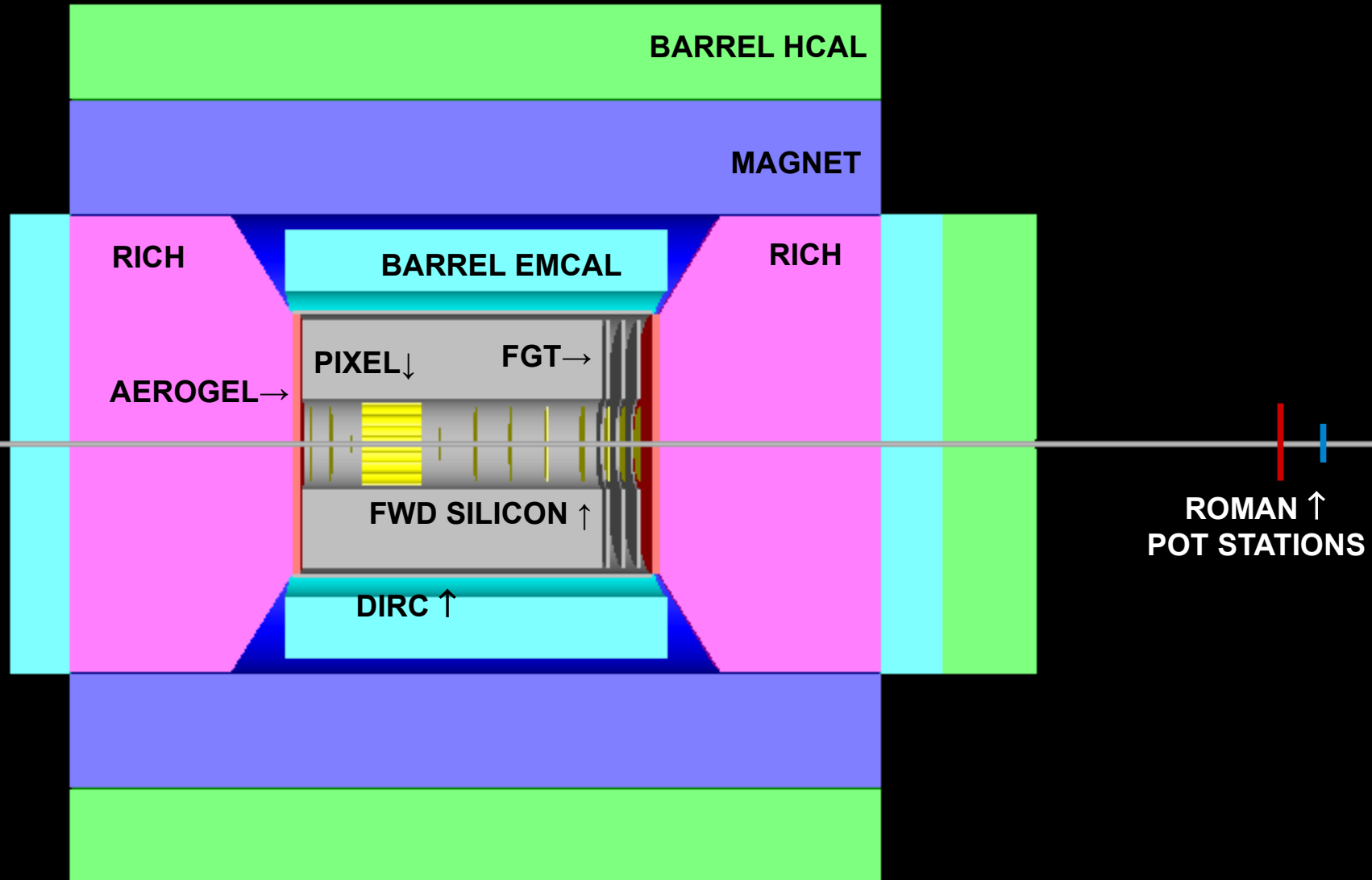




# ***EIC Detector Geometry Update***

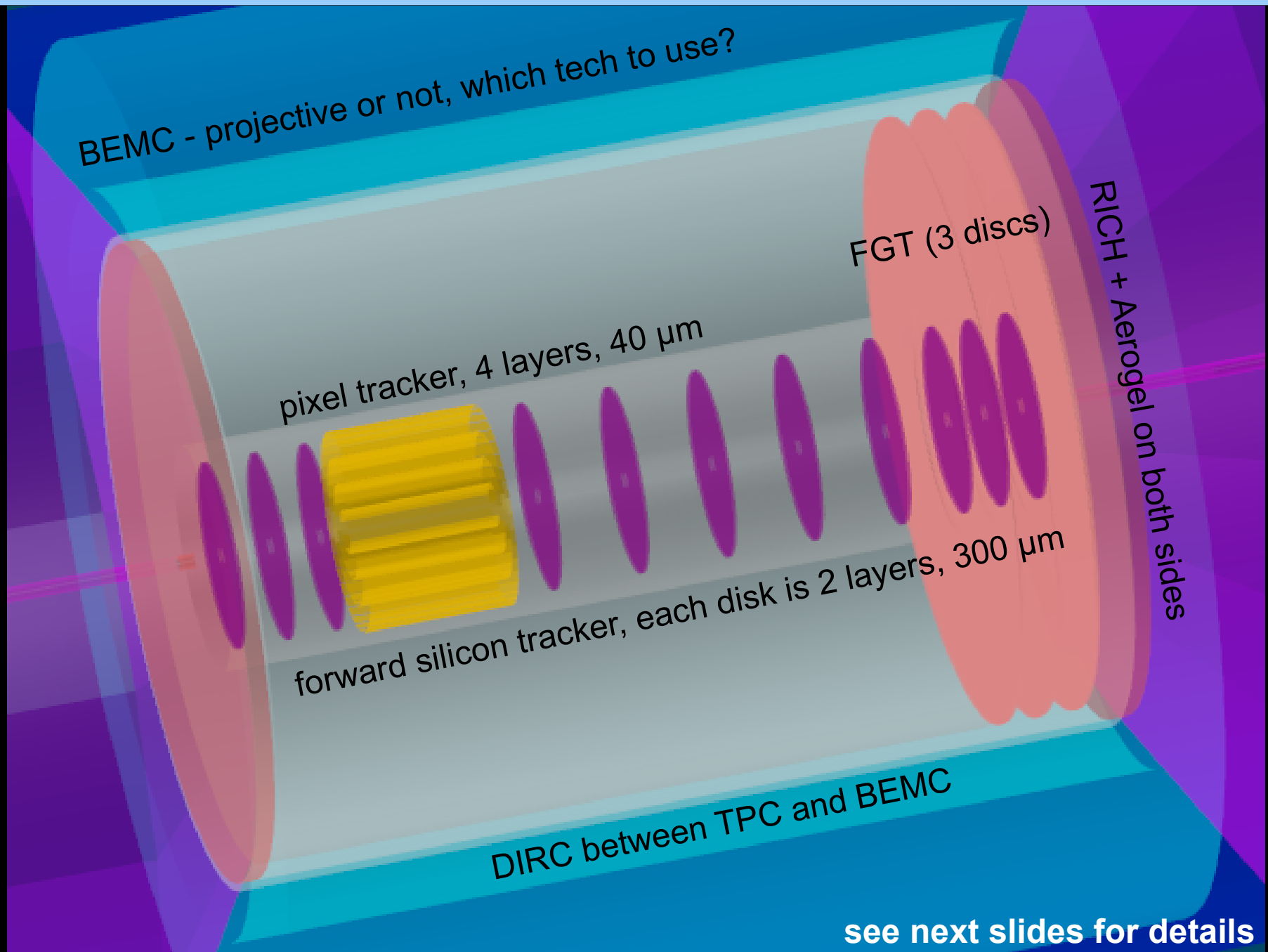
Yulia Zulkarneeva  
*BNL, 10<sup>th</sup> Nov 2011*

# Updated Detector Layout, 2D



see next slides for 3D

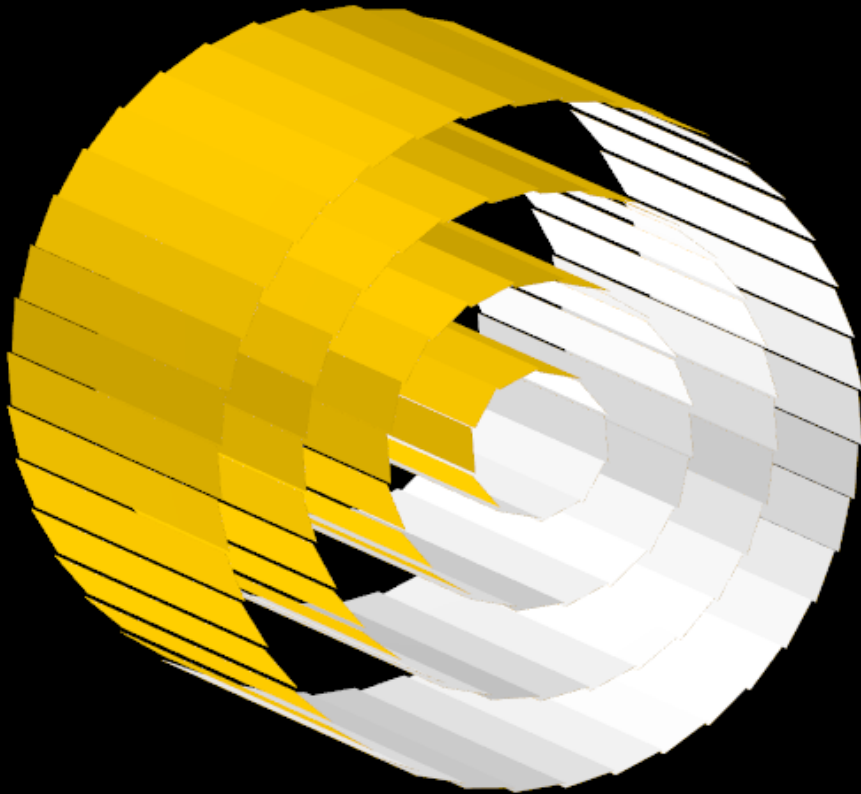
# Geometry Layout highlights, 3D



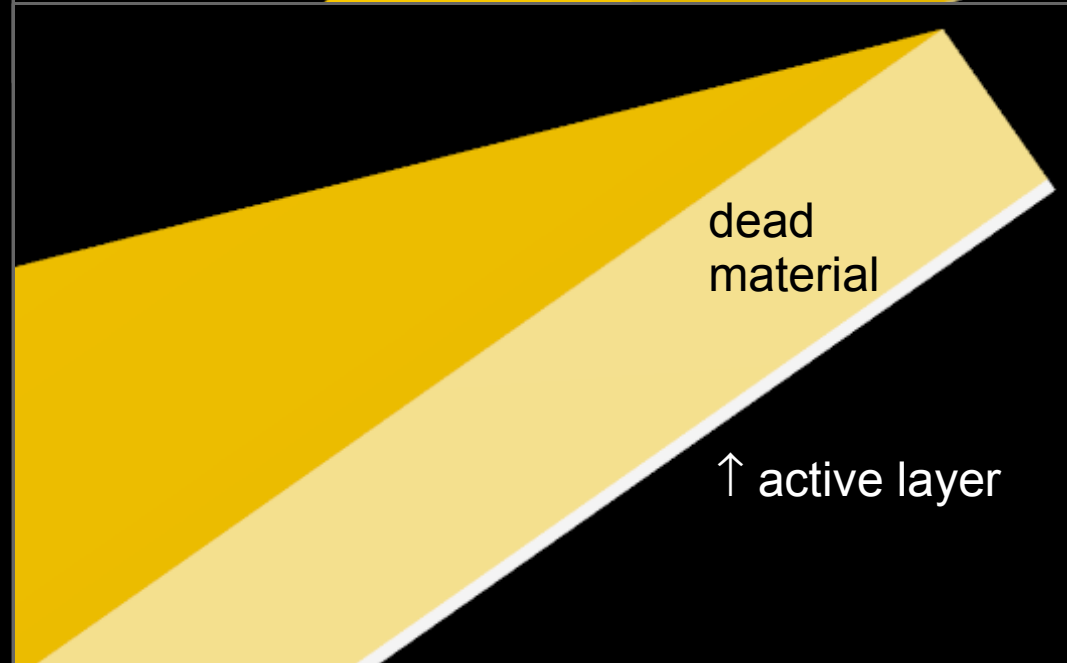
see next slides for details

# Barrel Pixel Tracker

Modelled after STAR Pixel Tracker  
Four layers implemented (configurable)

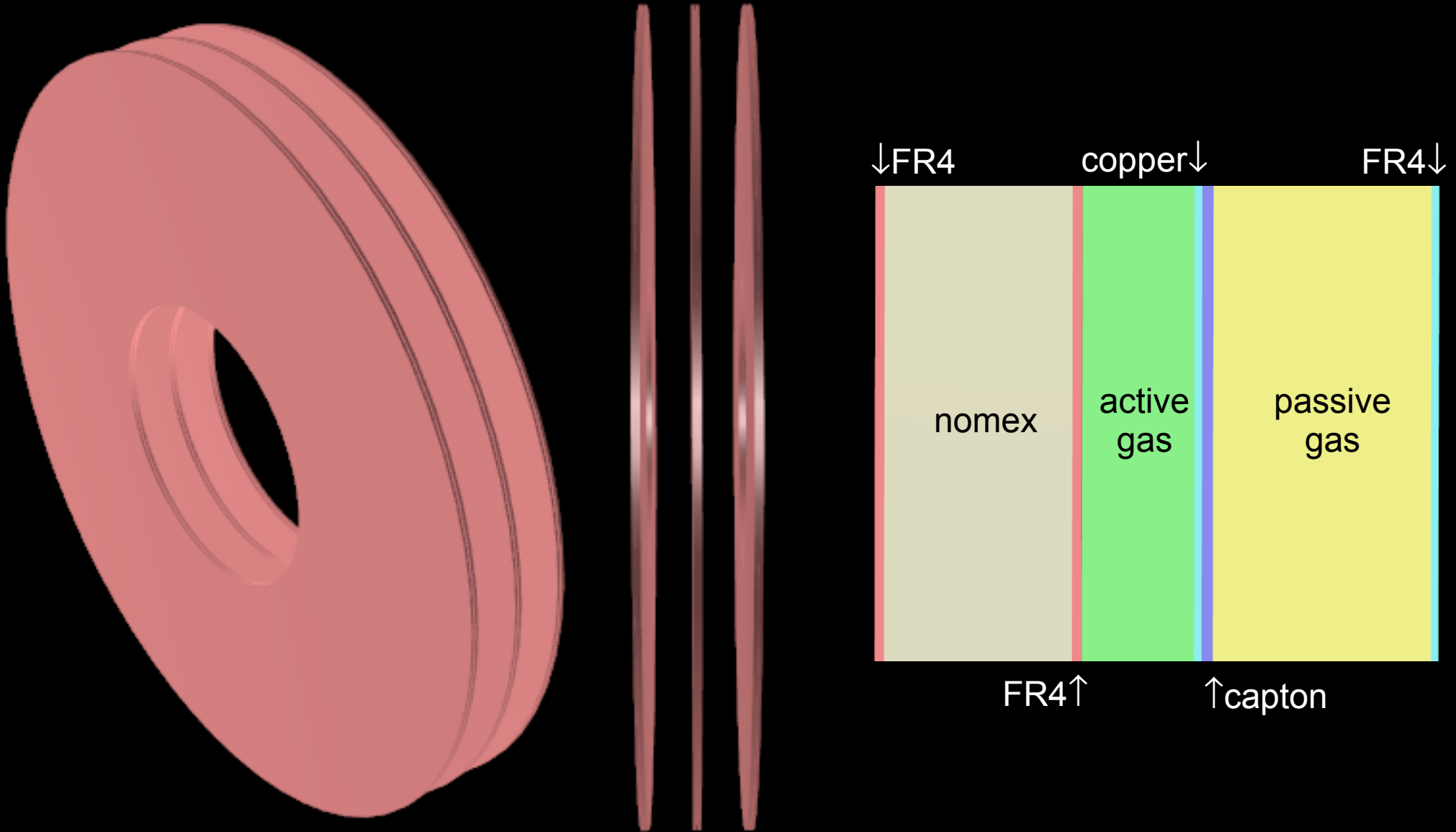


Each layer (ladder) has many dual-layered plates: 40  $\mu\text{m}$  – active layer, 280  $\mu\text{m}$  – passive layer (combined dead mater.)



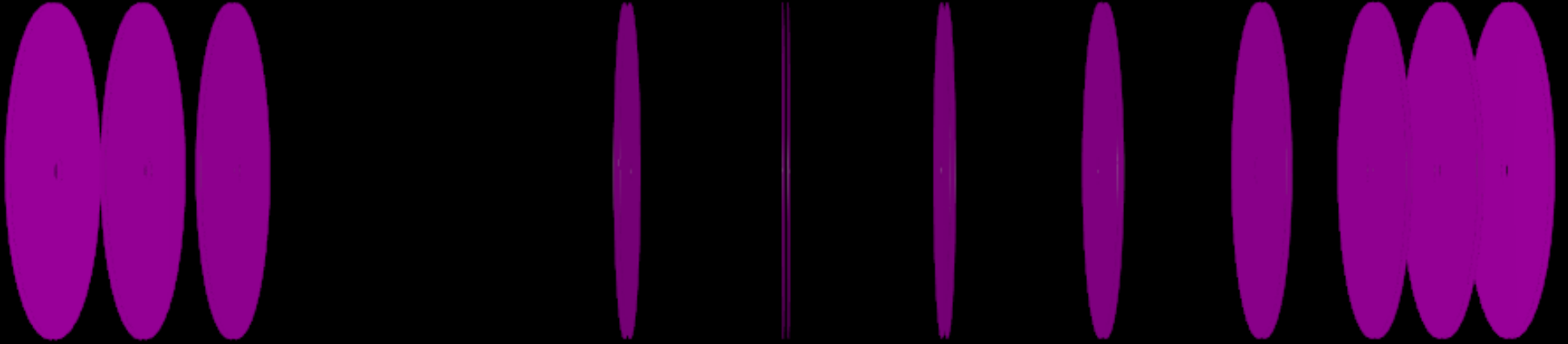
# Forward Gem Tracker

Three FGT disks, height equal to TPC - implemented (based on STAR FGT description)



# Forward Silicon Tracker

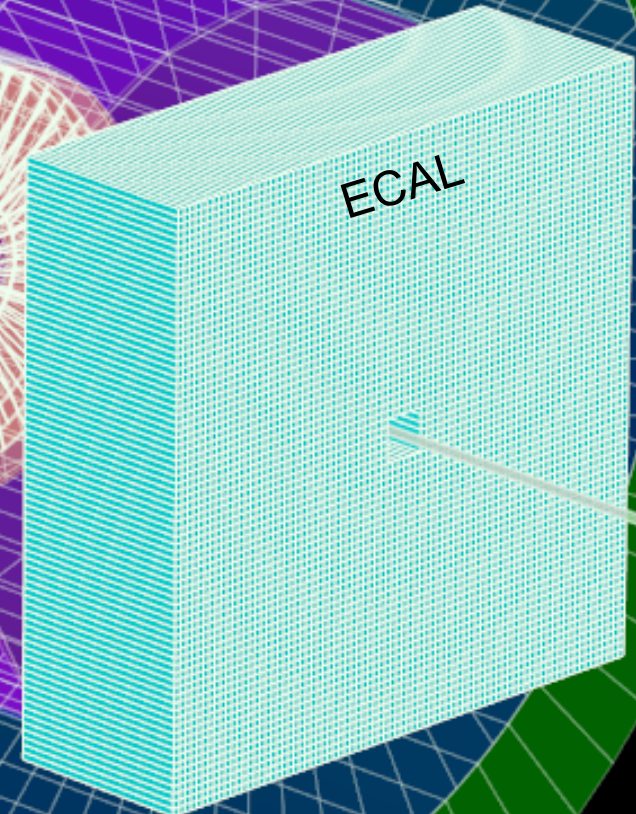
Modelled after ZEUS forward tracker – dual-layered silicon disks (300  $\mu\text{m}$  per layer)



two planes  
crossing strips for hit registration

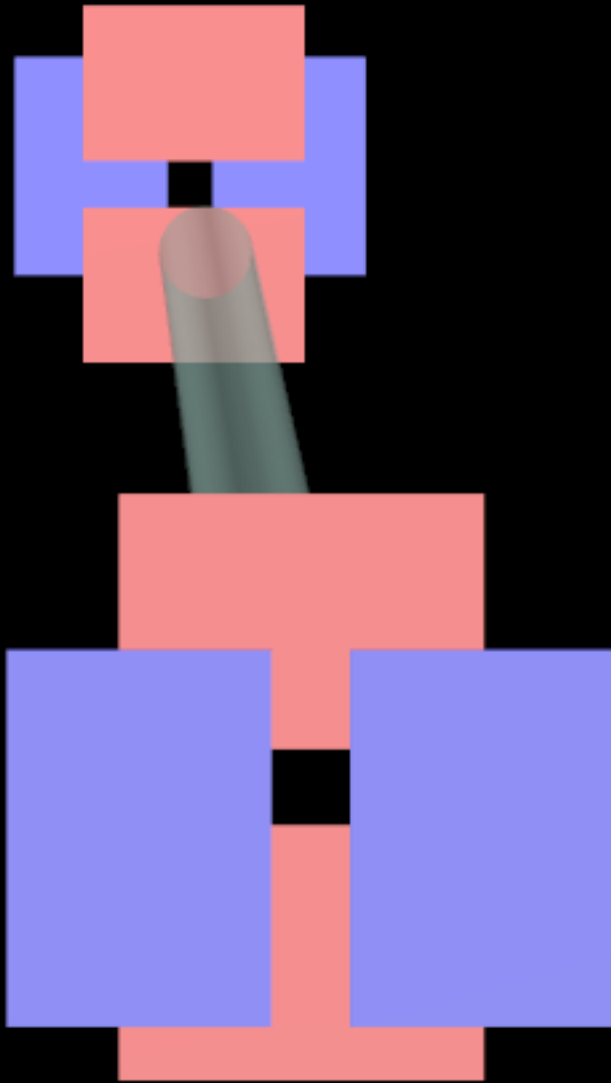
300  $\mu\text{m}$  silicon disks. Only active  
volumes implemented – barrel  
material does not contribute to  
longitudinal rad-length..

# Segmented Ecal (PWO) - forward direction



80 x 80 towers, 3 cm x 3 cm x 40 cm, PWO crystals, Calorimetric Hits enabled

# Roman Pot Stations



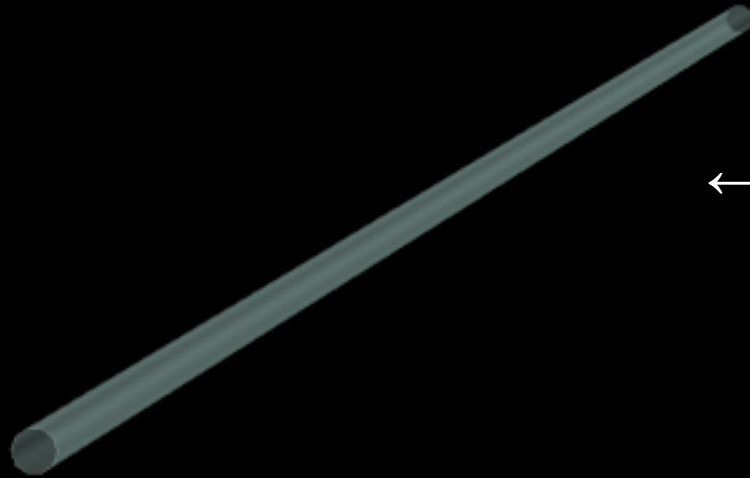
2 horizontal RP stations at  $z = 20\text{m}$   
with an active area of  $10\text{cm} \times 7\text{cm}$  each  
and  
2 vertical RP stations at  $z = 22\text{m}$

Each station implemented as :  
four layers of Si + 1 layer of Sci

No dead material / wrappers / cables  
Implemented yet - will consult NIM  
paper and drawings..

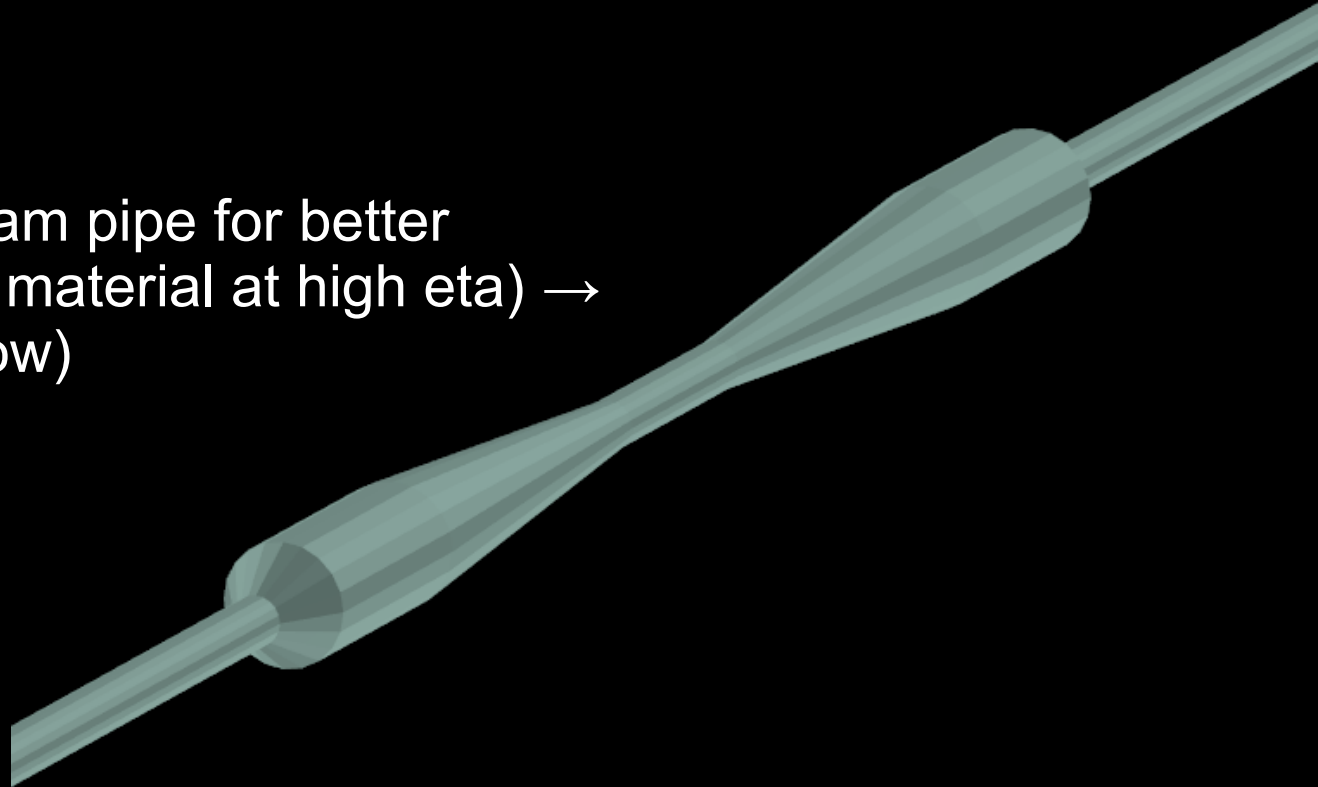


# More Beam Pipe Options



← Default : flat beam pipe, 2cm radius, beryllium

Optionally, configurable beam pipe for better forward transparency (less material at high eta) →  
(also 100% beryllium for now)

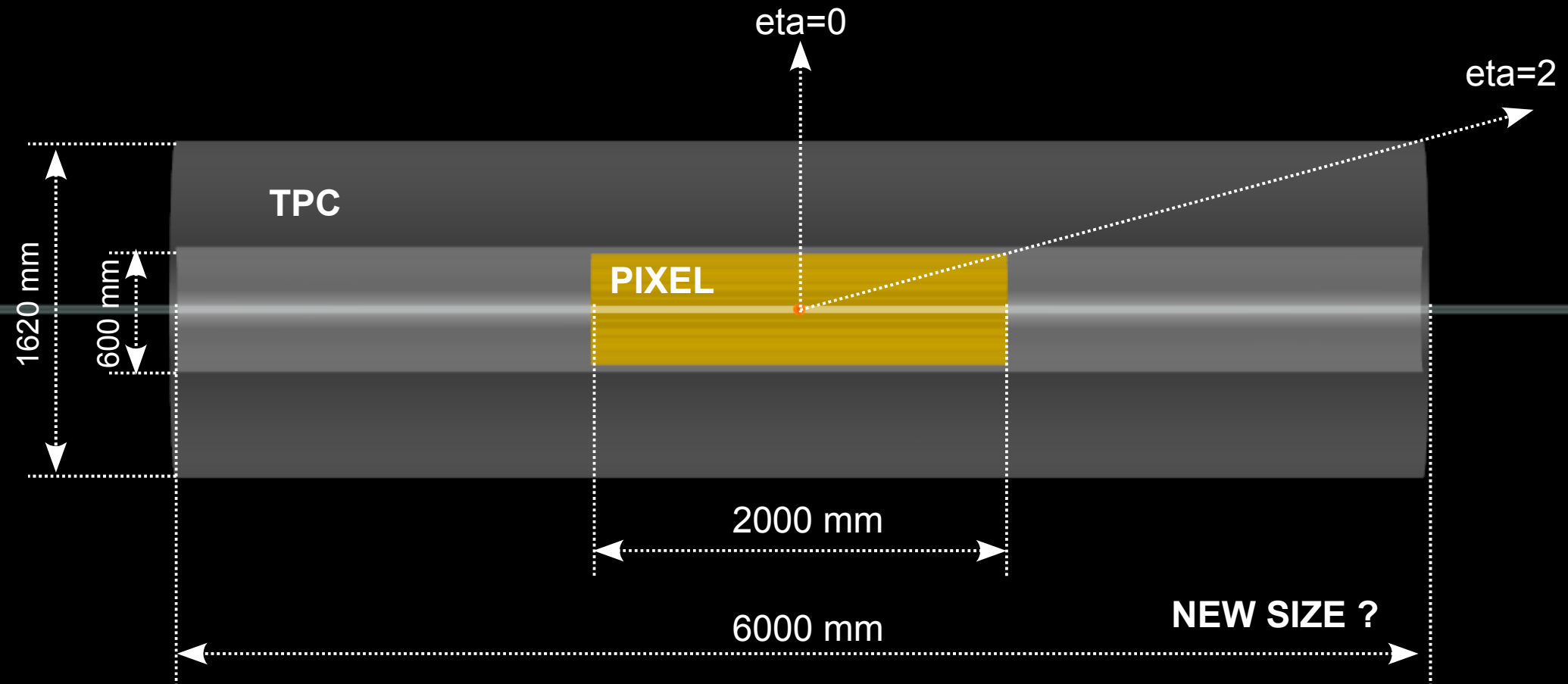


IR magnets yet to be implemented (complex magfield configuration)

# Pseudorapidity $\pm 2$ : detector size?

By switching to  $\pm 2$  eta in barrel tracker and vertex tracker,  
we are tripling longitudinal size of detector.

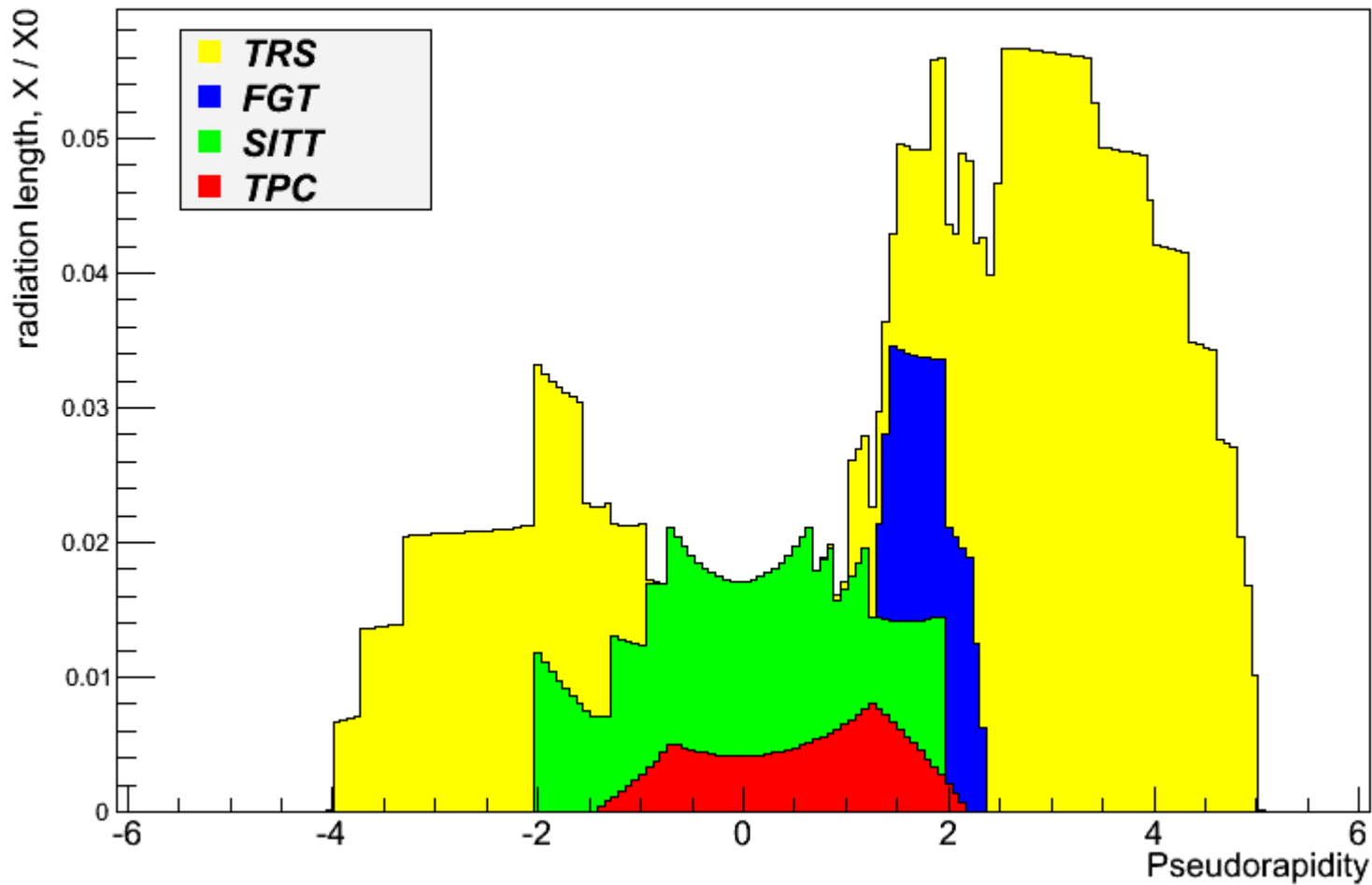
**OLD SIZE:** TPC gas barrel length:  $\sim 1900$  mm, PIXEL: 400mm



Need to know maximum possible length for that..  
Alternatively, change TPC radius, or demand less than 100% pads

# Radiation Length, total

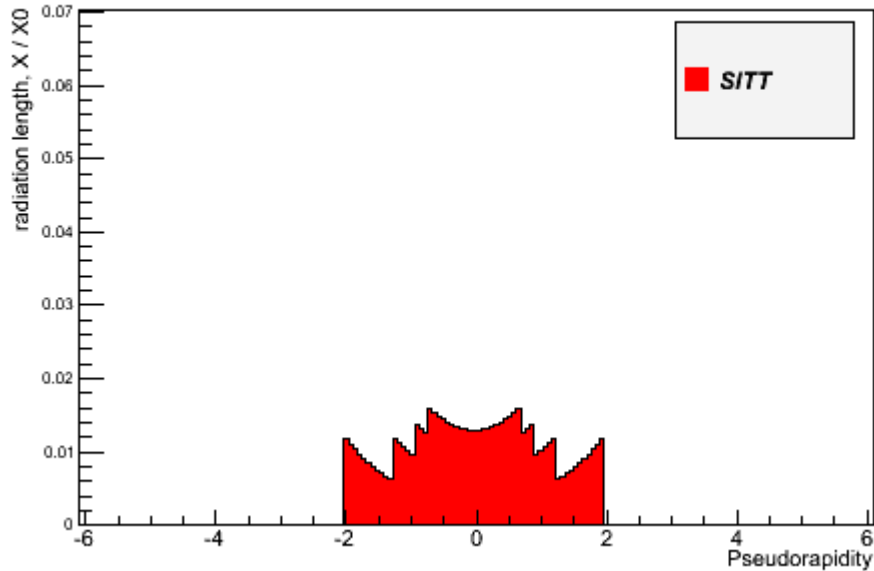
EIC Detector Geometry: Radiation Length Scan



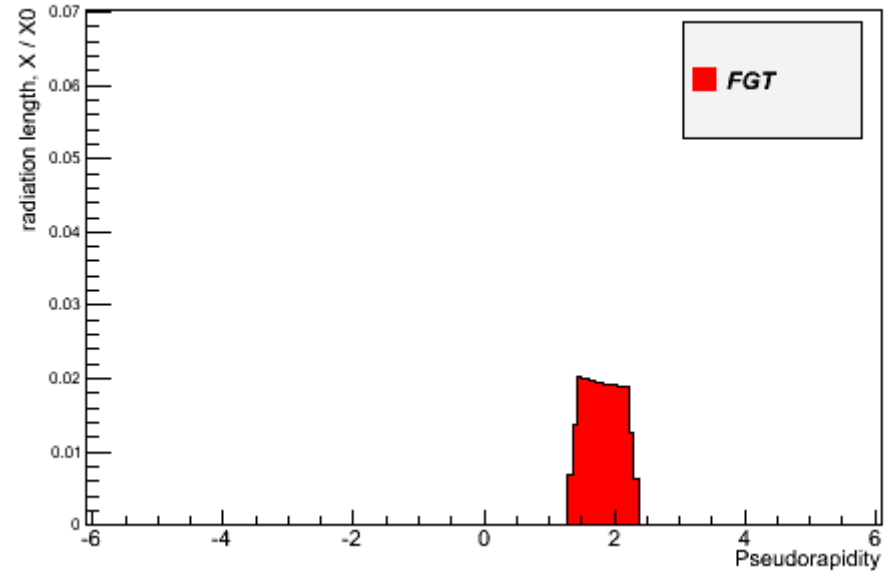
TRS – forward tracker, SIT – barrel vertex tracker (pixel for now)

# Radiation Length, per subsystem

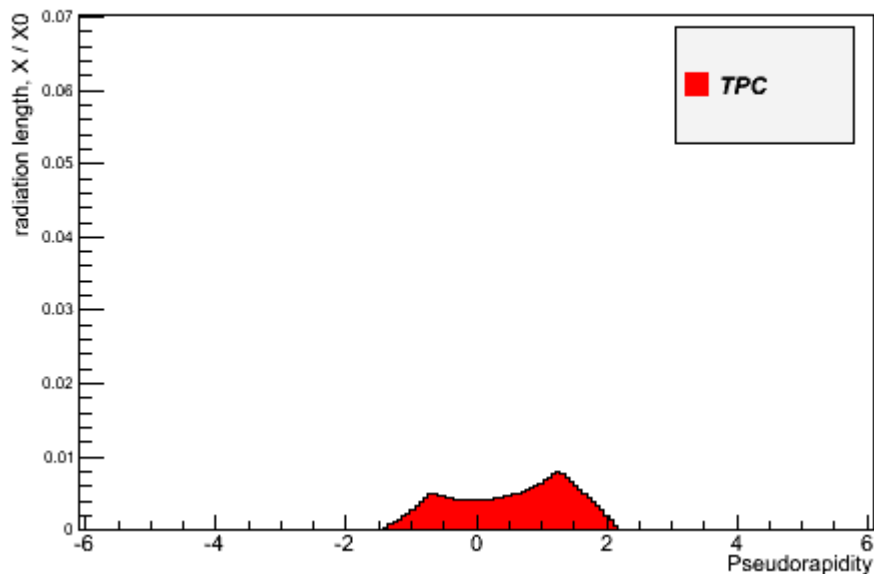
EIC Detector Geometry: Radiation Length Scan



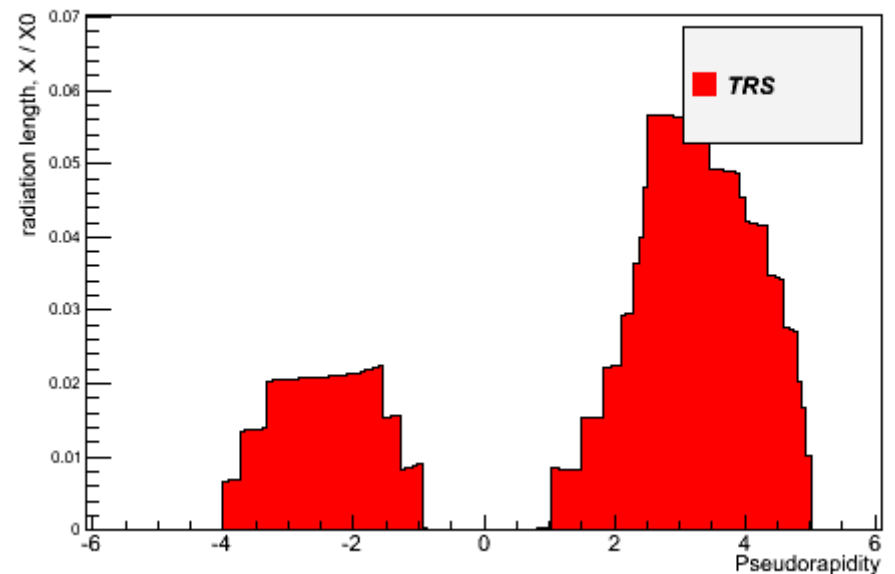
EIC Detector Geometry: Radiation Length Scan



EIC Detector Geometry: Radiation Length Scan



EIC Detector Geometry: Radiation Length Scan



# Summary

- Geometry updates as follows:
  - TRACKING:
    - barrel tracker – TPC for now;
    - central tracker – PIXEL;
    - forward tracking – silicon discs (ZEUS), FGT (STAR);
  - PID: RICH, DIRC, Aerogel;
  - Calorimetry: BEMC (?), BHCAL, EEMC (detailed), EHCAL;
  - Roman Pot stations – initial version;
- More work to implement IR magnet system, complex magnetic field maps etc..
- Items to discuss further:
  - symmetric vs asymmetric detector setup
  - exact technology for barrel EM calorimeter
  - barrel tracker technology and granularity
    - TPC or GEM?
    - padrow number and size?

**Thank You!**