

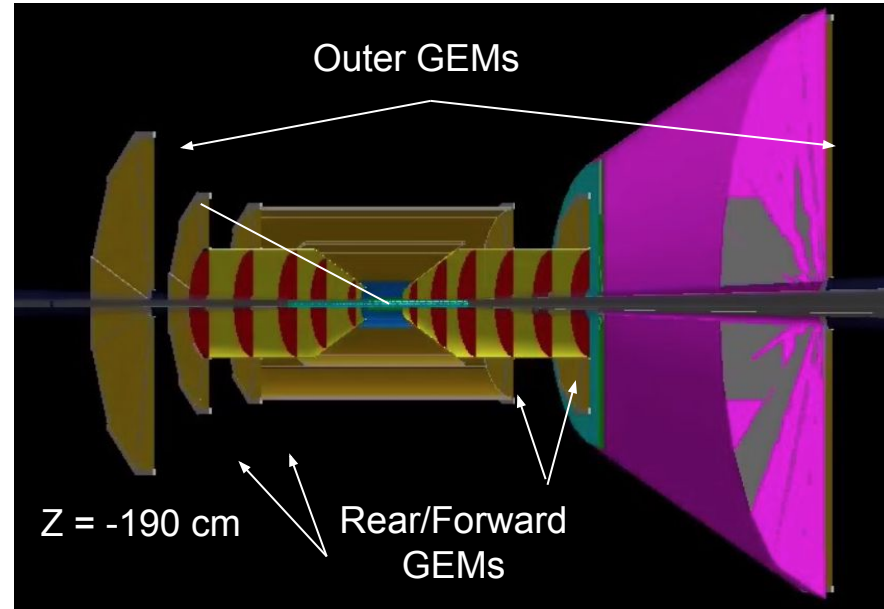
# Baseline 2 Tracking Detector

Baseline 2 related studies by:

- Nick Lukow:  
[https://indico.bnl.gov/event/13432/contributions/55605/attachments/37538/61845/2021\\_10\\_05\\_Baseline\\_2.pdf](https://indico.bnl.gov/event/13432/contributions/55605/attachments/37538/61845/2021_10_05_Baseline_2.pdf)
- Rey Cruz-Torres:  
[https://indico.bnl.gov/event/13432/contributions/55639/attachments/37545/61856/211004\\_Disk\\_outer\\_rad.pdf](https://indico.bnl.gov/event/13432/contributions/55639/attachments/37545/61856/211004_Disk_outer_rad.pdf)

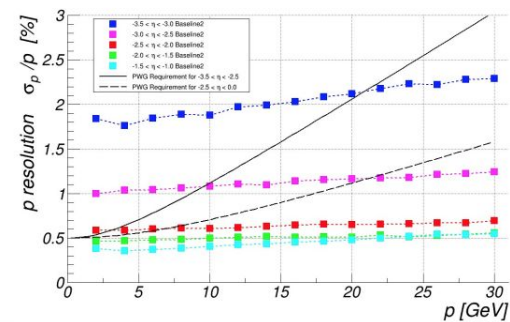
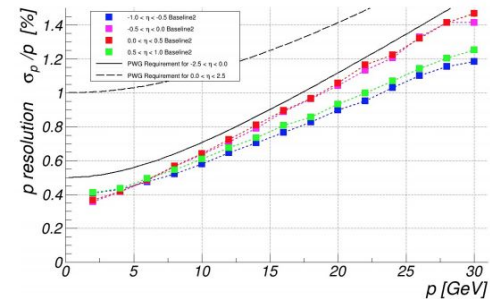
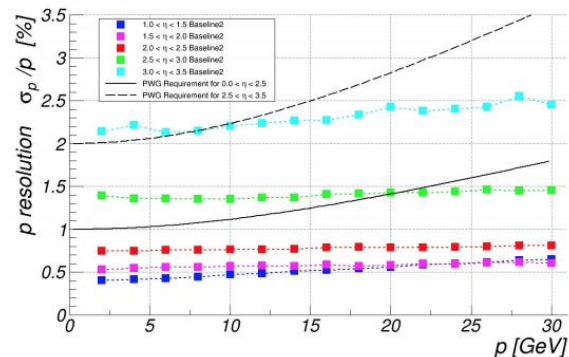
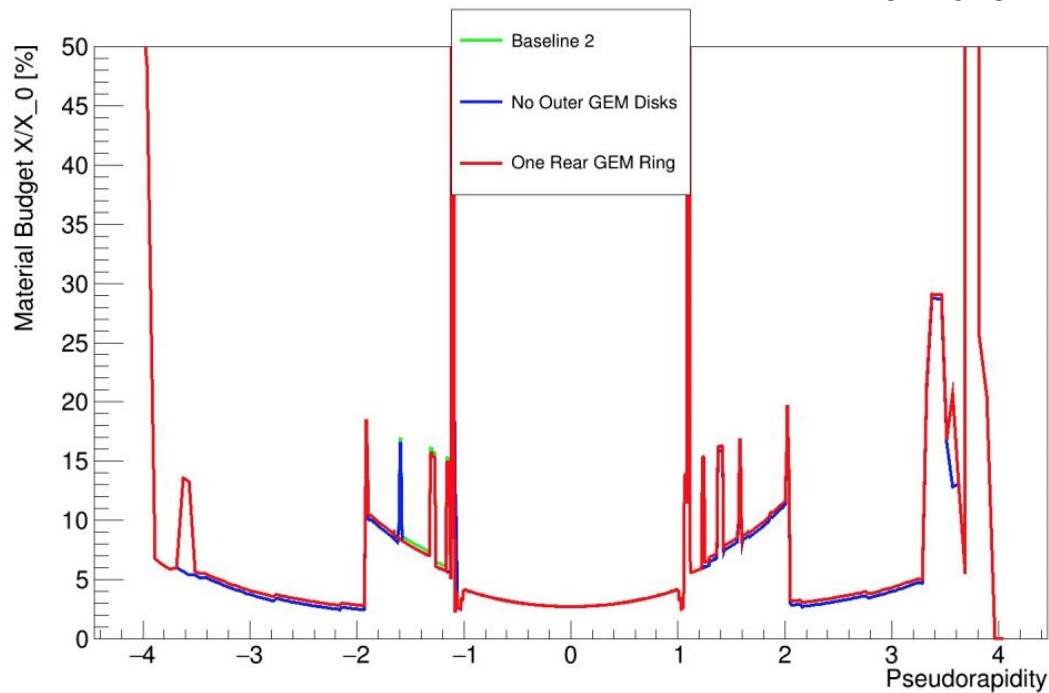
# Baseline 2 Configuration

- ❑ Develop a tracker which integrates Si and MPGD technology
- ❑ Minimizes material, especially in the negative direction - implements average of new Si routing scheme (Ernst and Shujie)
- ❑ **Positive Endcap**
  - ❑ 6 Si disks ( $25 \text{ cm} < z < 165 \text{ cm}$ )
  - ❑ 2 GEMs ( $z = 103 \text{ cm}$  and  $164.5 \text{ cm}$ )
  - ❑ 1 GEM behind dRICH
- ❑ **Barrel**
  - ❑ 3 vertex layers ( $r \sim 3.3\text{-}5.5 \text{ cm}$ , 28 cm long)
  - ❑ 2 Si layers ( $r \sim 13.4 - 18 \text{ cm}$ )
  - ❑ 4 MM layers ( $r \sim 47.7 - 77.4 \text{ cm}$ )
- ❑ **Negative Endcap**
  - ❑ 5 Si disks ( $-145 \text{ cm} < z < -25 \text{ cm}$ )
  - ❑ 2 GEMs ( $z = -144.5 \text{ cm}$  and  $-103 \text{ cm}$ )
  - ❑ 1 GEM behind mRICH ( $z \sim -190 \text{ cm}$ )
- ❑ Rear/Forward GEMs used to provide additional tracking points between  $\sim 1.1 < |\eta| < 1.7$  for tracks with only a few Si hits



# Baseline 2 Material Scan

Nick Lukow

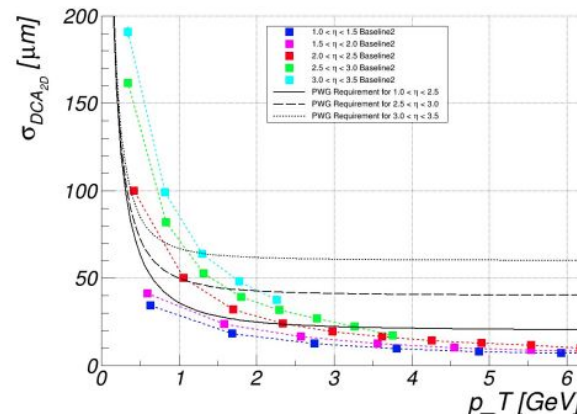
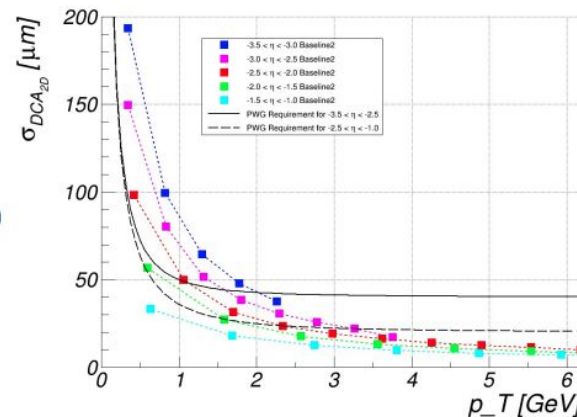
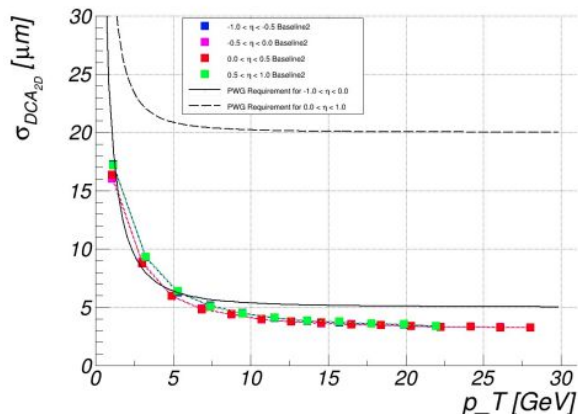


# Baseline 2 Performance

Nick Lukow

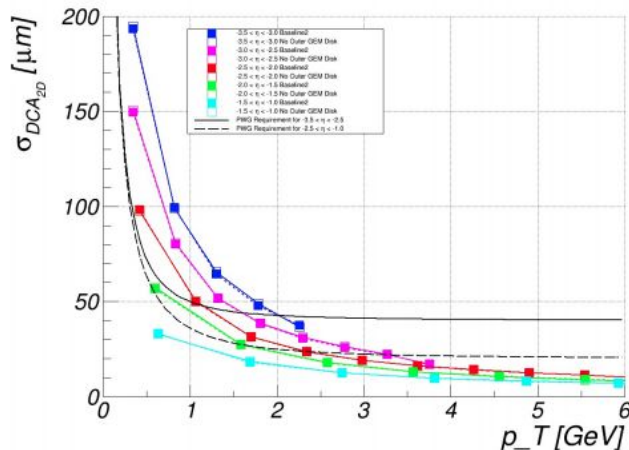
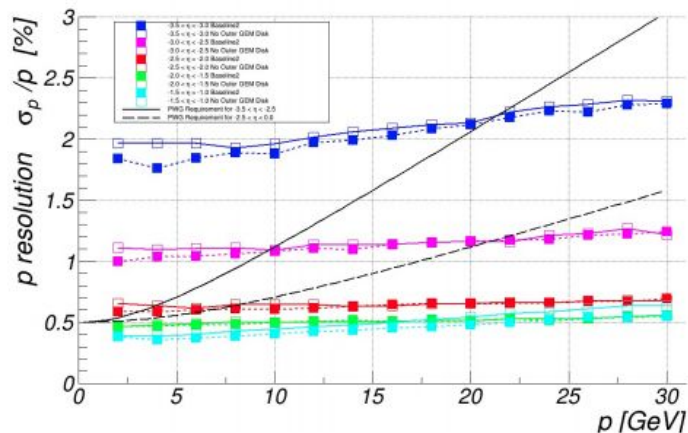
## Transverse Pointing Resolution

- Barrel:
  - Very close to meeting requirements everywhere
- Backward:
  - Meets requirements for  $\eta > -1.5$
  - Meets requirements for tracks with  $p_{t} > \sim 1.5$  GeV and  $\eta > -3.0$
- Forward:
  - Meets requirements for  $\eta < 2.0$
  - Meets requirements for tracks with  $p_{t} > \sim 1.5$  GeV and  $\eta < 3.0$



# Baseline 2 Performance: Impact of Outer GEMs

Nick Lukow



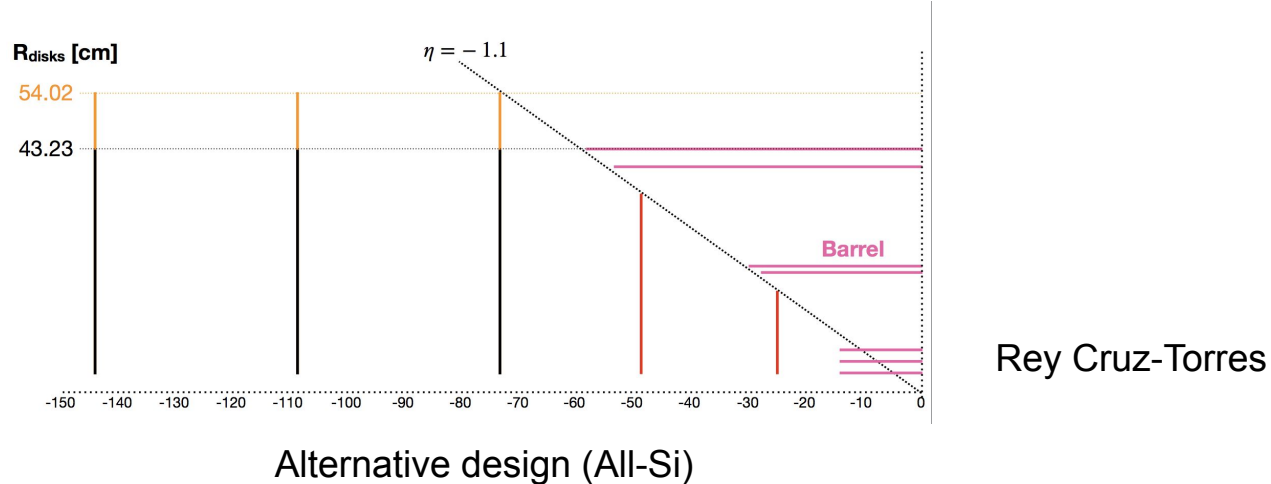
■  $-1.0 > \eta > -1.5$   
■  $-1.5 > \eta > -2.0$   
■  $-2.0 > \eta > -2.5$   
■  $-2.5 > \eta > -3.0$   
■  $-3.0 > \eta > -3.5$

■ Baseline Configuration  
□ No Outer GEM Disk

- Outer GEM trackers (behind PID) do not contribute significantly to tracking performance.
- Even less impact in positive end cap
  - Need (or not) for these trackers should be determined by other detector working groups.

# Baseline 2: All-Si (negative direction)

- Both GEM rings removed, and outer 3 Si disks radii increased (o.r. ~ 54 cm)
  - Larger Si disks may accumulate more material than current 0.24% X/X0



- Outer GEM trackers (behind PID) do not contribute significantly to tracking performance.
  - Need (or not) for these trackers should be determined by other detector working groups.

# Baseline 2: All-Si (negative direction)

$16.0 < p < 18.0 \text{ GeV}/c$

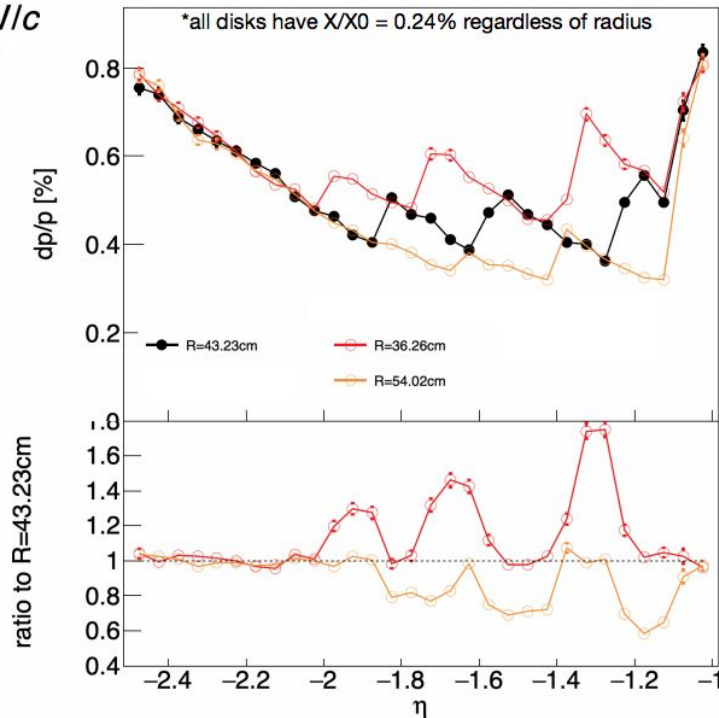
B = ATHENA (21/05/07)

$R_{\text{disks}} [\text{cm}]$

54.02

43.23

36.26



Rey Cruz-Torres