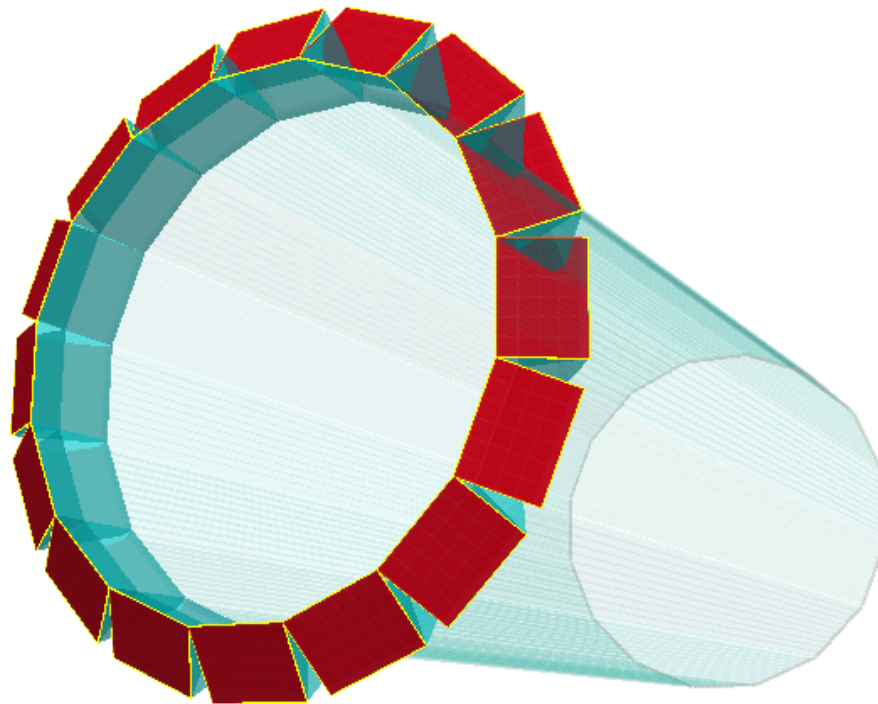


DIRC@EIC

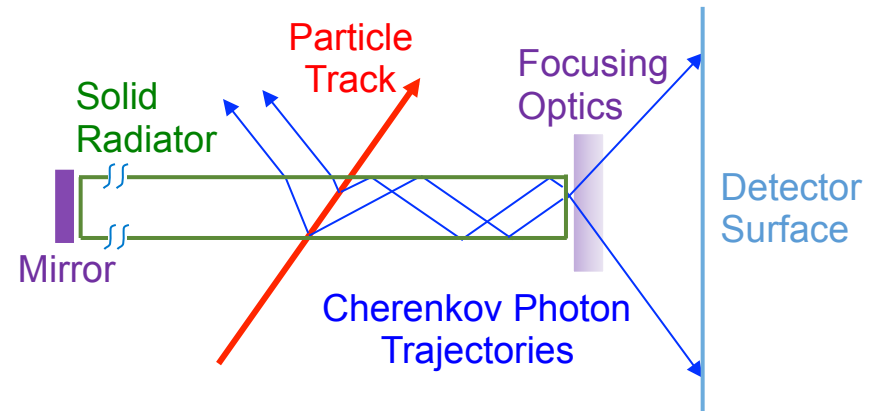
Greg Kalicy



DIRC Performance

- Expected PID performance defined by **Cherenkov angle resolution $\sigma_{\Theta_c}^{track}$** .

$$\sigma_{\Theta_c}^{track} = \sqrt{\left(\frac{\sigma_{\Theta_c}^{photon}}{\sqrt{N_{pe}}}\right)^2 + (\sigma^{correlated})^2}$$



➤ $\sigma^{correlated}$

(Correlated term:
tracking detectors, multiple scattering)

➤ $\sigma_{\Theta_c}^{photon}$

(Single photon Cherenkov angle resolution:
bar size, pixel size, chromatic, bar imperfections)

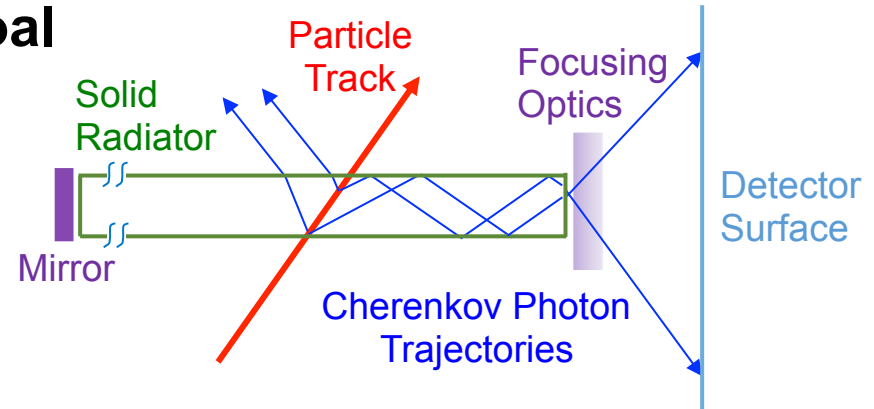
➤ N_{pe}

(Number of photons:
bar size, bar imperfections, Photon Detection Efficiency of the detector.

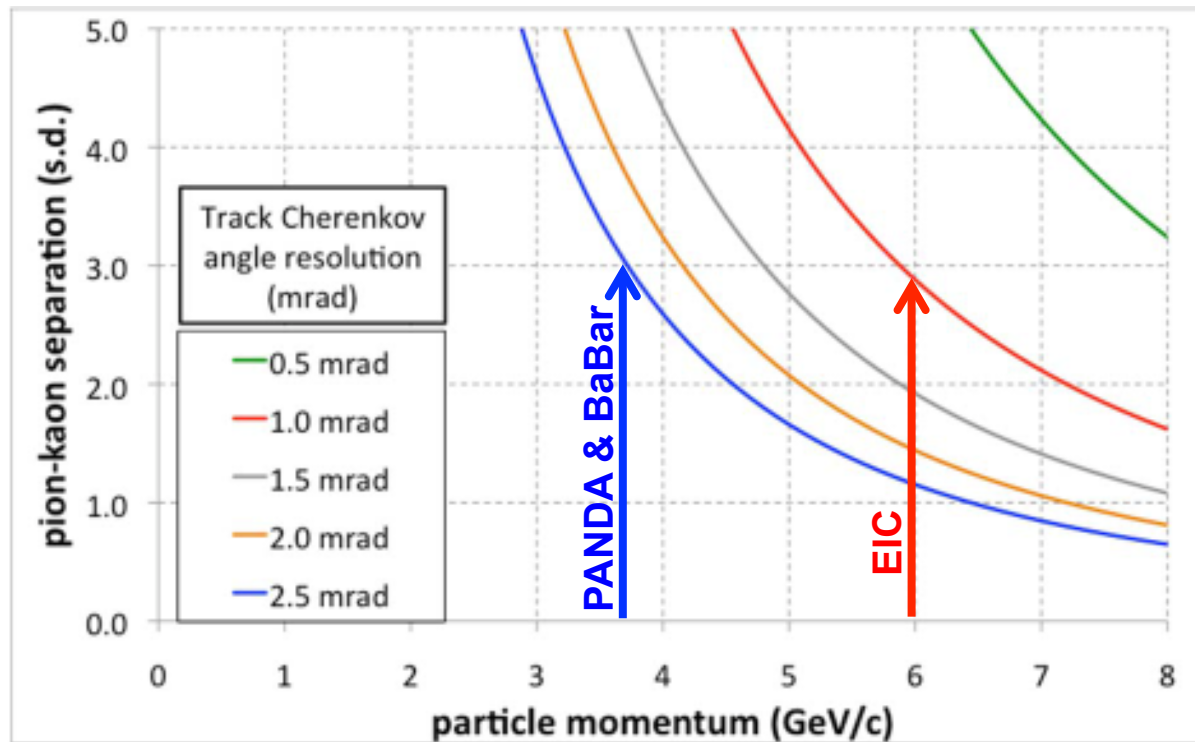
DIRC@EIC Performance Goal

DIRC@EIC PID capability:

- p/K up to 10 GeV/c
- π /K up to 6 GeV/c
- e/ π up to 1.8 GeV/c



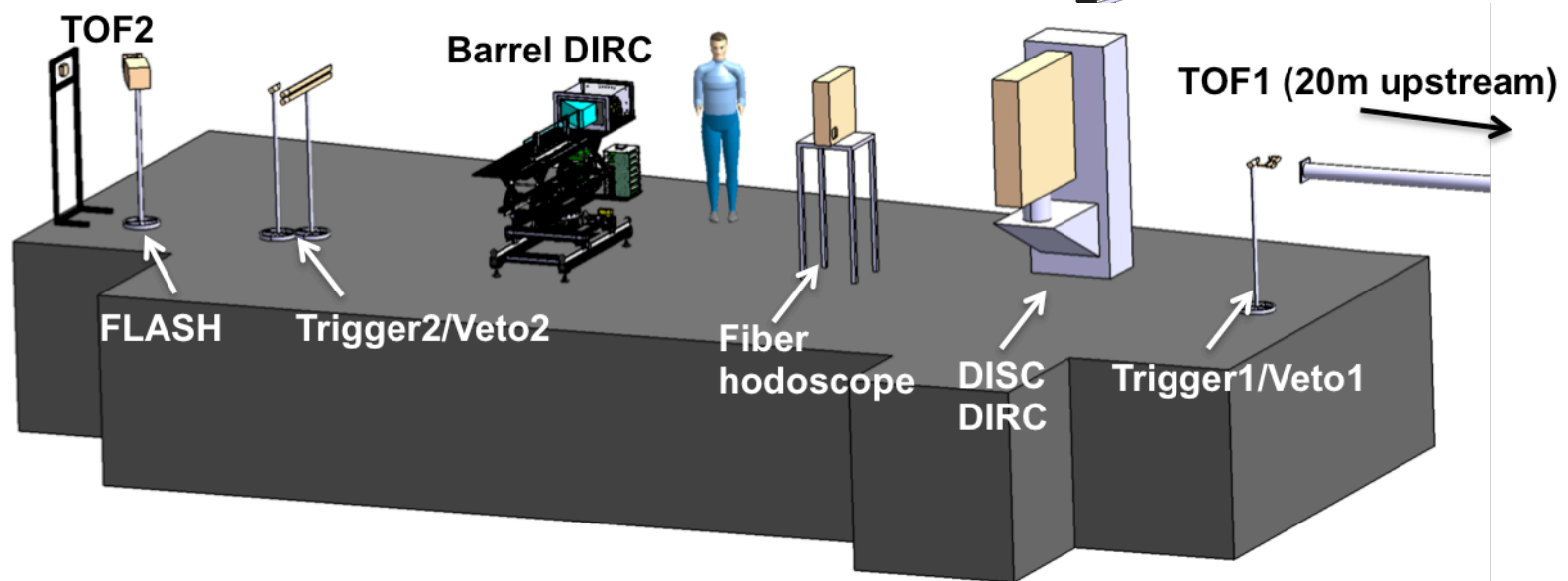
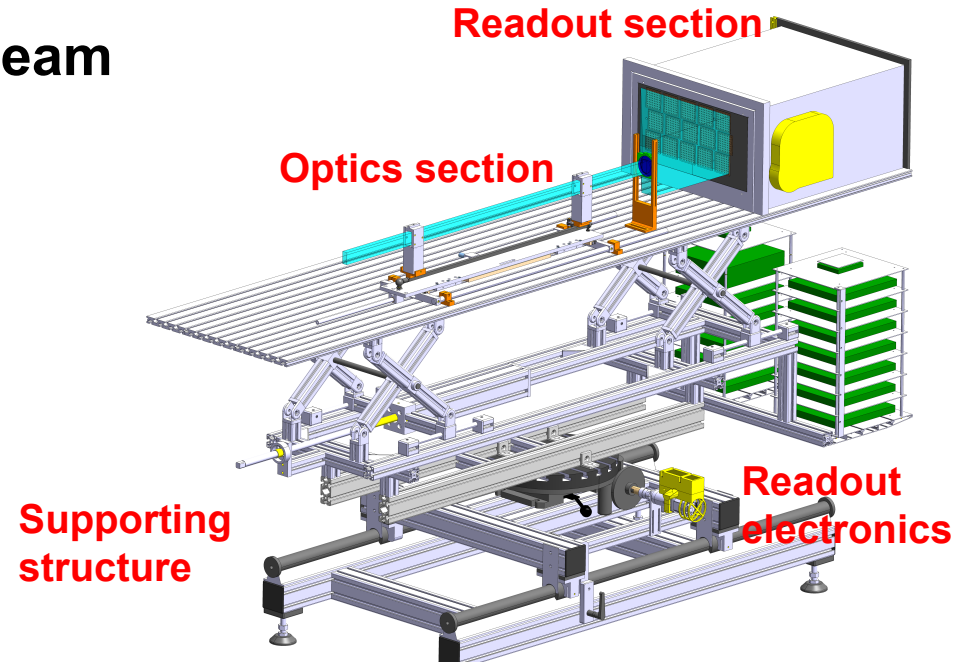
π /K identification as a function of the θ_c resolution



DIRC@EIC CERN Test Beam

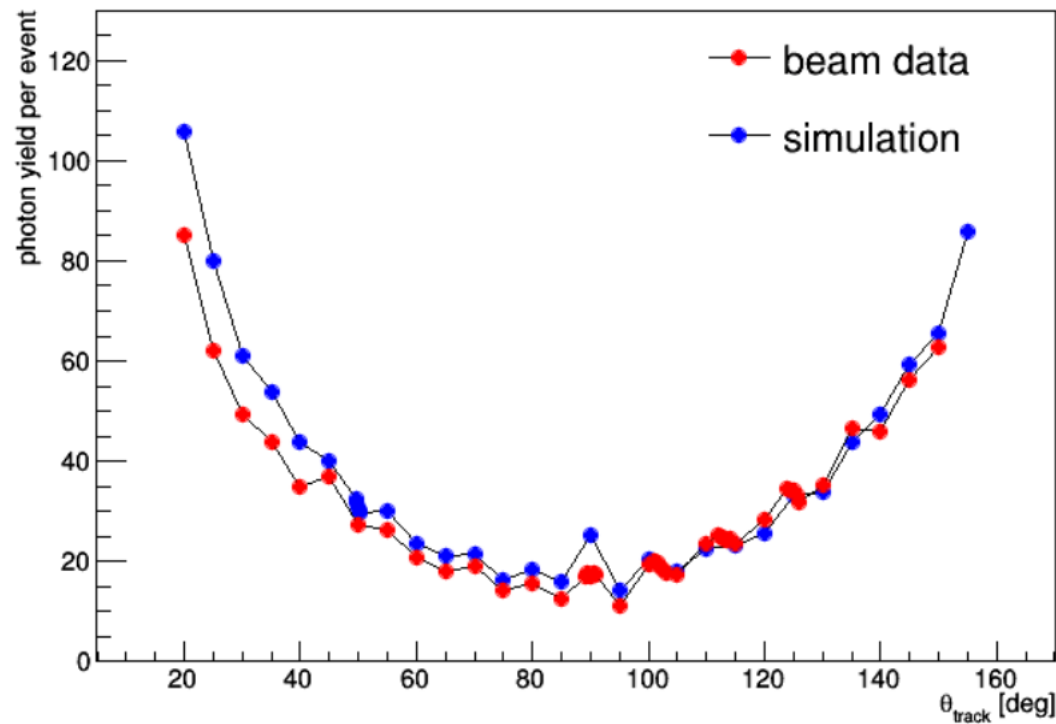
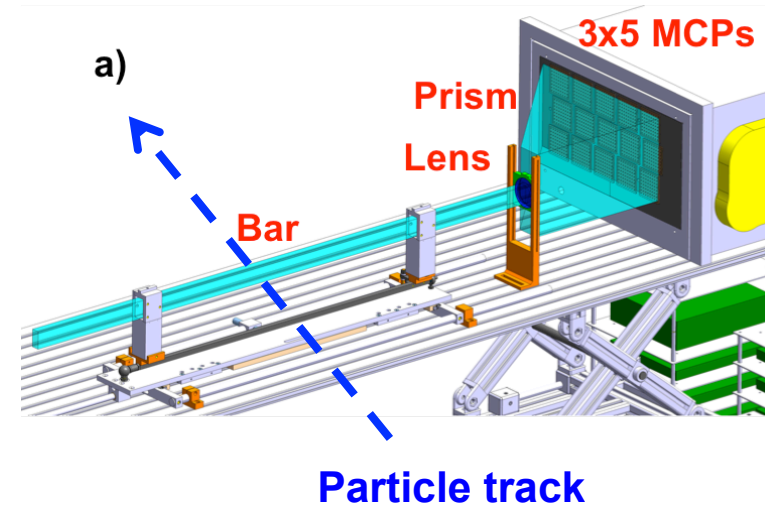
3-layer lens in PANDA Barrel DIRC prototype

- Modular and rotatable setup
- Different focusing options
- 1-10 GeV/c proton & pion beam



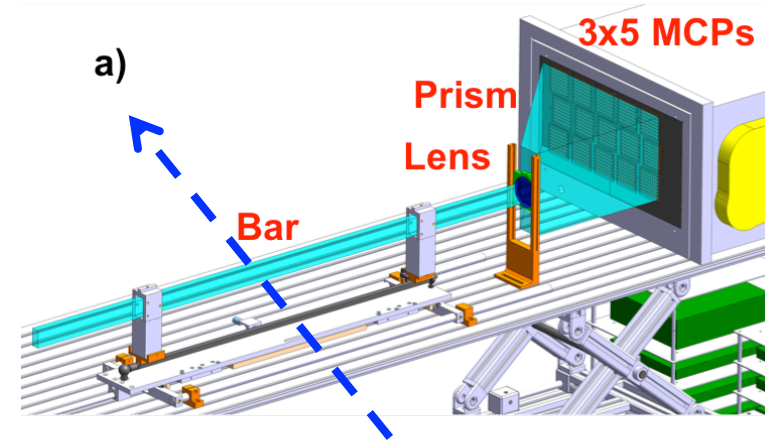
DIRC@EIC CERN Test Beam

Photon Yield



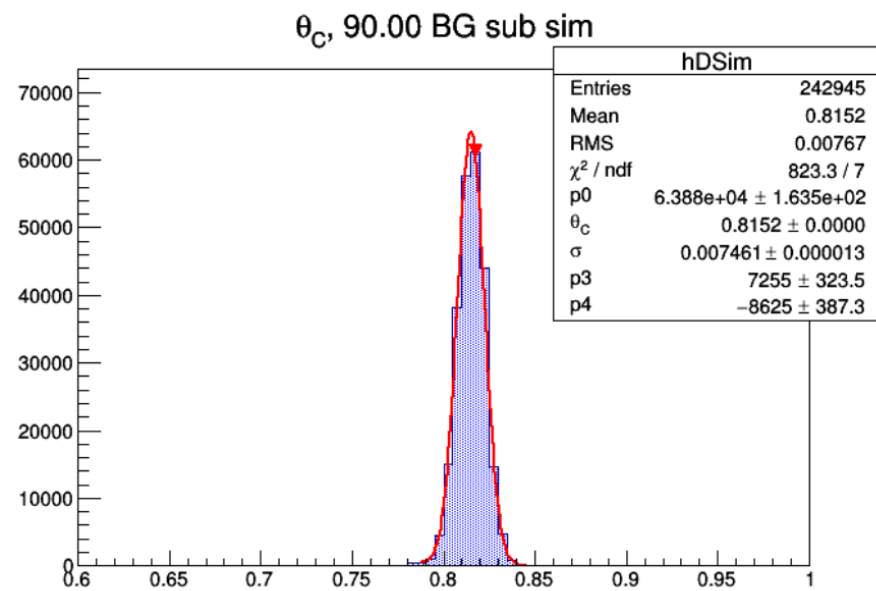
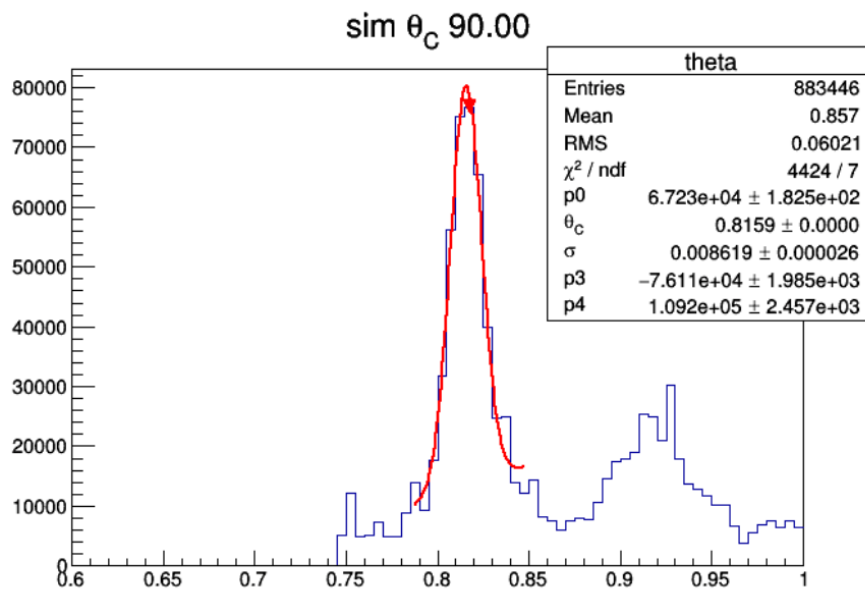
DIRC@EIC CERN Test Beam

Single Photon Resolution (SPR)



Particle track

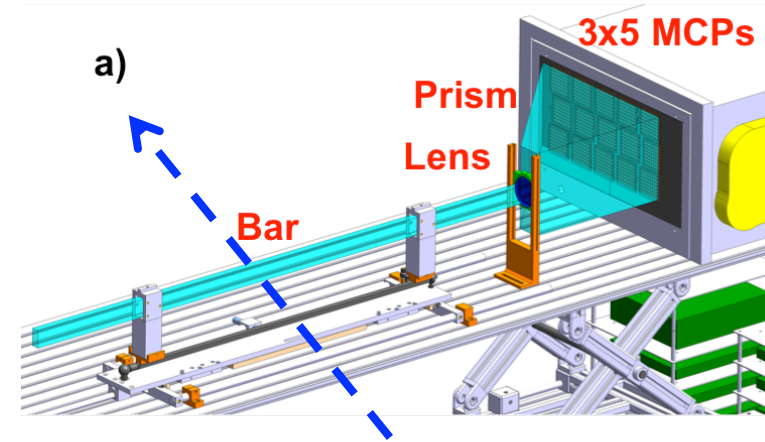
Simulation and fit without (left) and with (right) background subtraction



90.00°

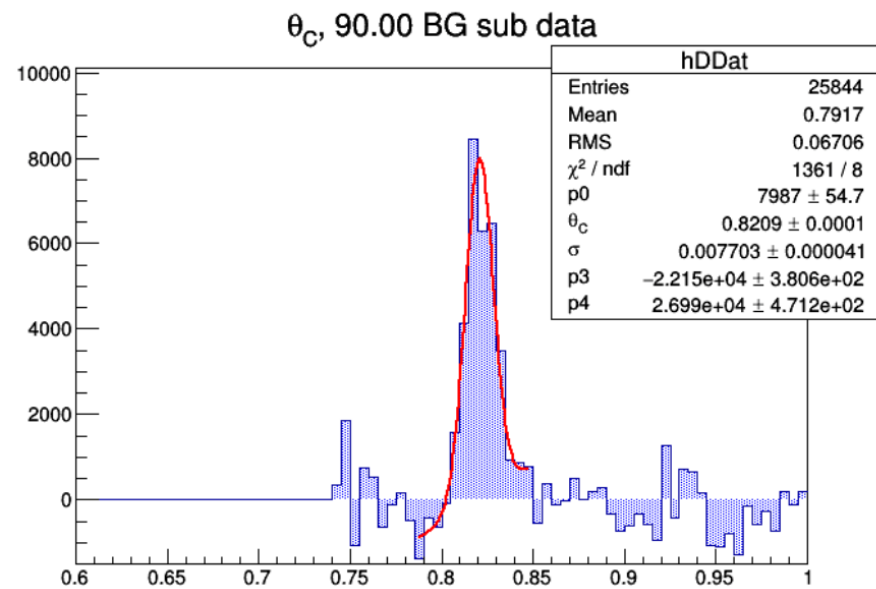
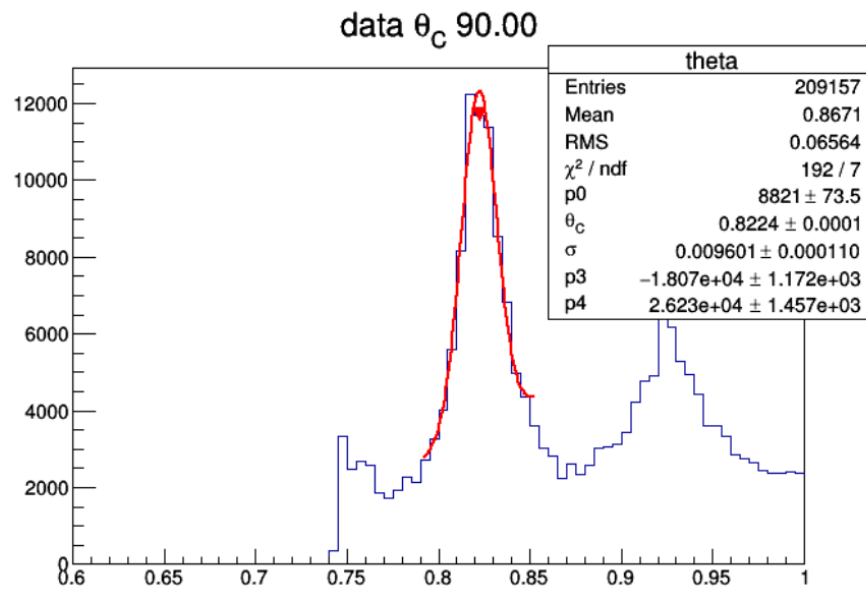
DIRC@EIC CERN Test Beam

Single Photon Resolution (SPR)



Particle track

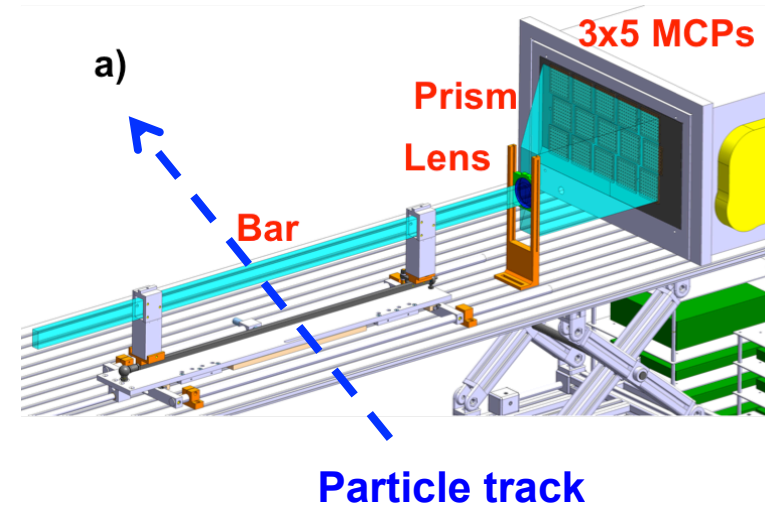
Beam Data and fit without (left) and with (right) background subtraction



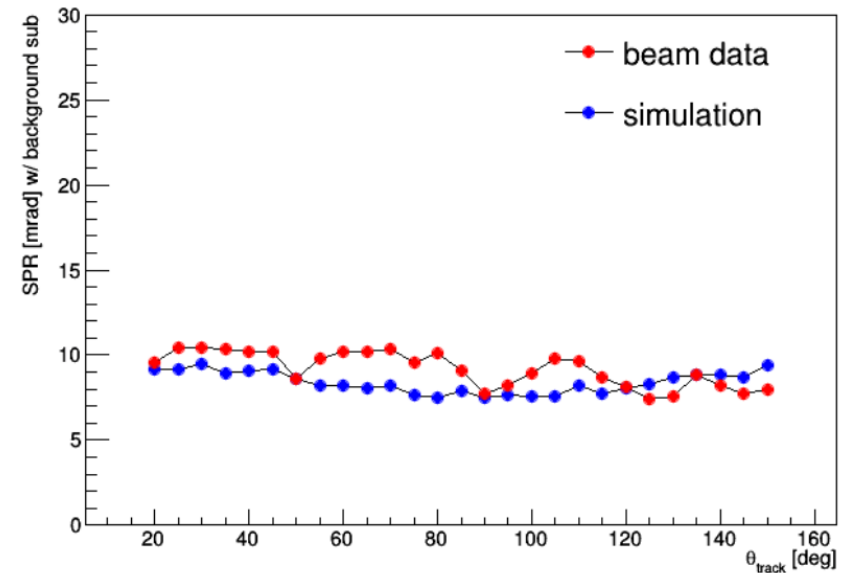
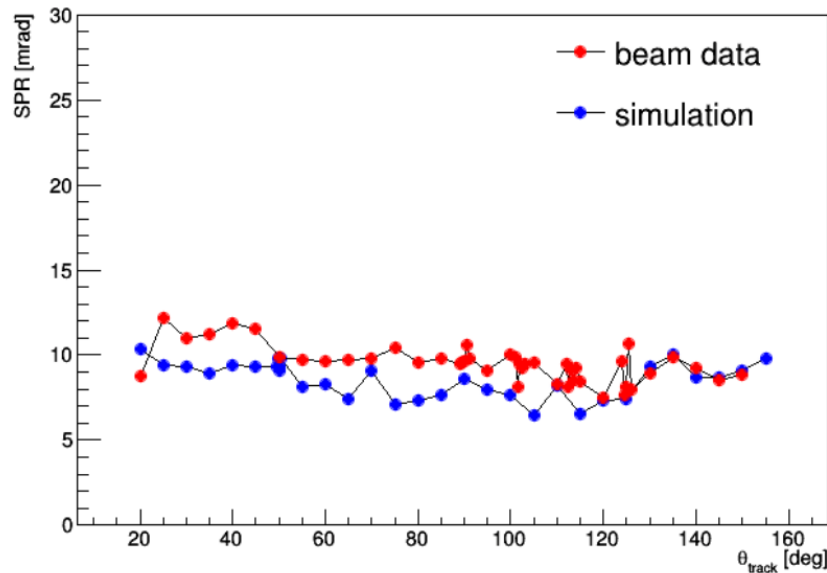
90.00°

DIRC@EIC CERN Test Beam

Single Photon Resolution (SPR)



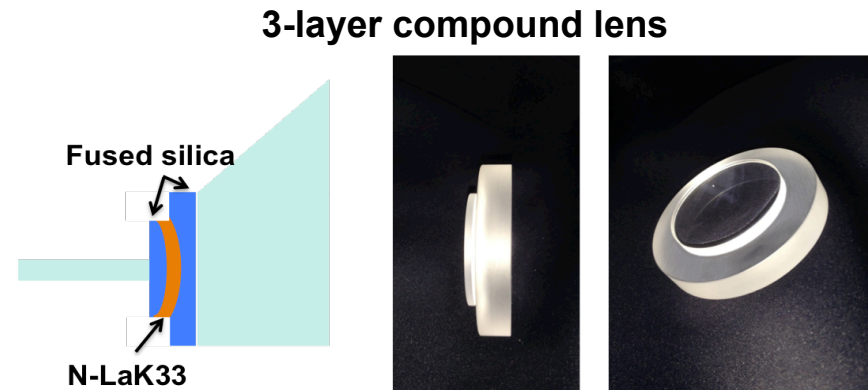
SPR without (left) and with (right) background subtraction



DIRC@EIC Prototype 3-layer lens

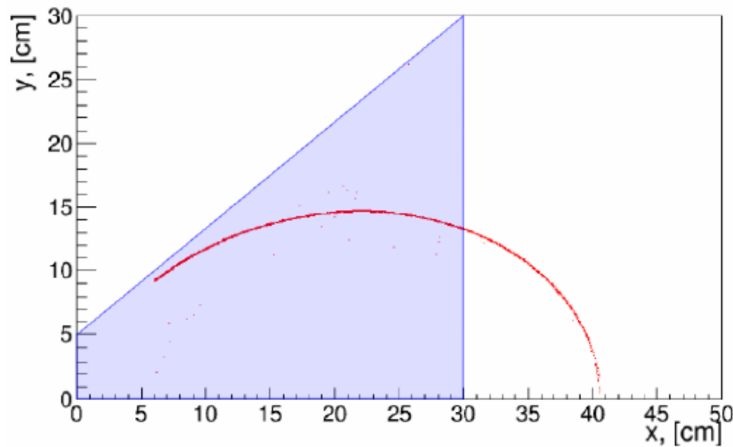
Prototype 3-layer lens:

- Flat focal plane
- Higher photon yield

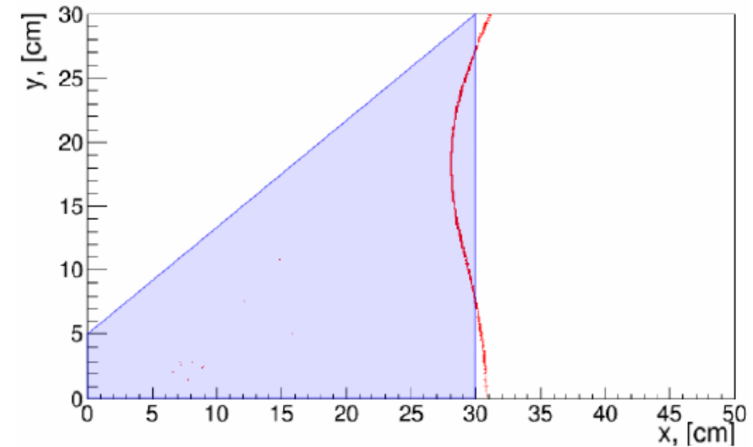


Geant4 simulation of focal plane:

Standard air gap lens



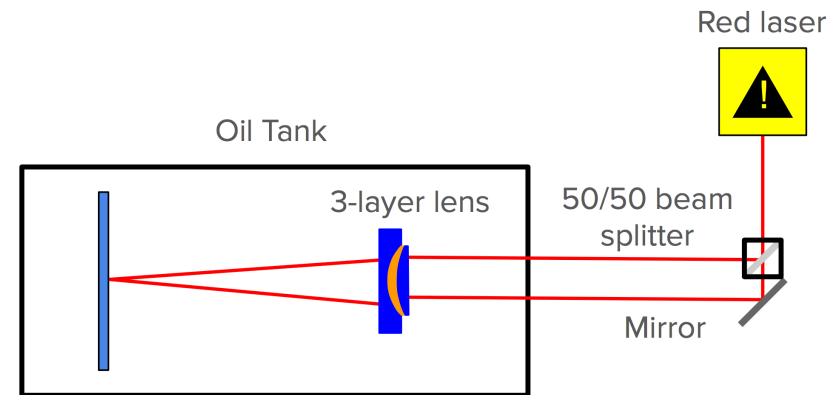
3-layer compound lens



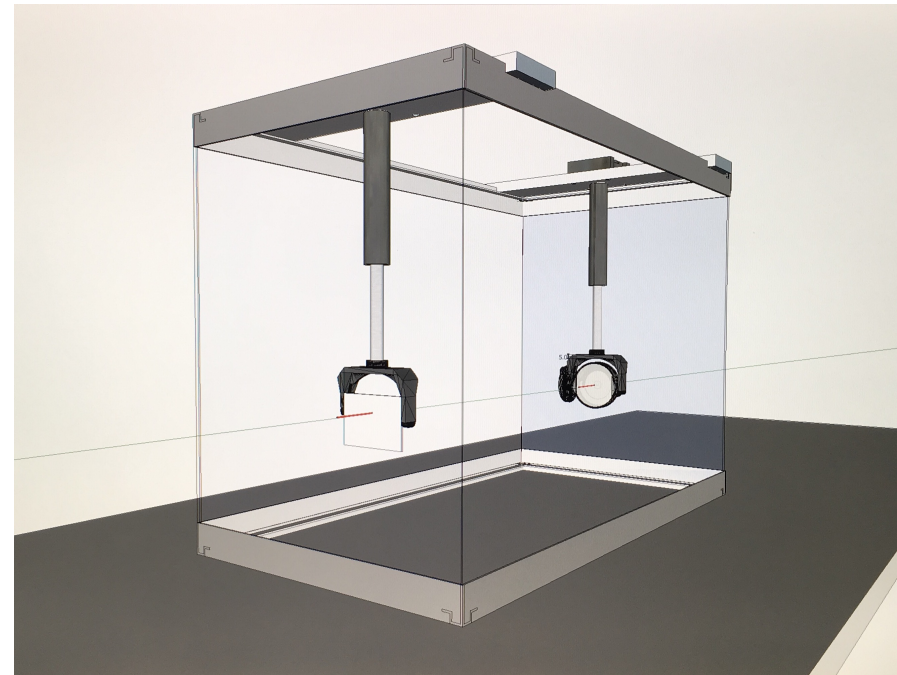
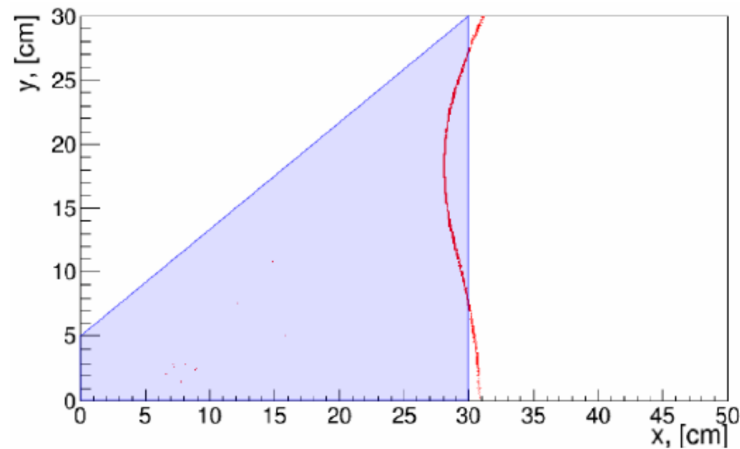
DIRC@EIC Prototype 3-layer lens

Experimental tests of the prototype 3-layer lens:

- Test benches (focal plane)



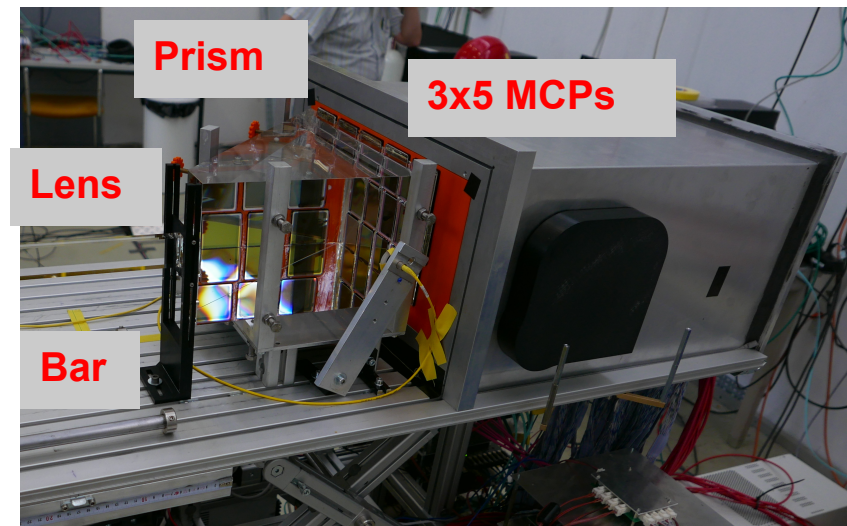
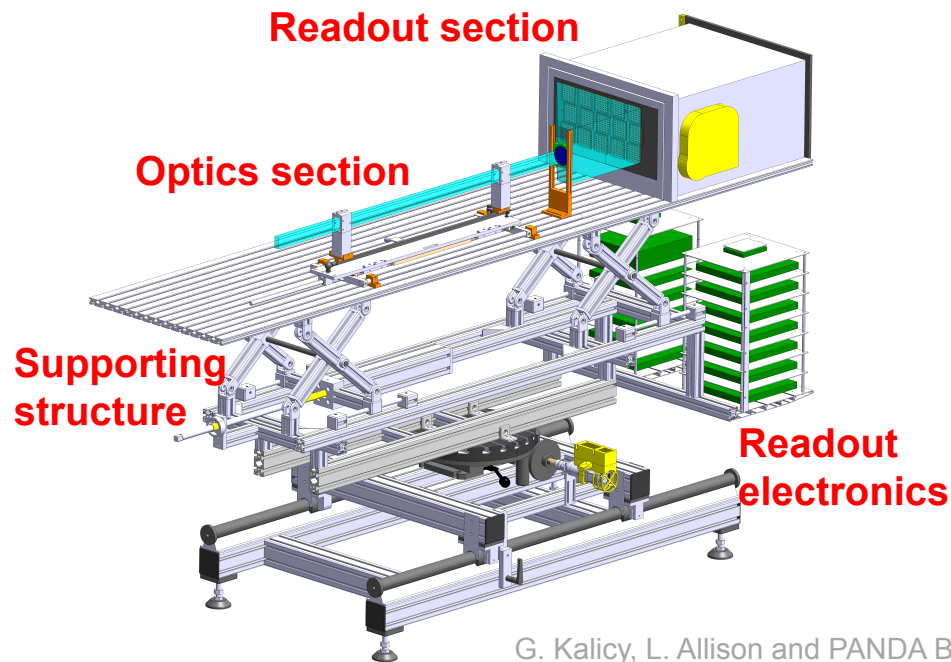
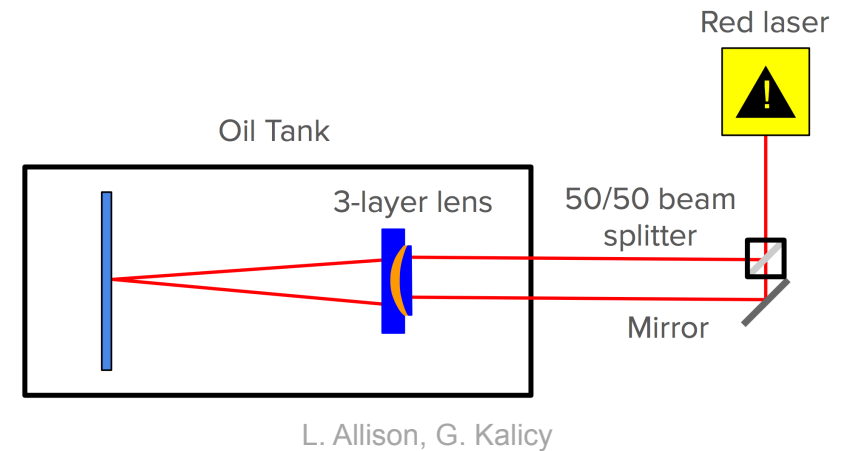
Geant4 simulation of focal plane:
3-layer compound lens



DIRC@EIC Prototype 3-layer lens

Experimental tests of the prototype 3-layer lens:

- Test benches (focal plane, radiation hardness)
- Full system prototype at particle beam



G. Kalicy, L. Allison and PANDA Barrel DIRC group

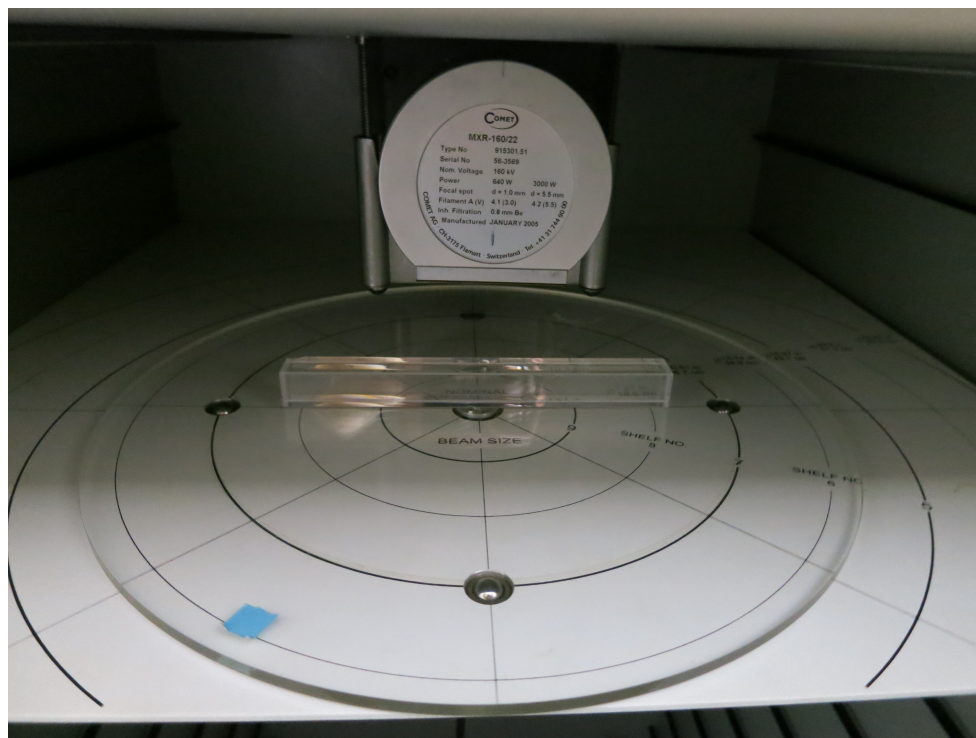
DIRC@EIC Radiation Hardness Test



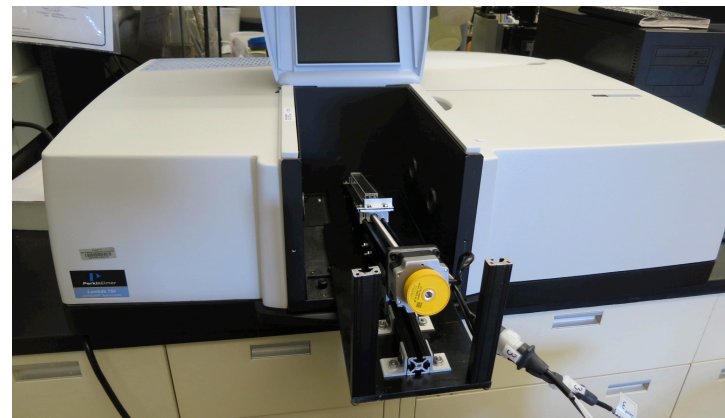
DIRC@EIC Radiation Hardness Test



DIRC@EIC Radiation Hardness Test



Monochromator



X-ray source

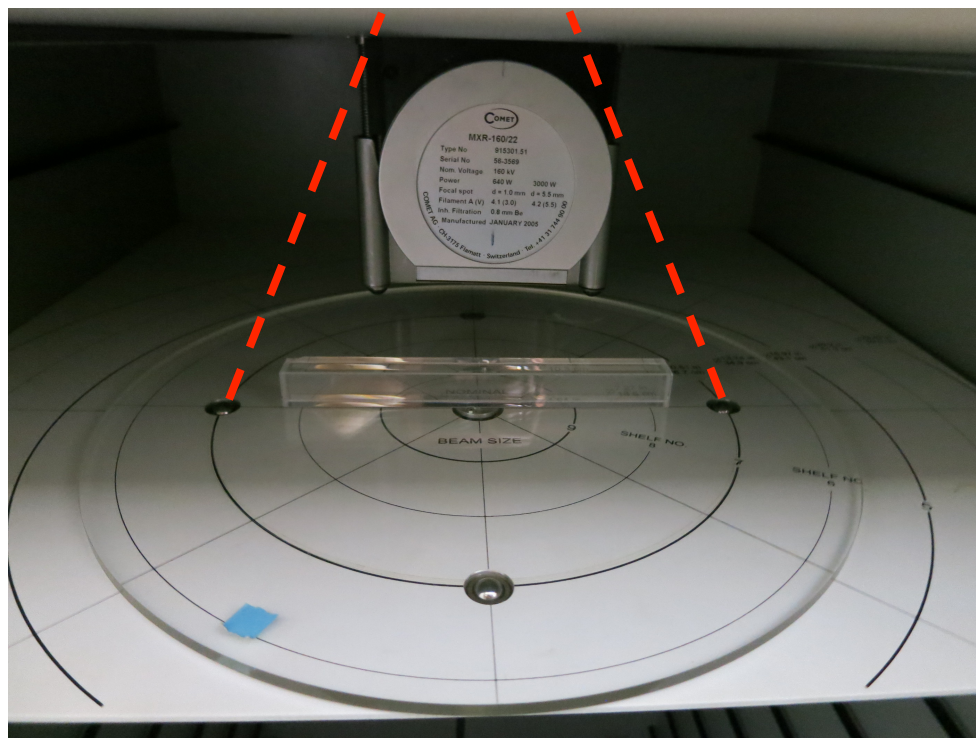


DIRC@EIC Radiation Hardness Test

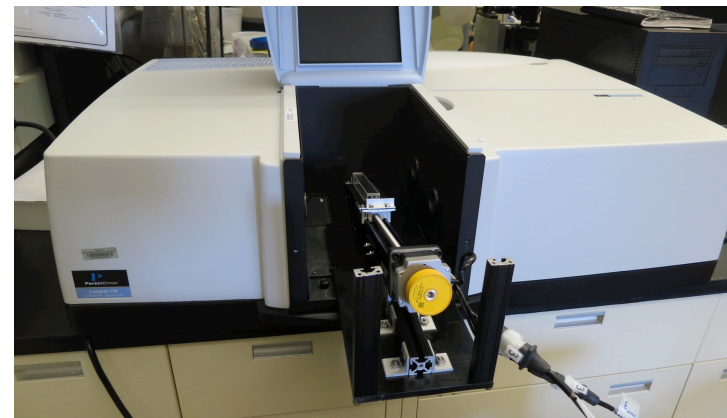
Monochromator



DIRC@EIC Radiation Hardness Test



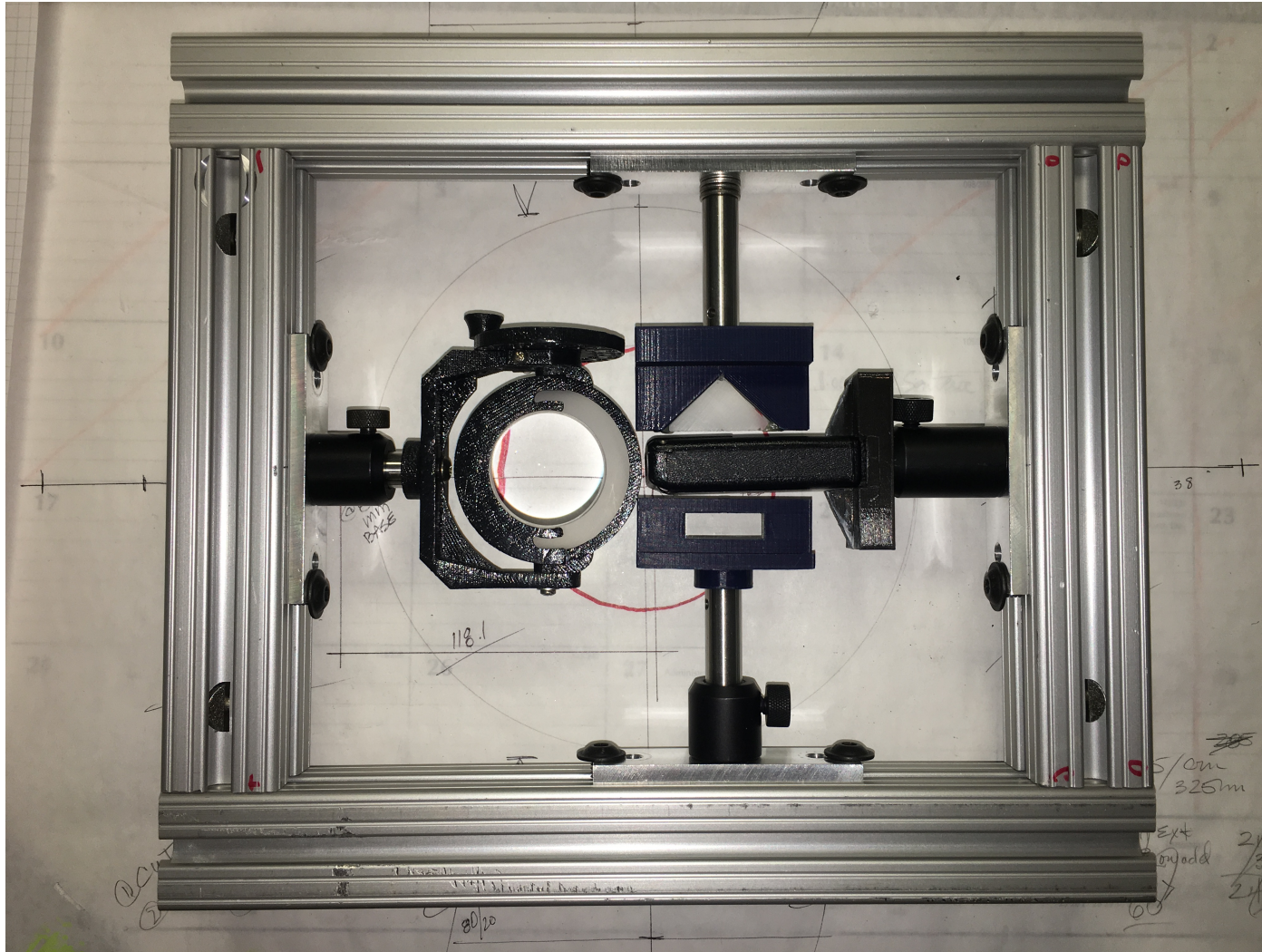
Monochromator



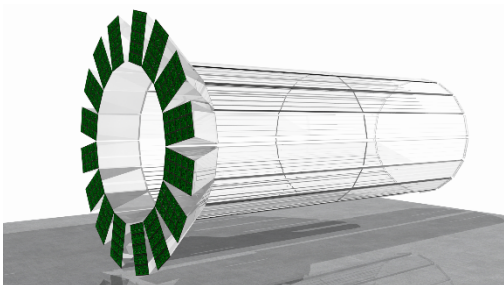
X-ray source



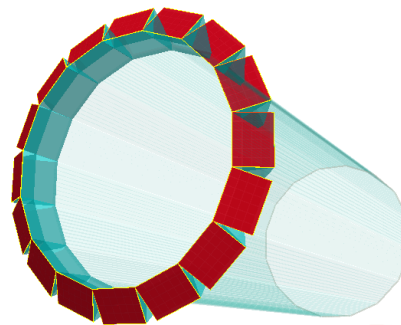
DIRC@EIC Radiation Hardness Test



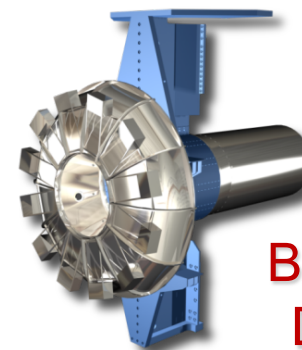
DIRC Family



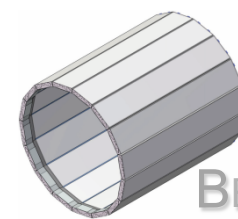
PANDA
BARREL DIRC



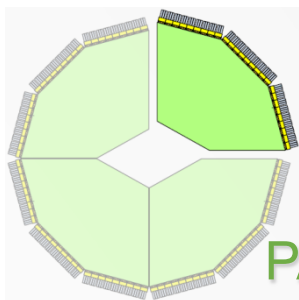
EIC
DIRC



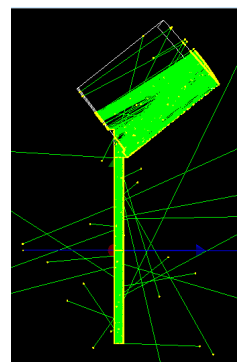
BABAR
DIRC



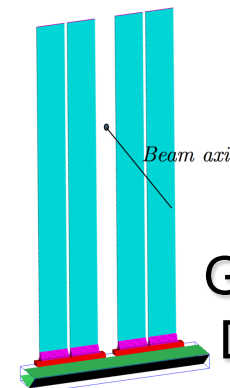
BELLE II
TOP



PANDA
Disc DIRC



LHCb
TORCH



GlueX
DIRC