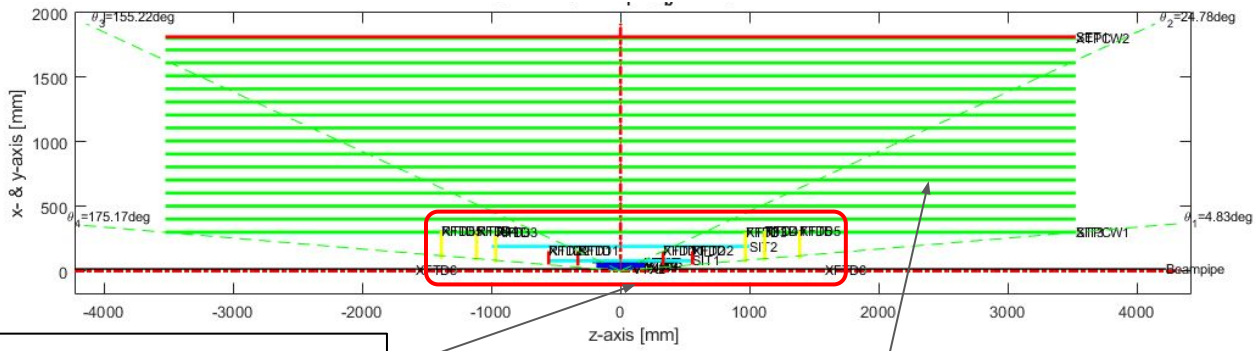
Tracker LDT Update

Lizi Hutchinson, Harald Fox

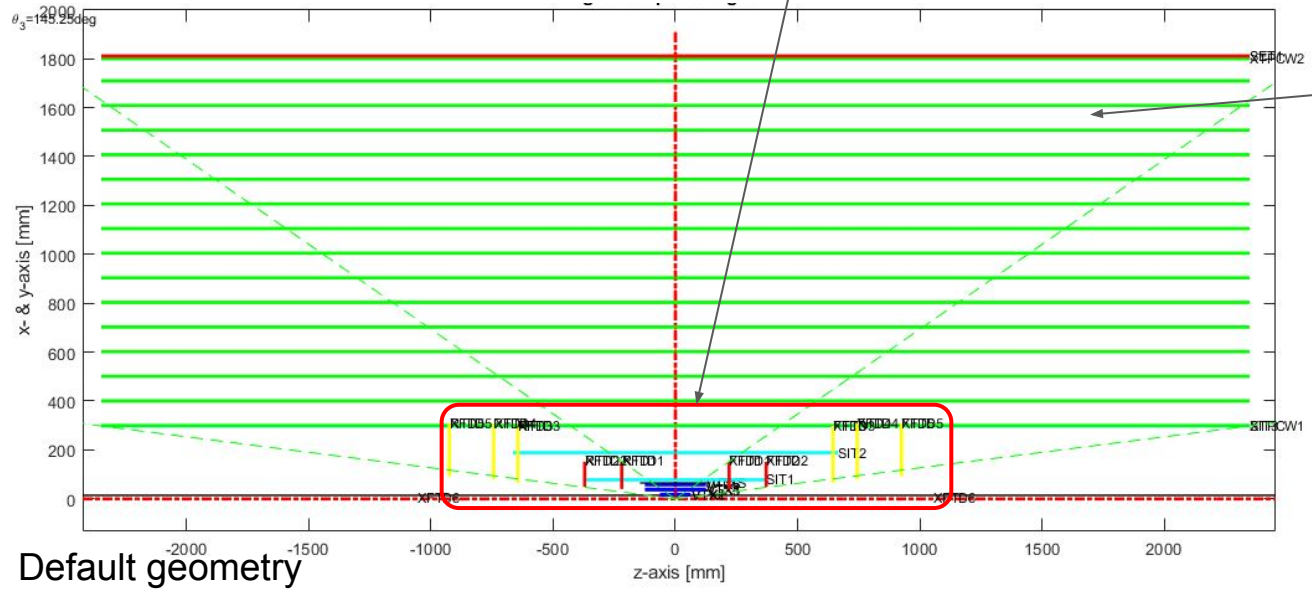
Graphs made by taking default geometry (as defined in weekly tracker meetings) and scaling the z measurements (including those of VTX, SIT, TPC and SET) by 0.5, 1.5 and 2.0 to simulate making the barrel length longer or shorter.

“Long” barrel (x1.5)

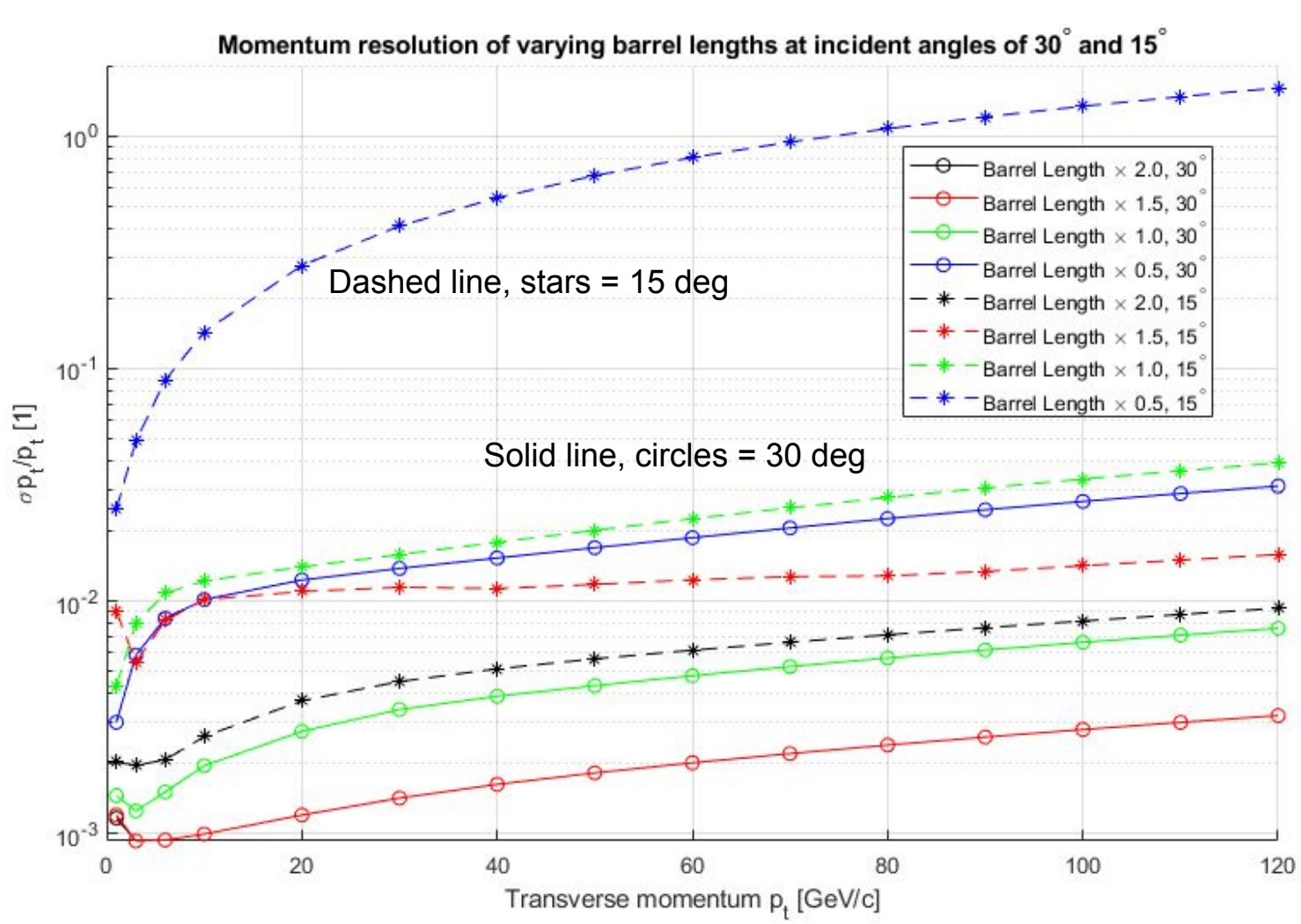


Inner detectors (VTX, SIT, FTDs)

TPC (green line shows every 10th layer)



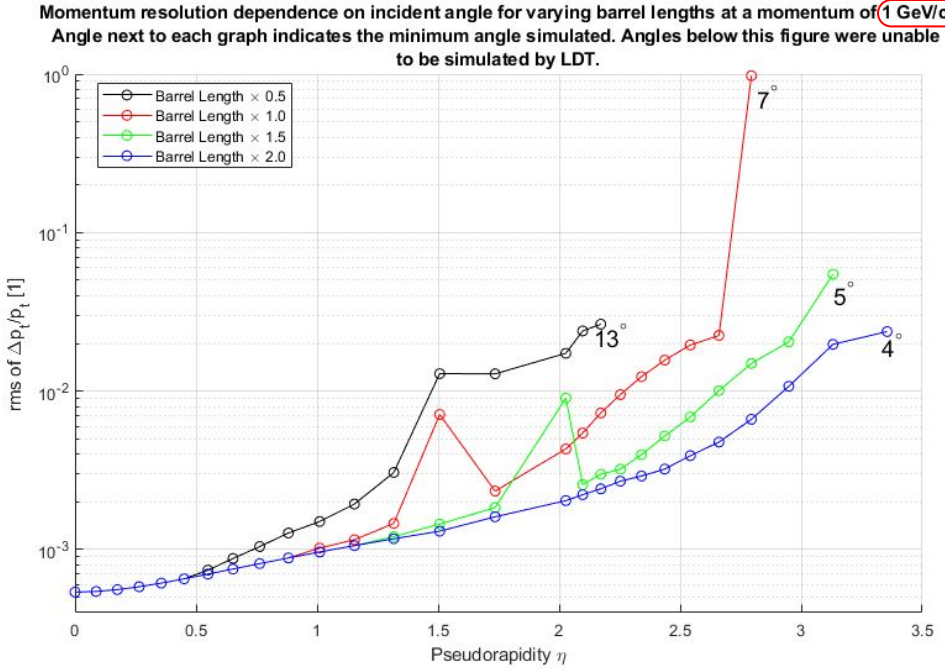
Default geometry

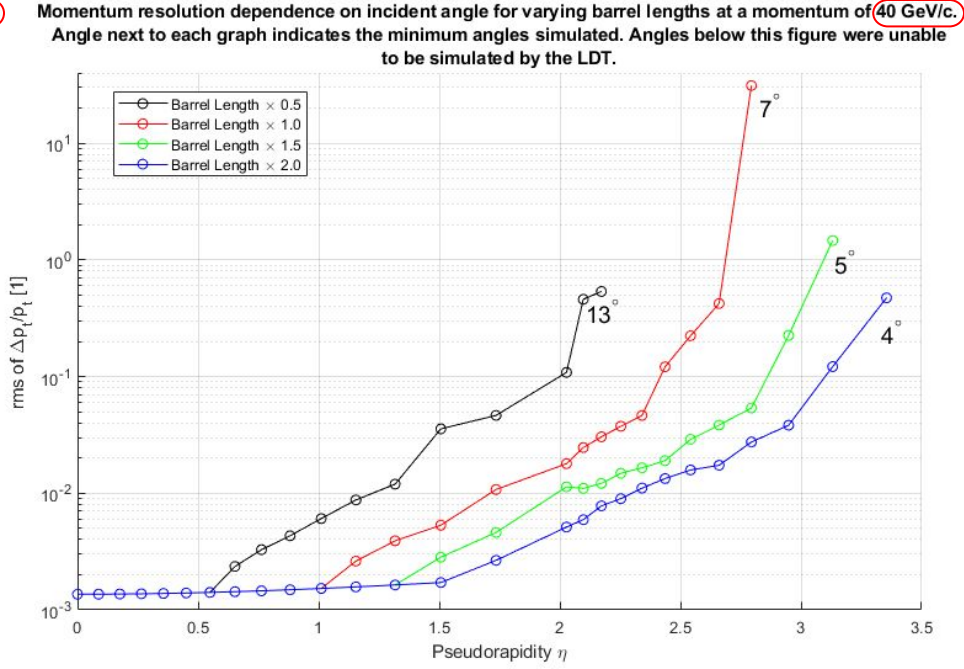


Increasing the barrel length increases the momentum resolution.

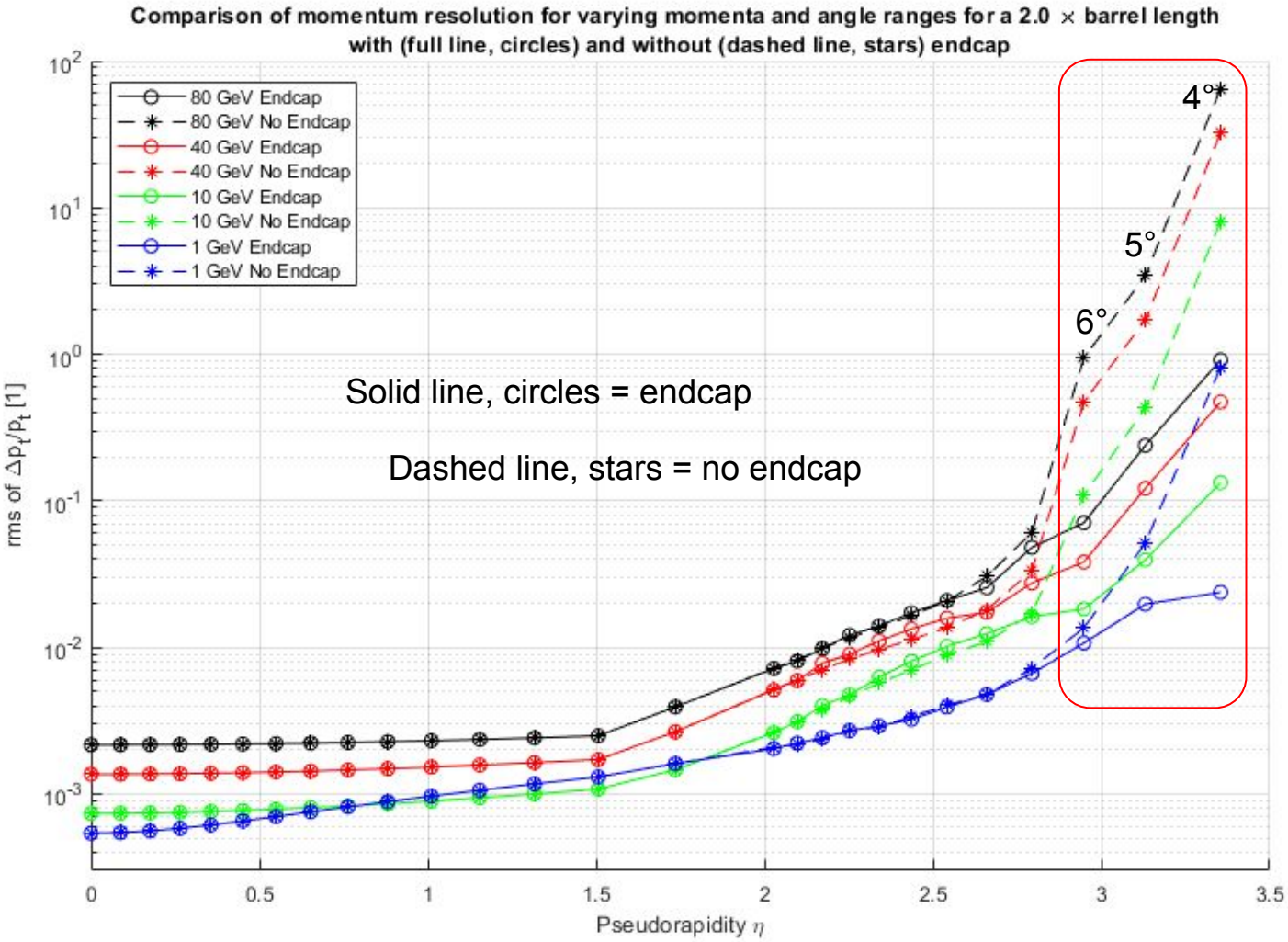
Above a certain angle, momentum resolution as a function of momentum is the same due to the fact that, at higher angles, a particle will travel through mostly the same amount of material and get the same amount of detector hits.

Black solid line is underneath red solid line, and as angle is increased, all plots are exactly the same, and hence are not shown here.





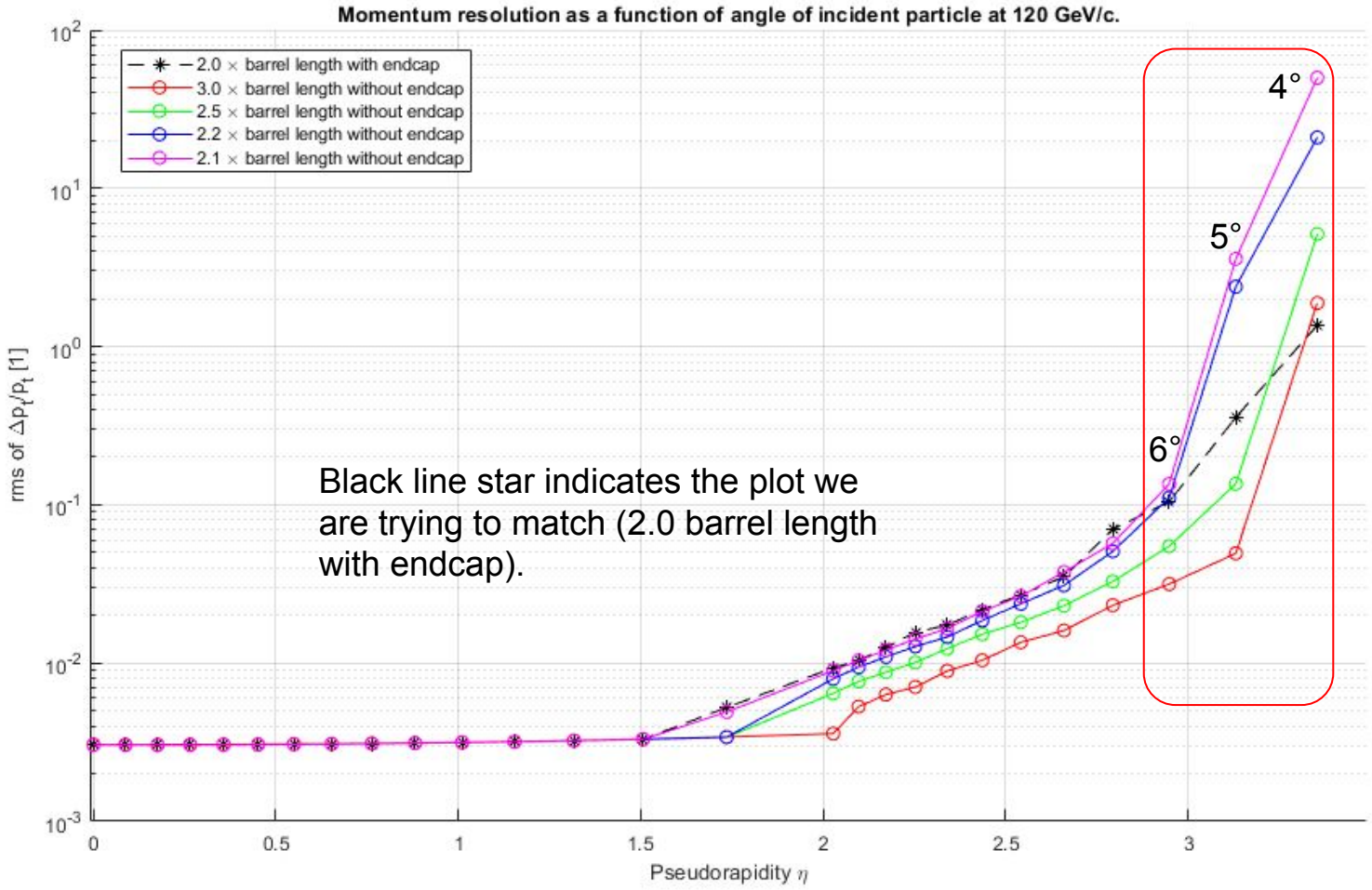
Increase in barrel length leads to increase in angle coverage. Blips in 1.0 and 1.5 most likely due to low momentum effects.



What effect does the endcap (forward detectors) have on the momentum resolution?

As expected, not at all above a certain angle (this angle depends on the barrel length, for 2.0, this angle is around 15 degs), and little between 15 and 7 degrees (more so for higher momenta).

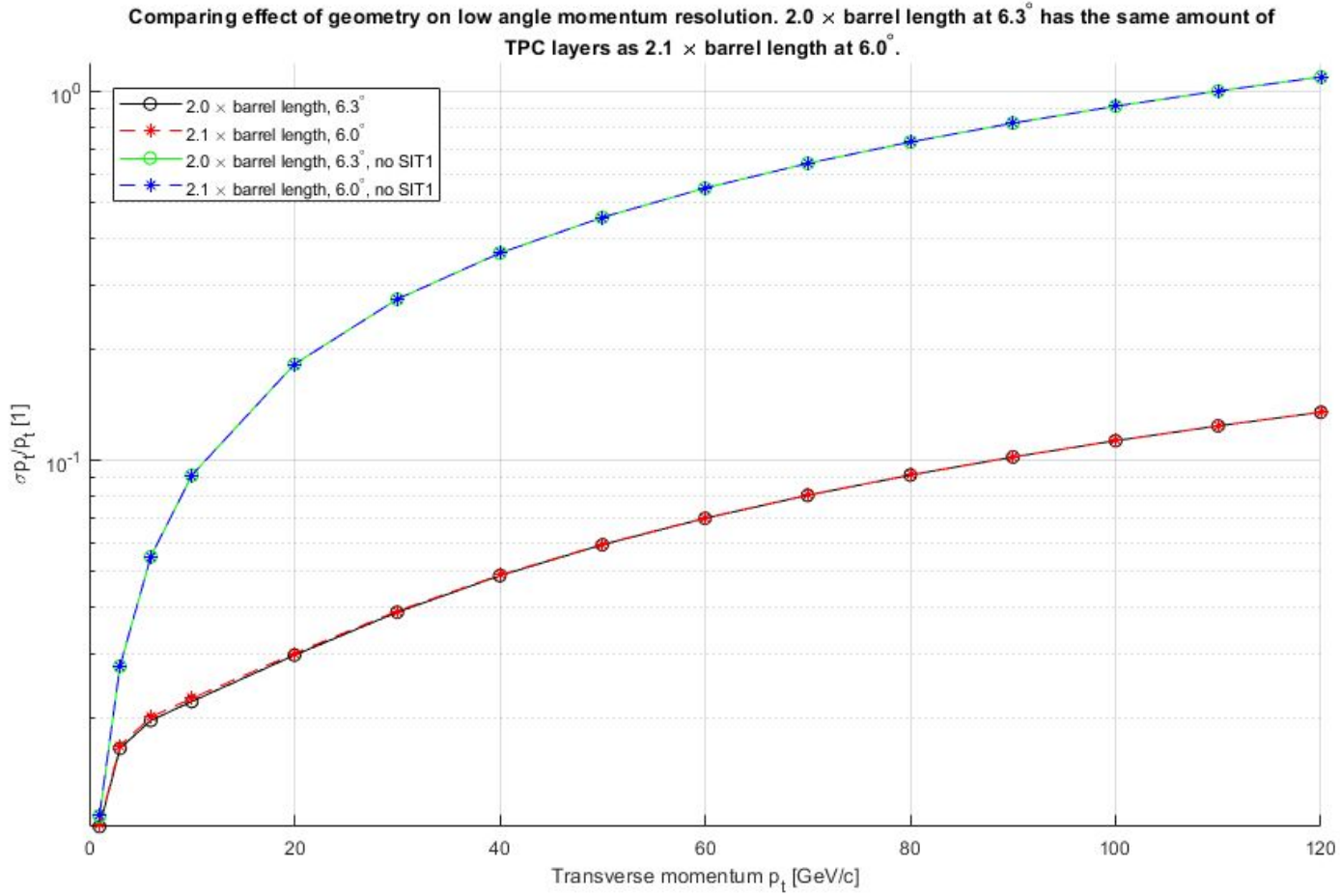
Below 7 degrees, the endcap has a large effect (seen here in the difference between the full circles and the dashed stars of the same colour).



What length would the barrel have to be, compared to 2.0, to make up for the removal of the endcap?

The one that matches most closely is 2.1 x barrel length (pink), but only up to 6 degrees. There is a sharp increase at 4 and 5 degrees.

This is because of the number of TPC layers hit and inclusion of SIT1.



This graph shows that when the amount of TPC layers hit are made the same (in this case, 22 layers), the momentum resolution results are almost identical.

This graph also shows that if we manually remove SIT1, so that SIT1s removal is the only difference between the blue-green plots and the black-red plots, this results in a loss of momentum resolution.