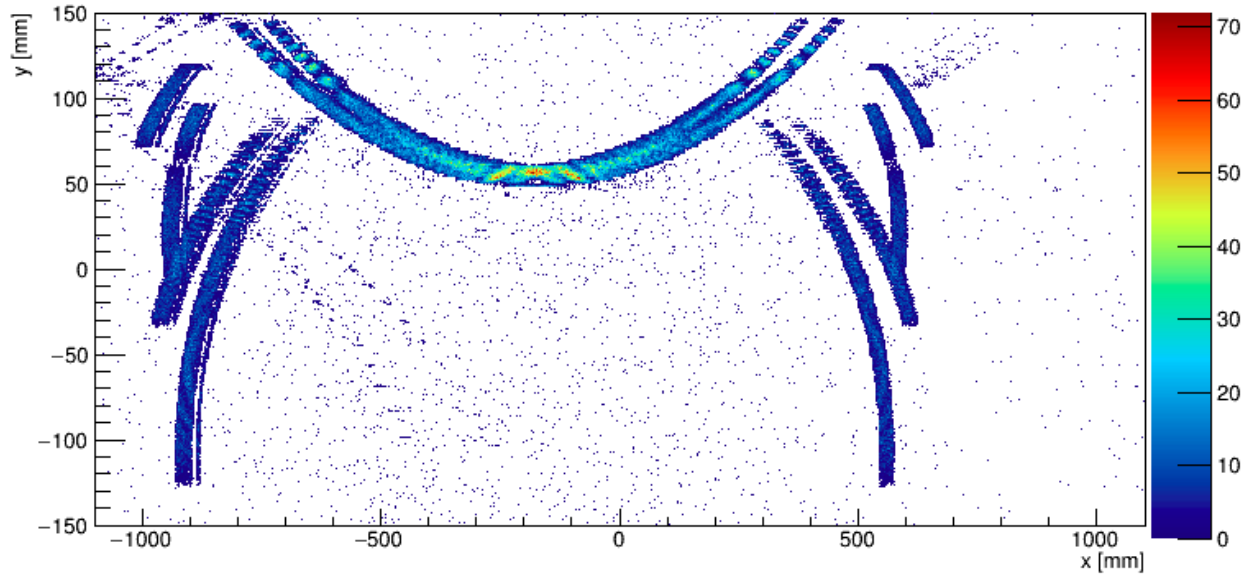
# Kaleidoscopic effect

$\theta=24.02$ ,  $\varphi=176.32$ ,  $R=800$ ,  $T=16^\circ$ ,  $N=269757$



Normal  
Cherenkov

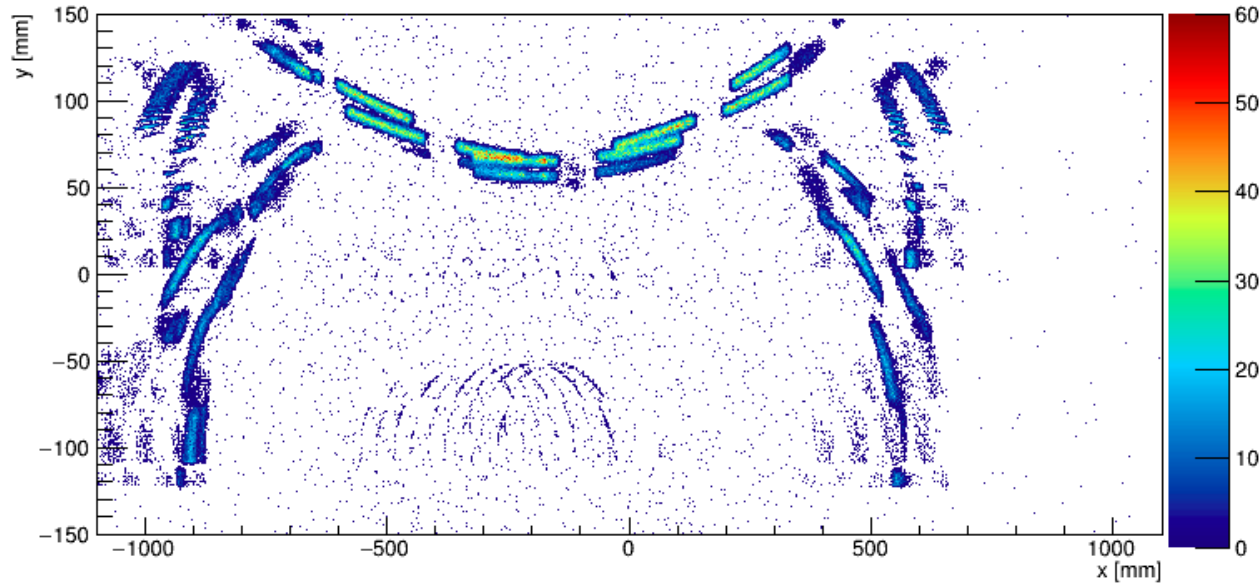
$\theta=24.02$ ,  $\varphi=176.32$ ,  $R=800$ ,  $T=16^\circ$ ,  $N=406483$



Monochromatic  
Cherenkov

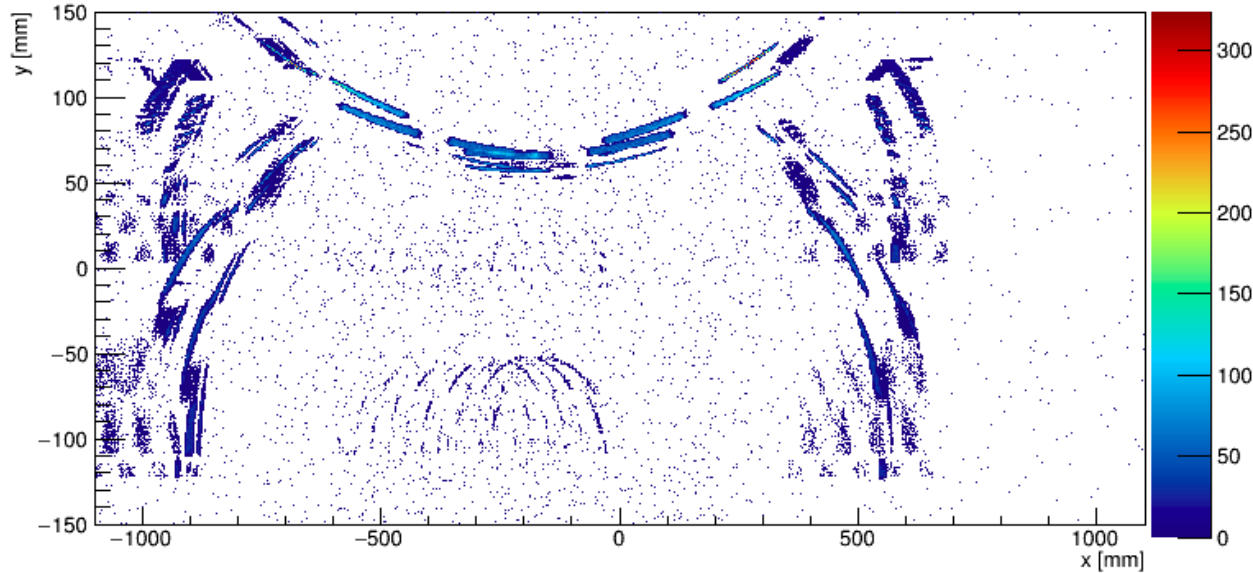
# Kaleidoscopic effect. Hit close to EV

$\theta=22.63$ ,  $\varphi=3.93$ ,  $R=800$ ,  $T=16^\circ$ ,  $N=303856$



Normal  
Cherenckov

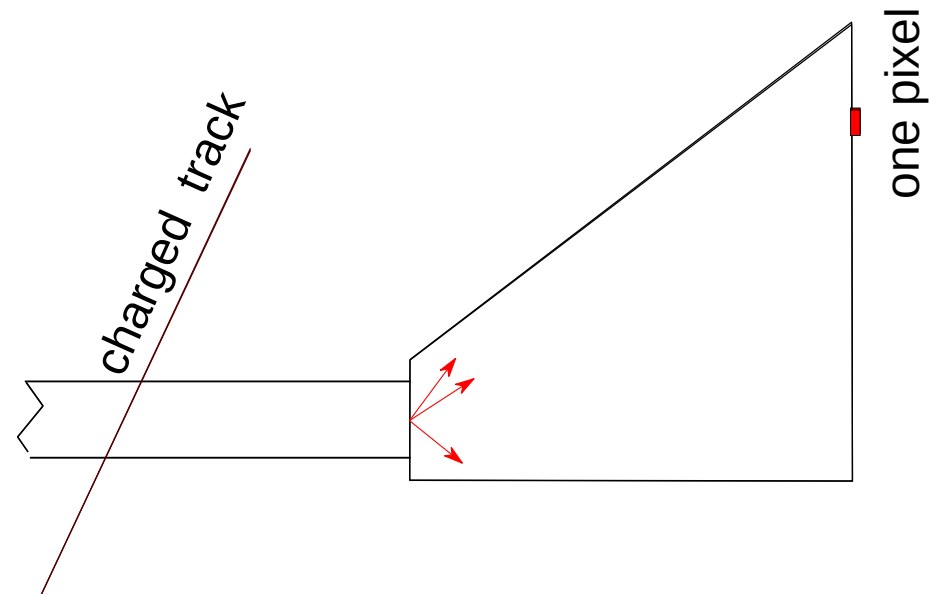
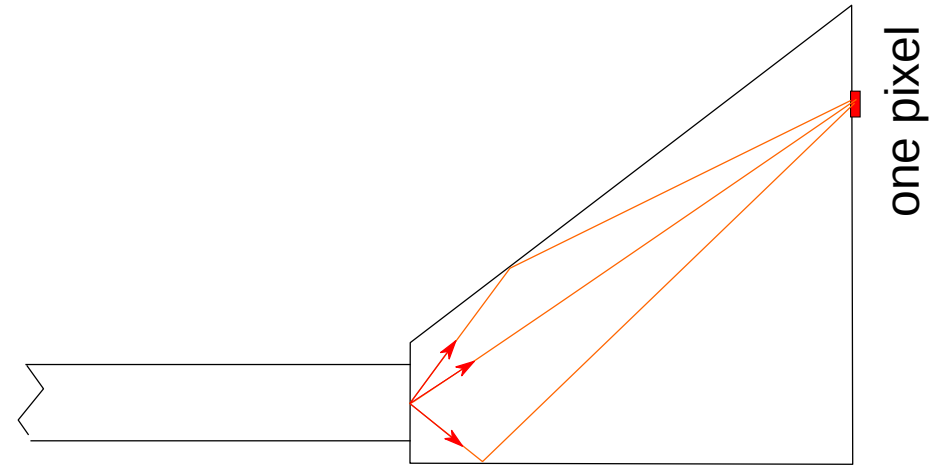
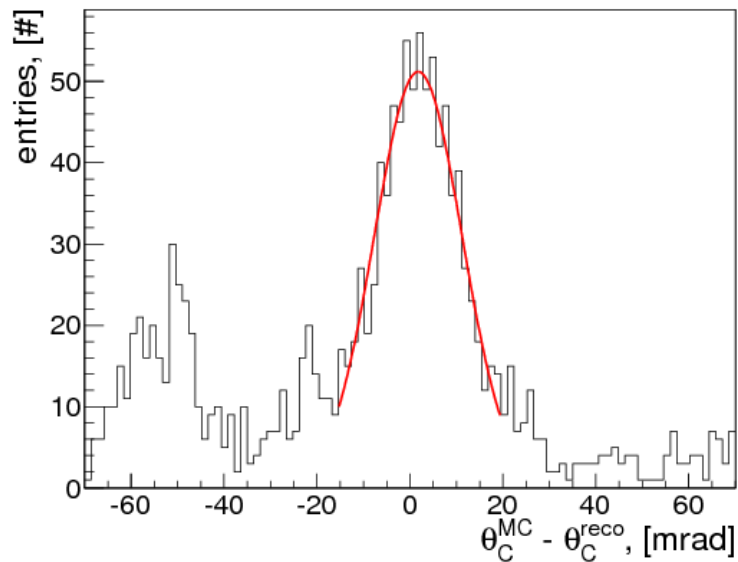
$\theta=22.63$ ,  $\varphi=3.93$ ,  $R=800$ ,  $T=16^\circ$ ,  $N=447440$



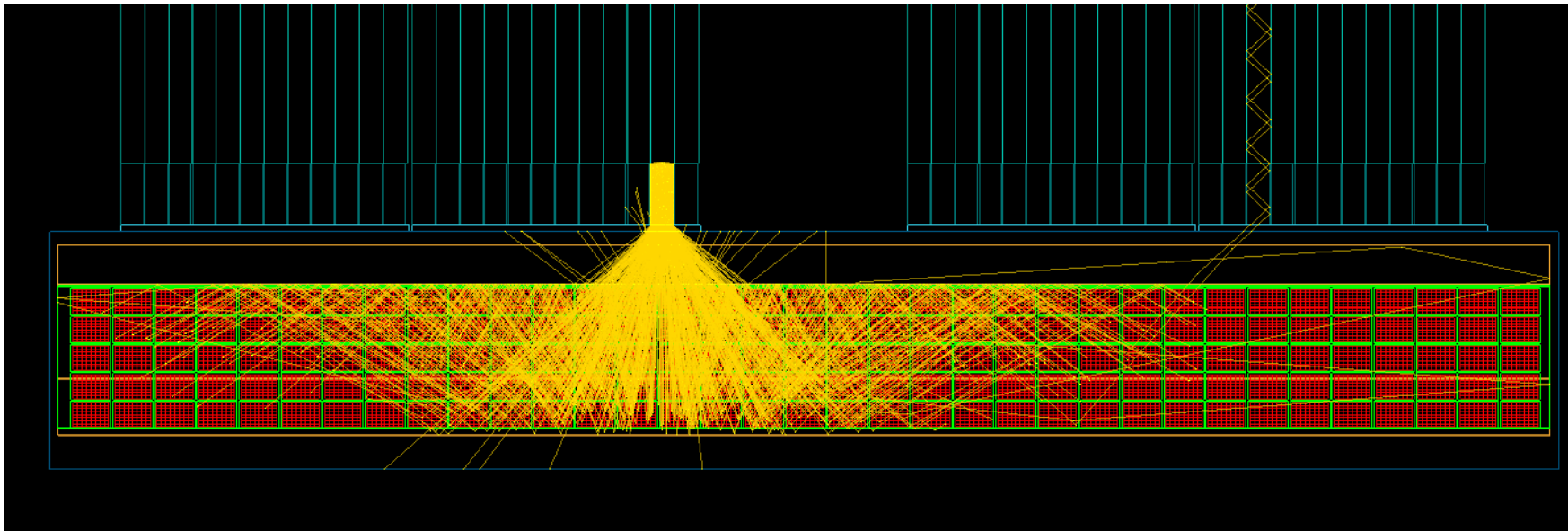
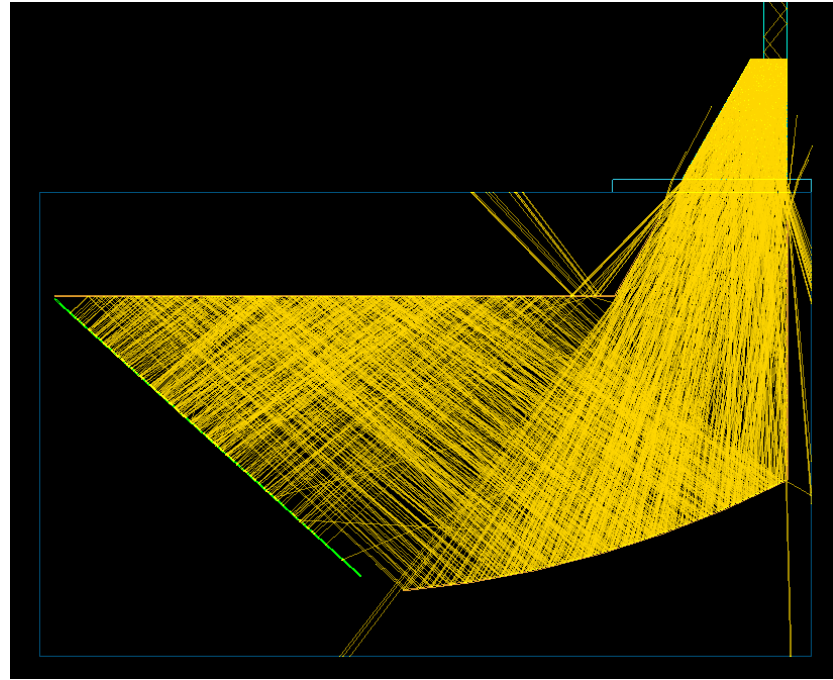
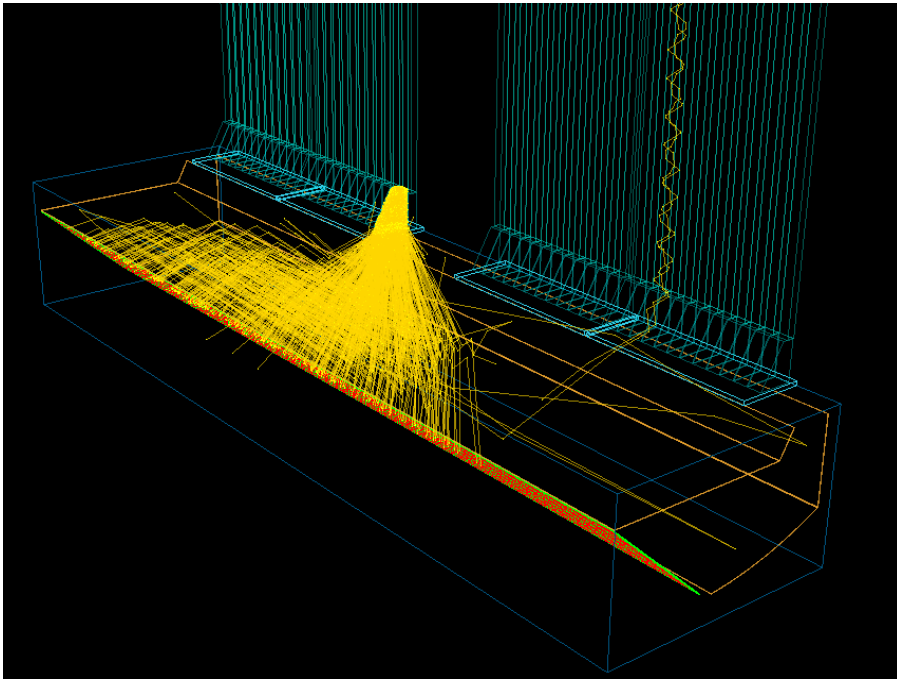
Monochromatic  
Cherenckov

# Look-Up Table reconstruction

- BABAR-like reconstruction
- **LUT creation:** store direction at the end of the radiators for each fired pixel by full simulation using photon gun.
- **Reconstruction:** direction from LUT for fired pixels are combined with charge track direction.

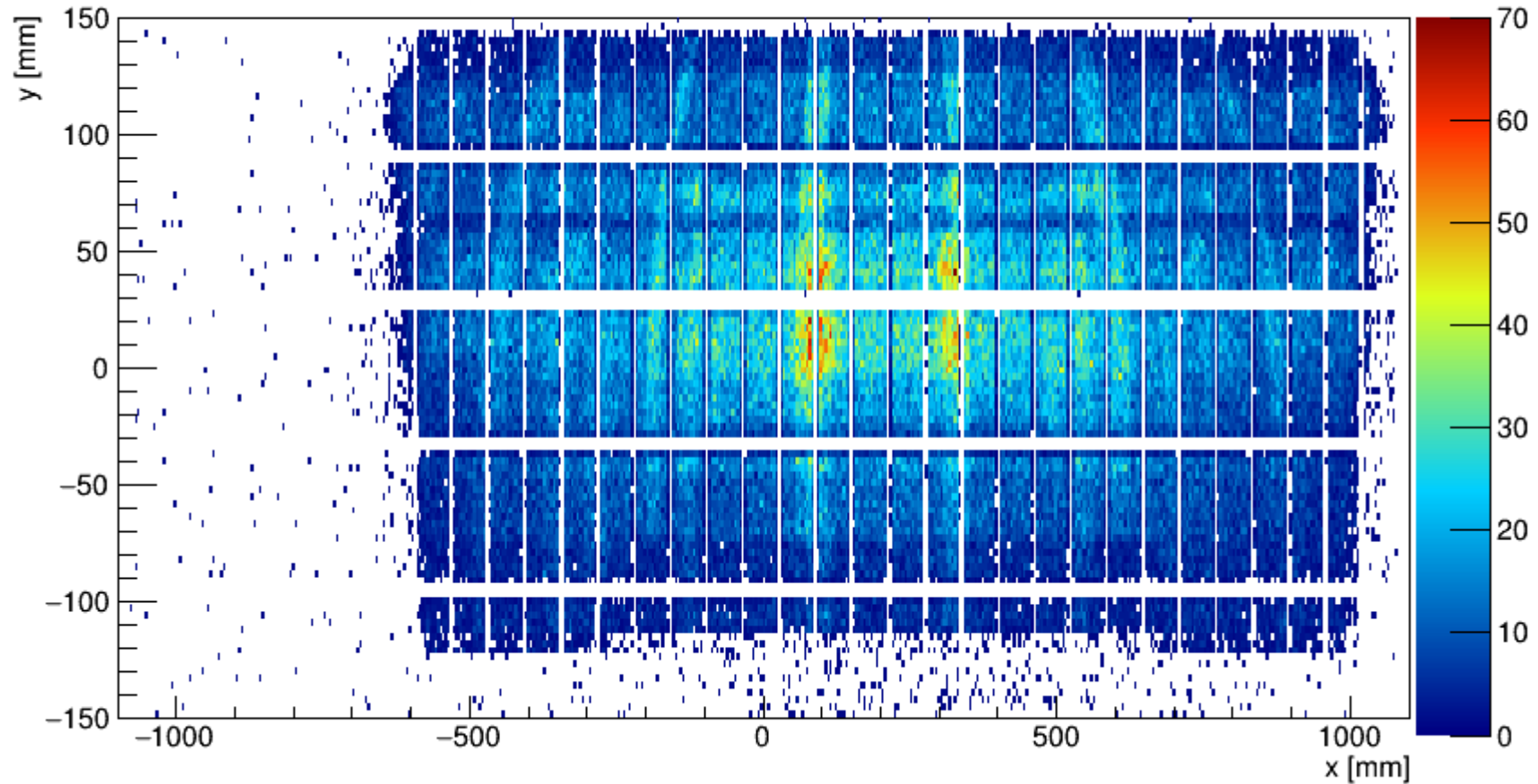


# Look-Up Table generation

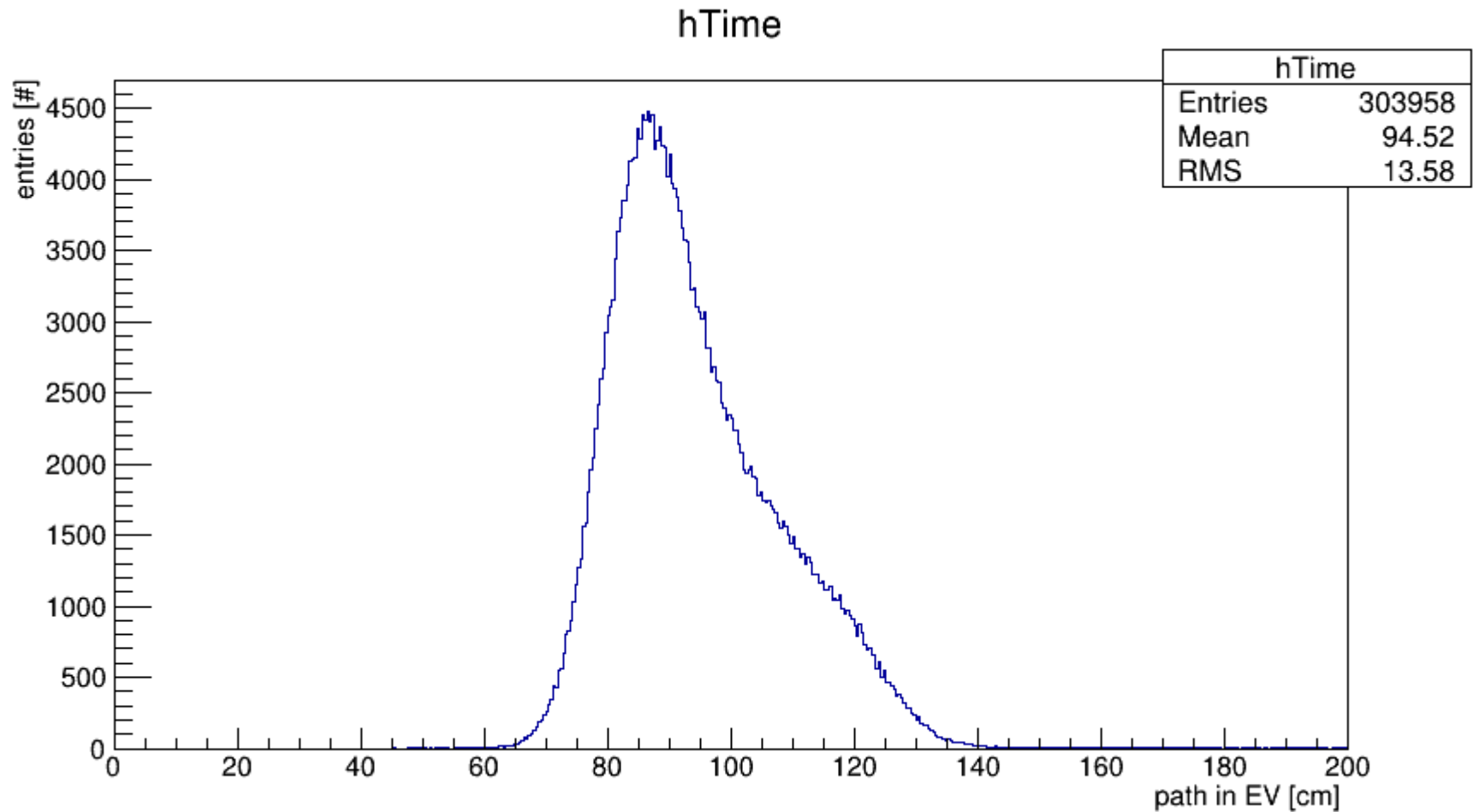




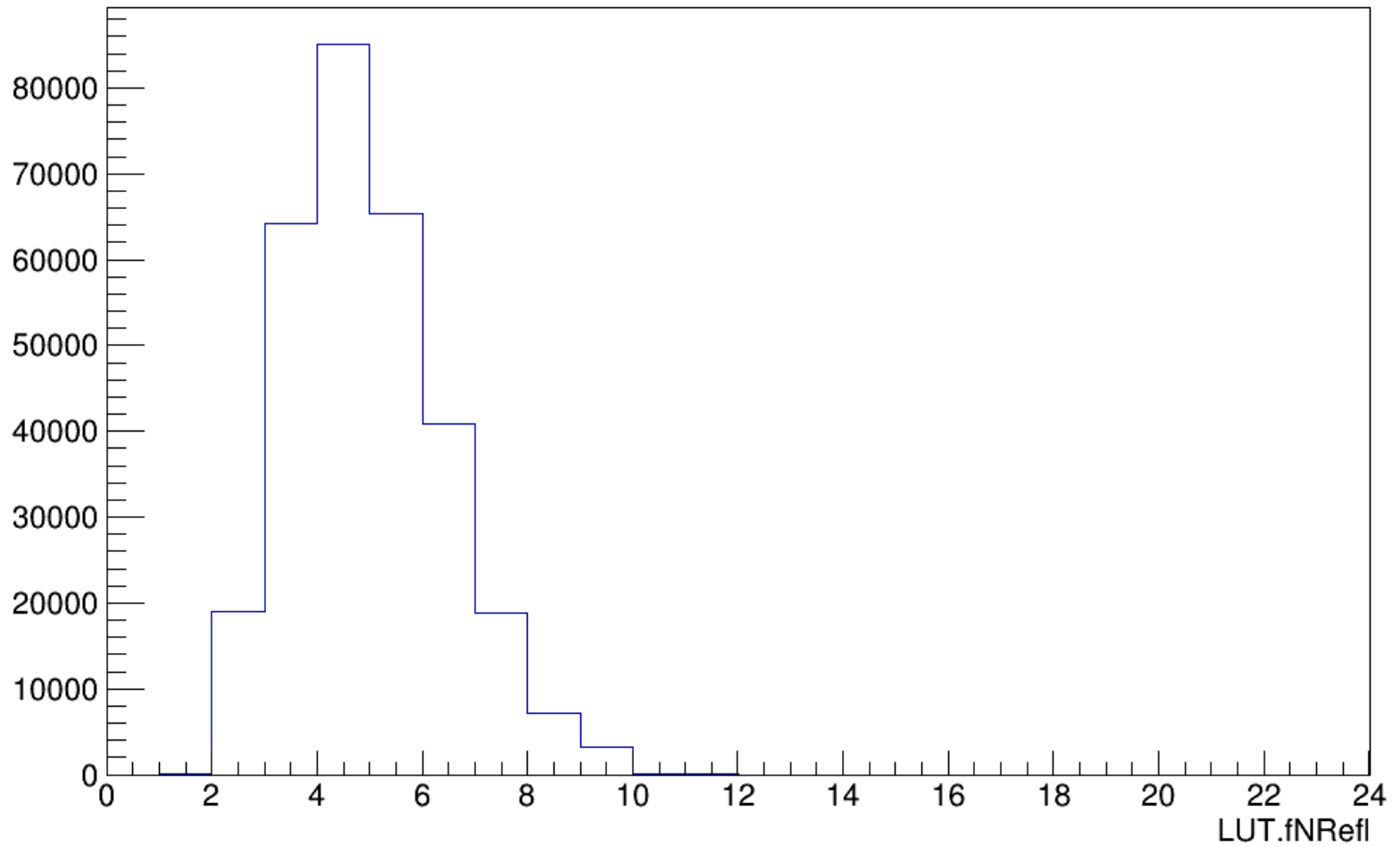
# Look-Up Table generation



# Look-Up Table generation

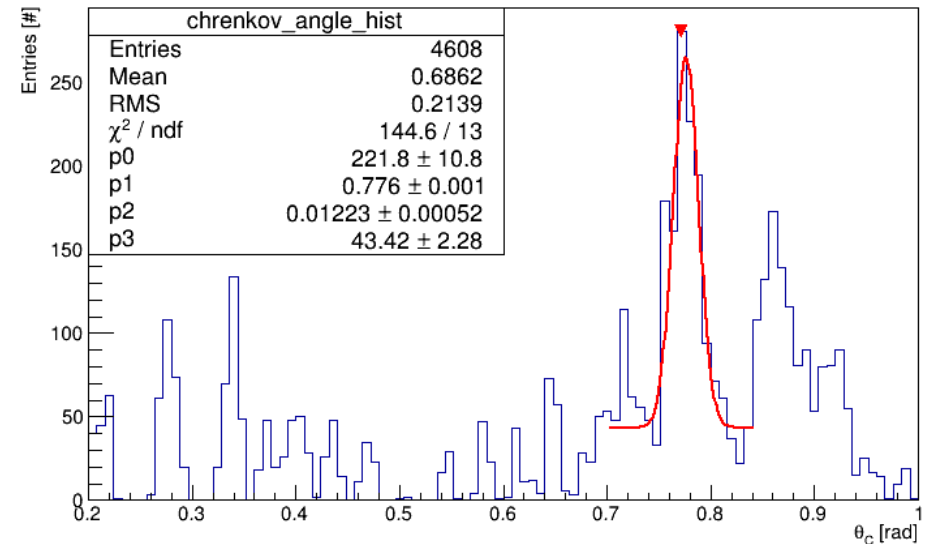
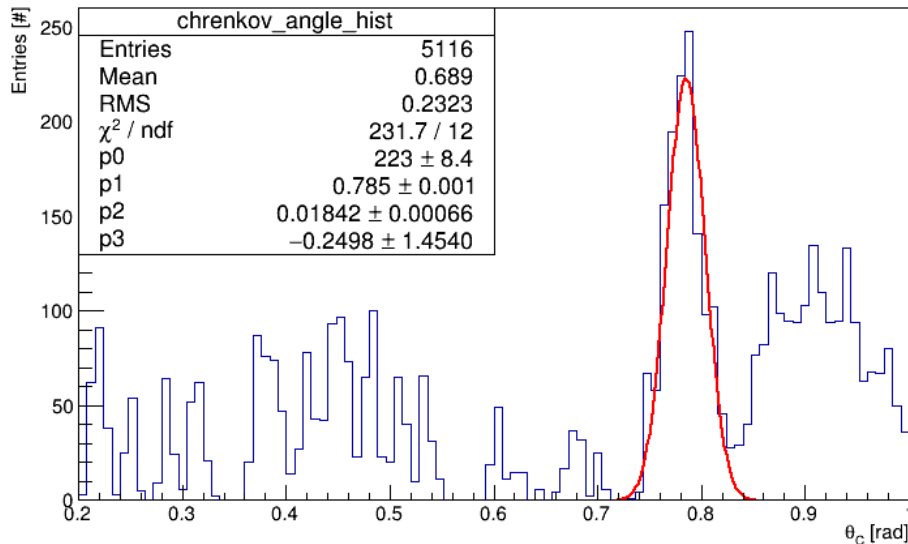
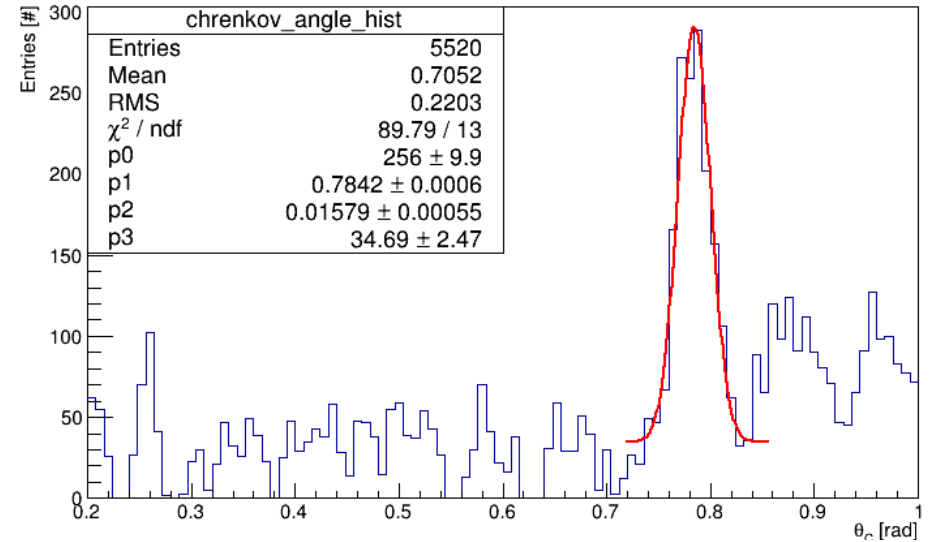
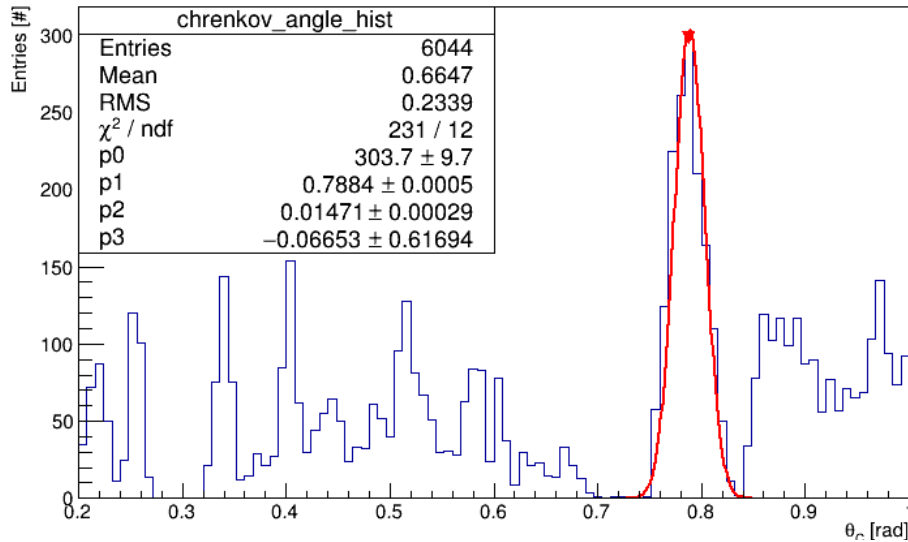


# Look-Up Table generation





# LUT. First reconstruction results for GlueX



# Source code

```
> git clone https://github.com/rdom/luexdir.git luexdir
> cd luexdir
> mkdir build
> cd build
> cmake -DGeant4_DIR=/path/to/geant4/installation ..
> make -j4
> luexdir -s 0 -e 1 -x kaon+ -p 4.5 -z -1 -c 2 -w 0
```

Full list of options is here: <https://github.com/rdom/luexdir>