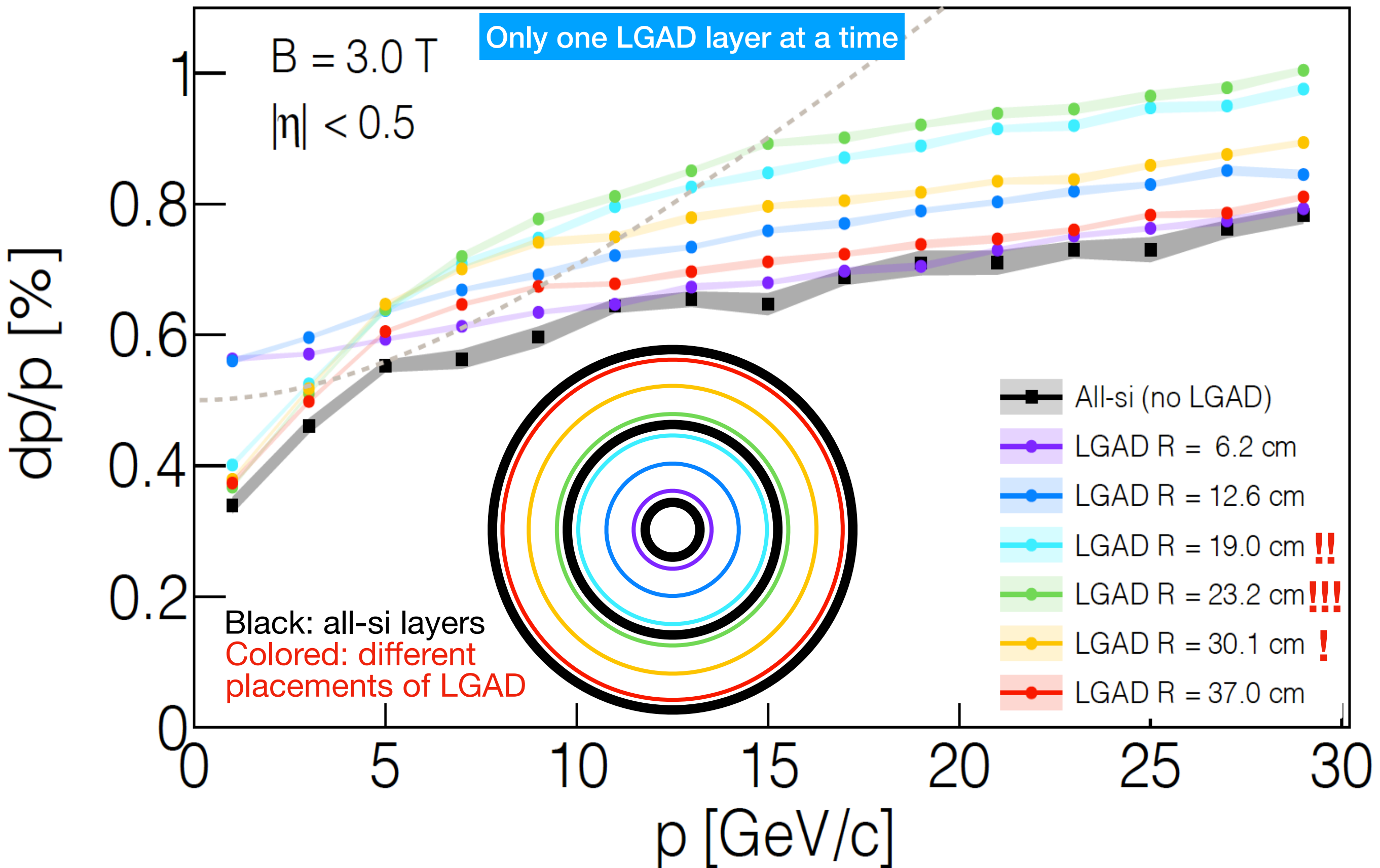


Barrel middle-layer material budget



Rey Cruz-Torres
RNC EIC Meeting
07/06/2021

Placement of material inside the tracking volume



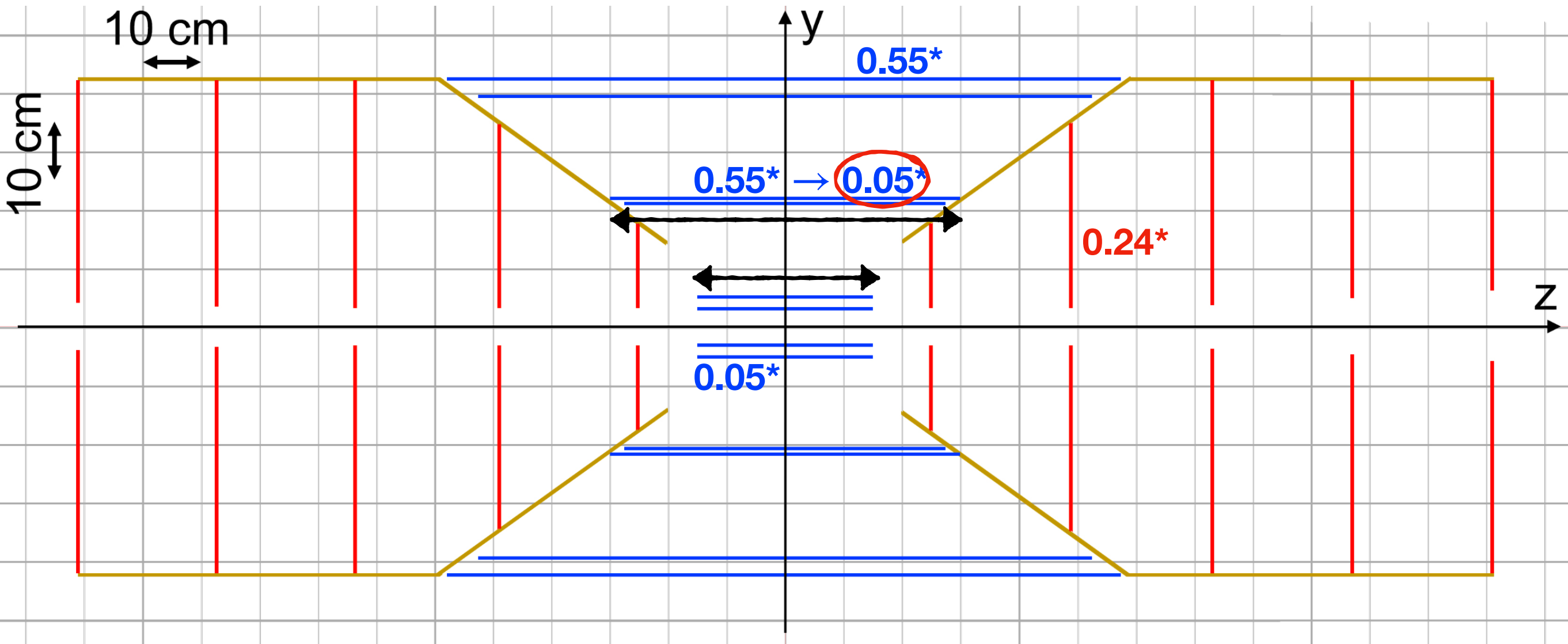
We saw in the past that momentum resolution is very sensitive to material near the sagitta

Detector diagram

Disks

Barrel

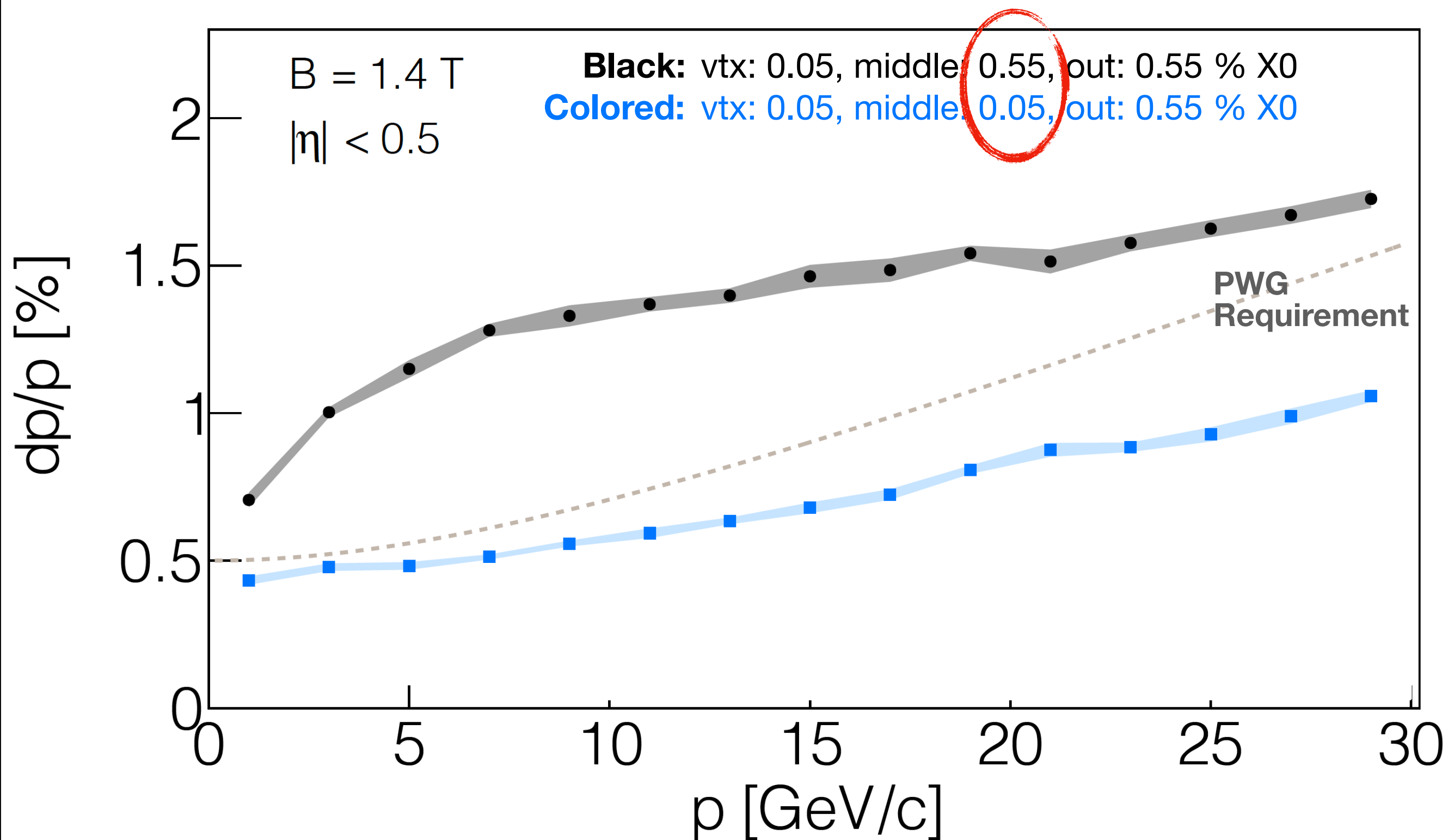
Support and services



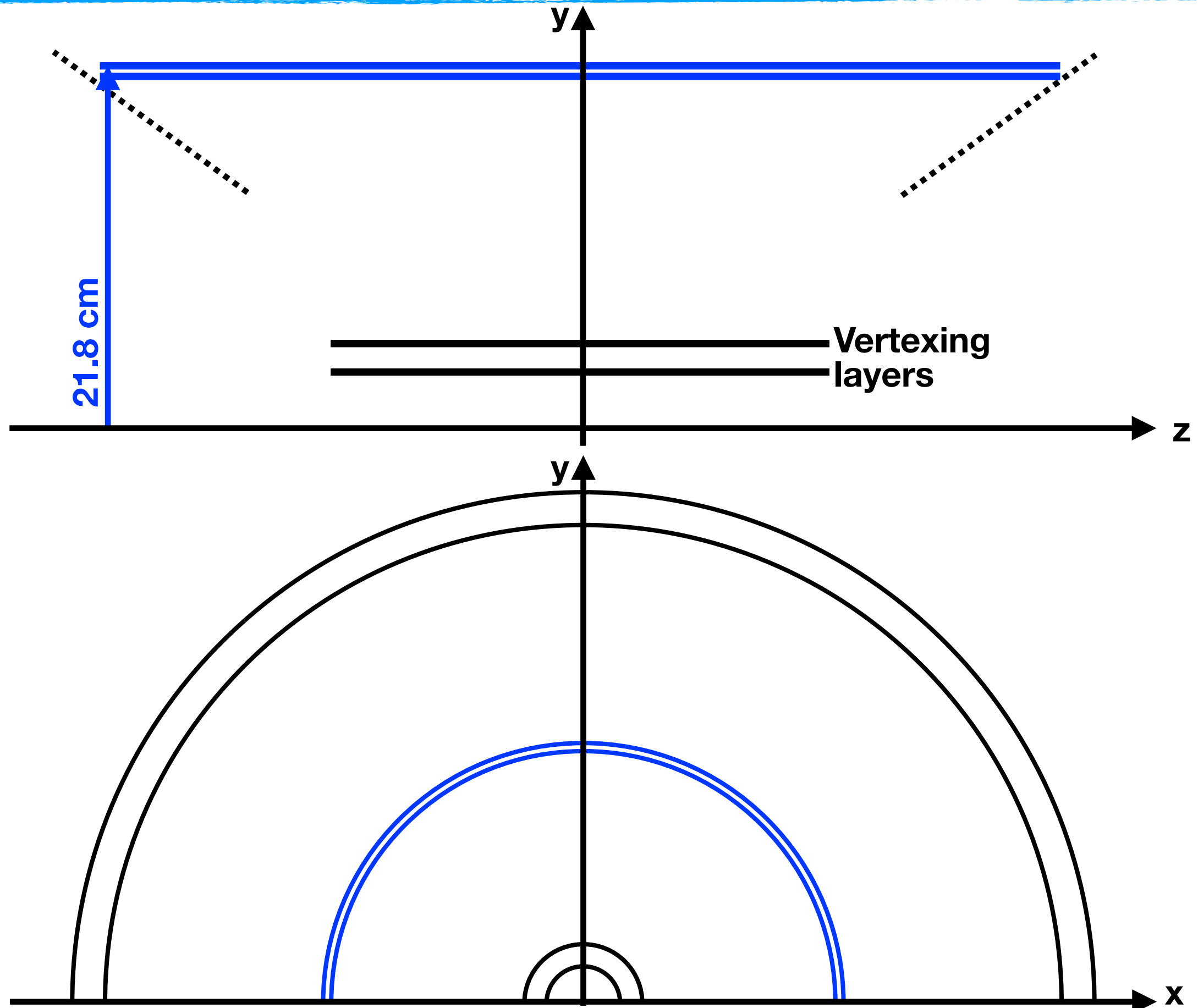
* % X_0

The middle layers are not much longer in z than the vertexing layers. Can we use the ultra thin (0.05 % X_0) bent-silicon technology there? What do we gain?

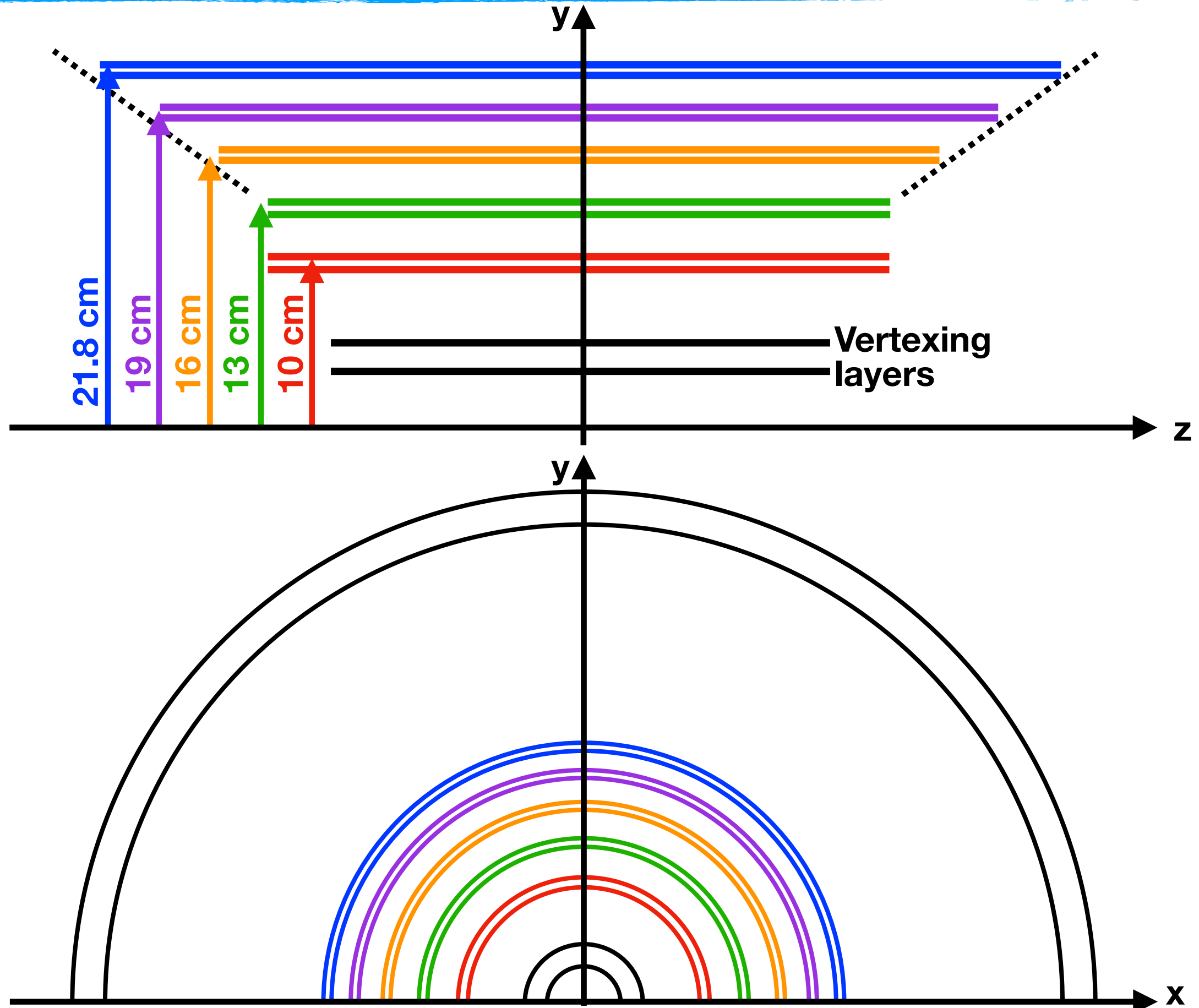
Momentum resolution impact



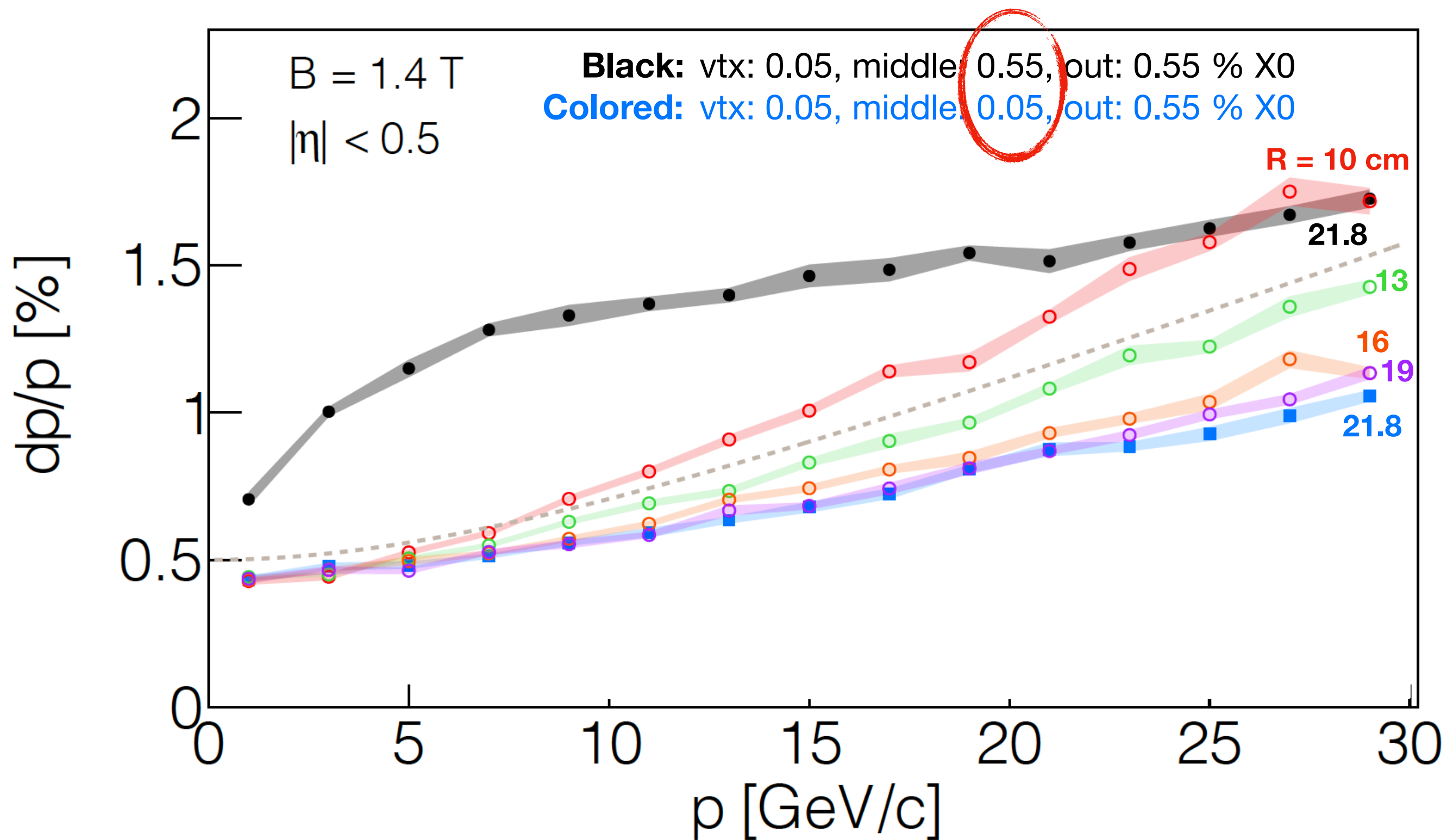
Placement of barrel middle layers



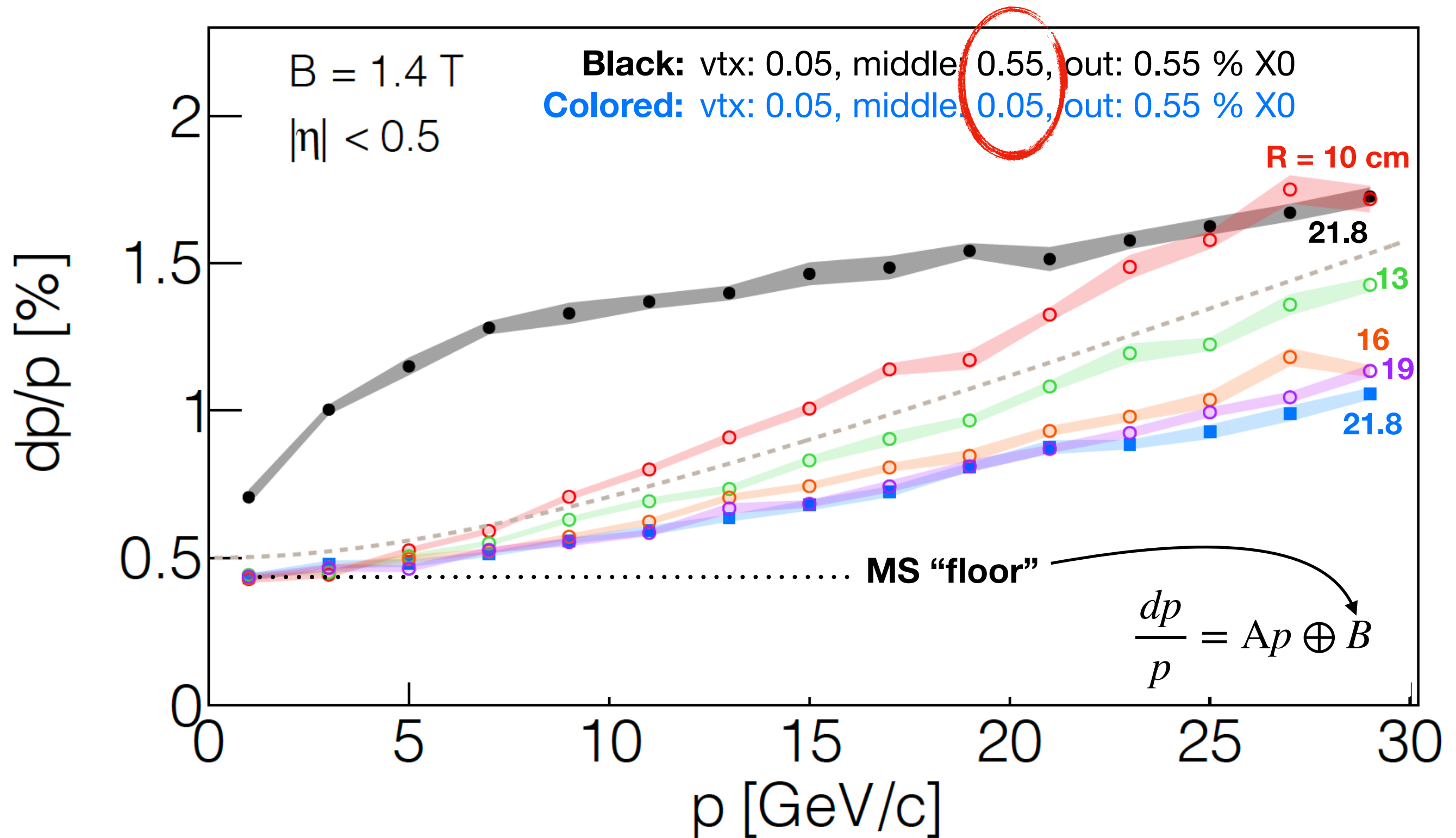
Placement of barrel middle layers



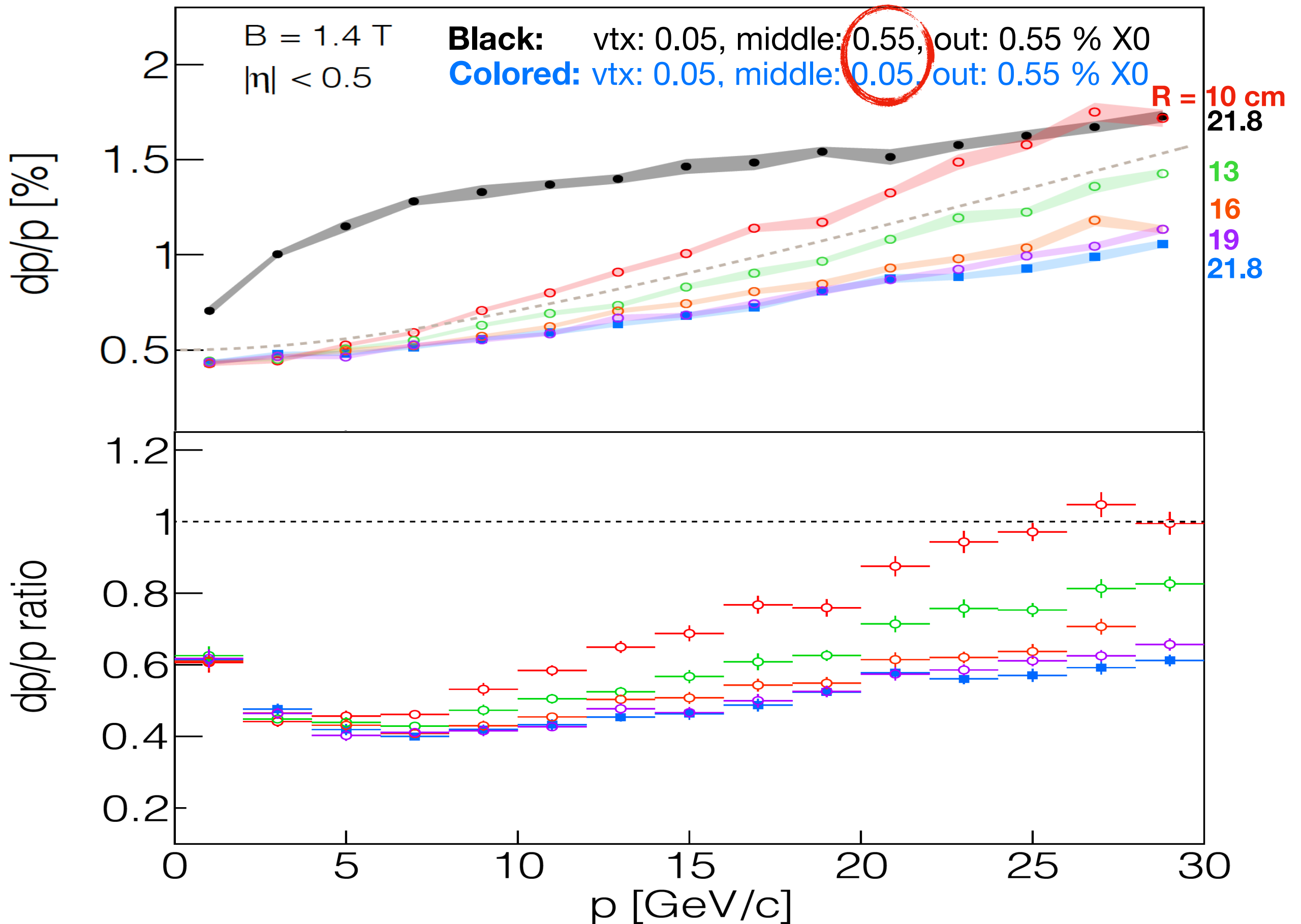
Momentum resolution impact



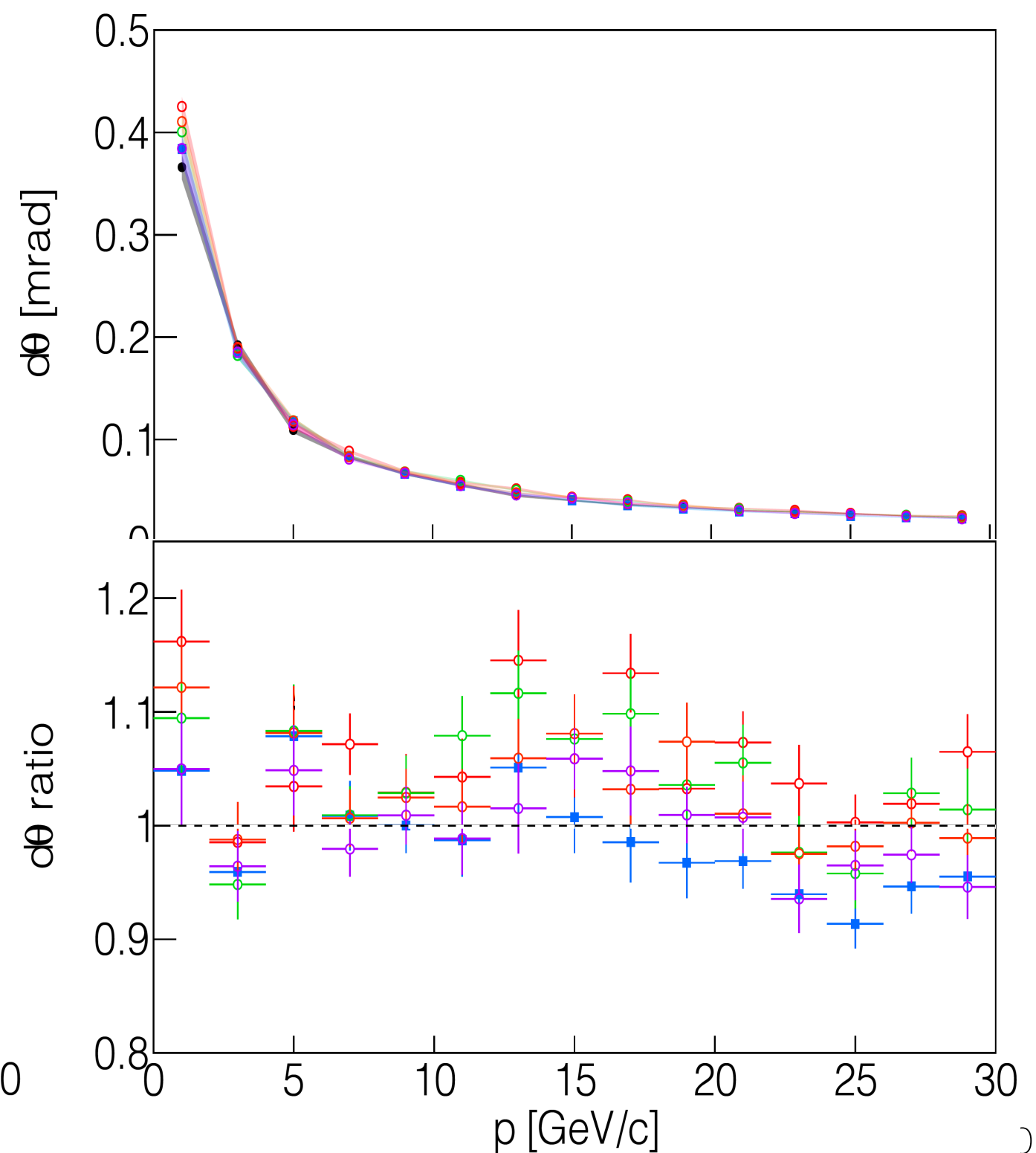
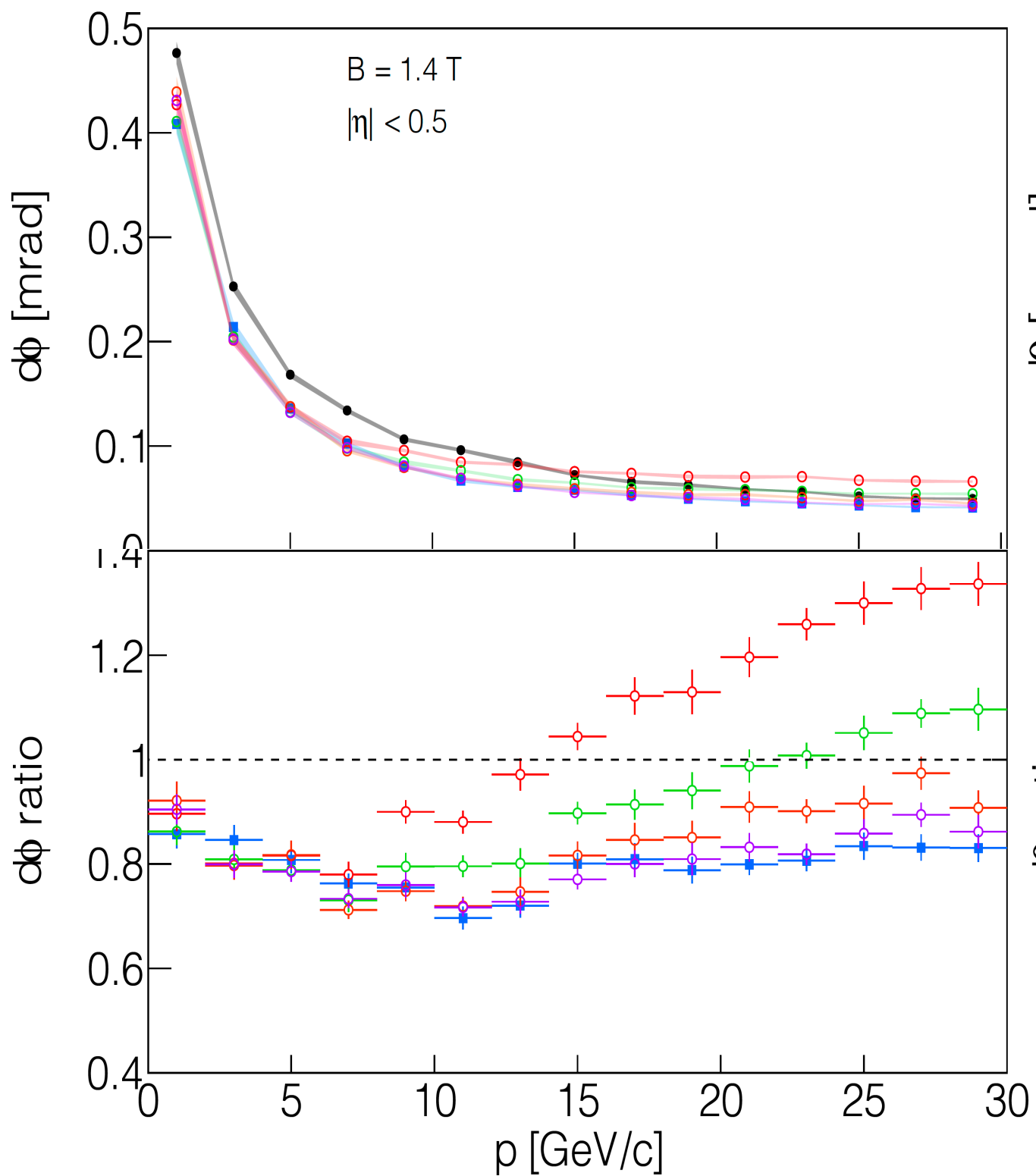
Momentum resolution impact



Momentum resolution impact



Angular resolution (at vertex)



Summary

- ❑ Momentum resolution can be significantly enhanced (~50%) if the ITS3 ultra-thin (0.05%) bent silicon technology is used for the middle (sagitta) barrel layers.
- ❑ This sets the detector momentum-resolution performance (for $|\eta| < 0.5$, $B = 1.4$ T) below the PWG requirements.
- ❑ Azimuthal-angle resolution improves by ~20%.
- ❑ Polar-angle resolution not significantly impacted by these changes.
- ❑ The radius (and thus the length in z) can be reduced significantly (from $r_s \approx 22$ cm down to $r_s \approx 13$ cm) while still achieving a momentum resolution better than the PWG requirements.
- ❑ It would be useful to have an order-of-magnitude rough estimate for the cost of these variants.