

CEPC Silicon Drift Chamber Tracker

Xin Shi

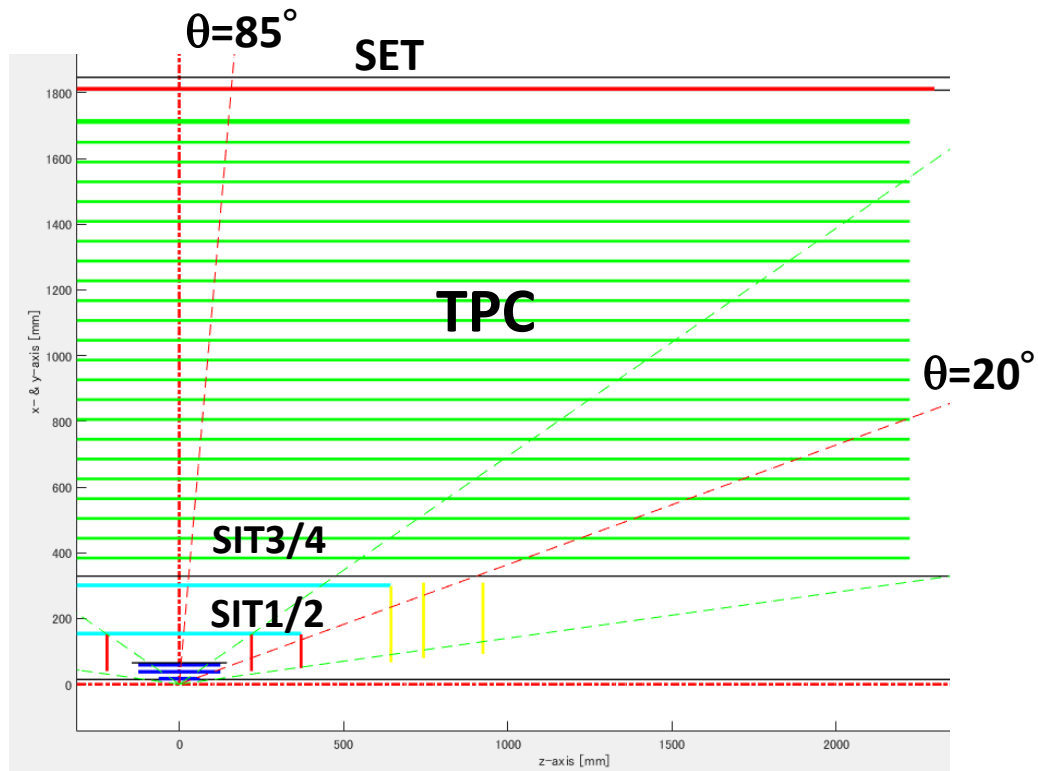
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Outline

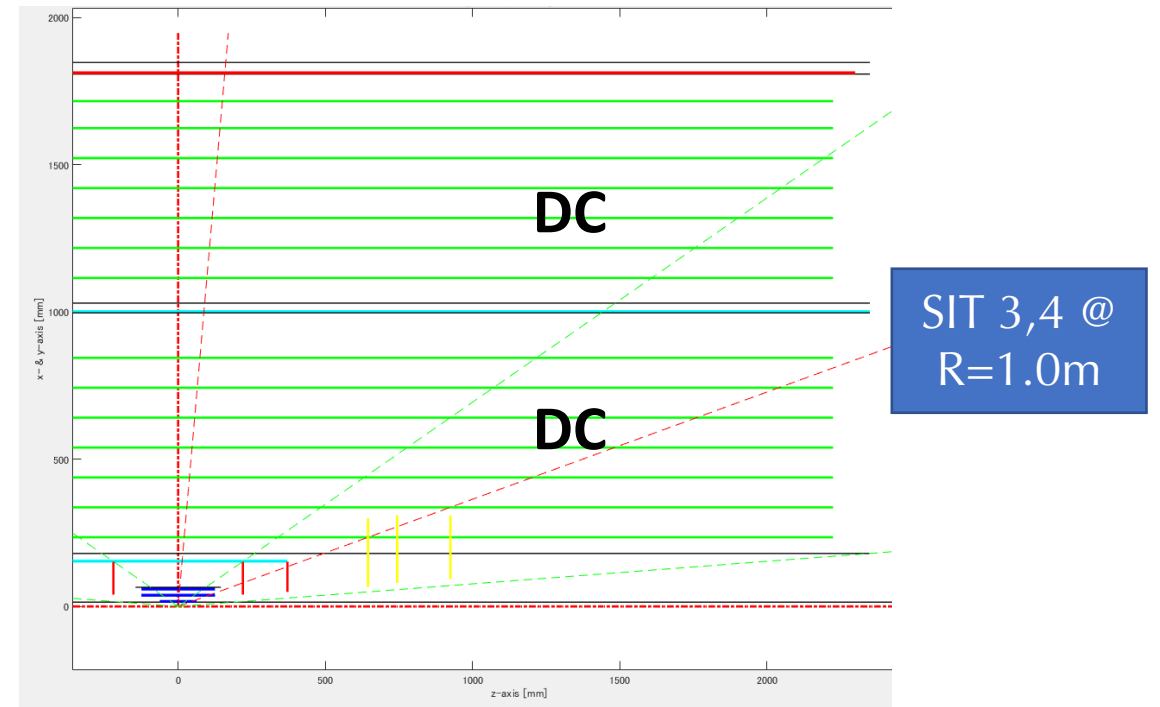
- SDT v1.0: Baseline config with two Drift Chambers
- SDT v1.1: $R = 1.5\text{m}$
- Next steps

CEPC Silicon + Drift Chamber Tracker: v1.0

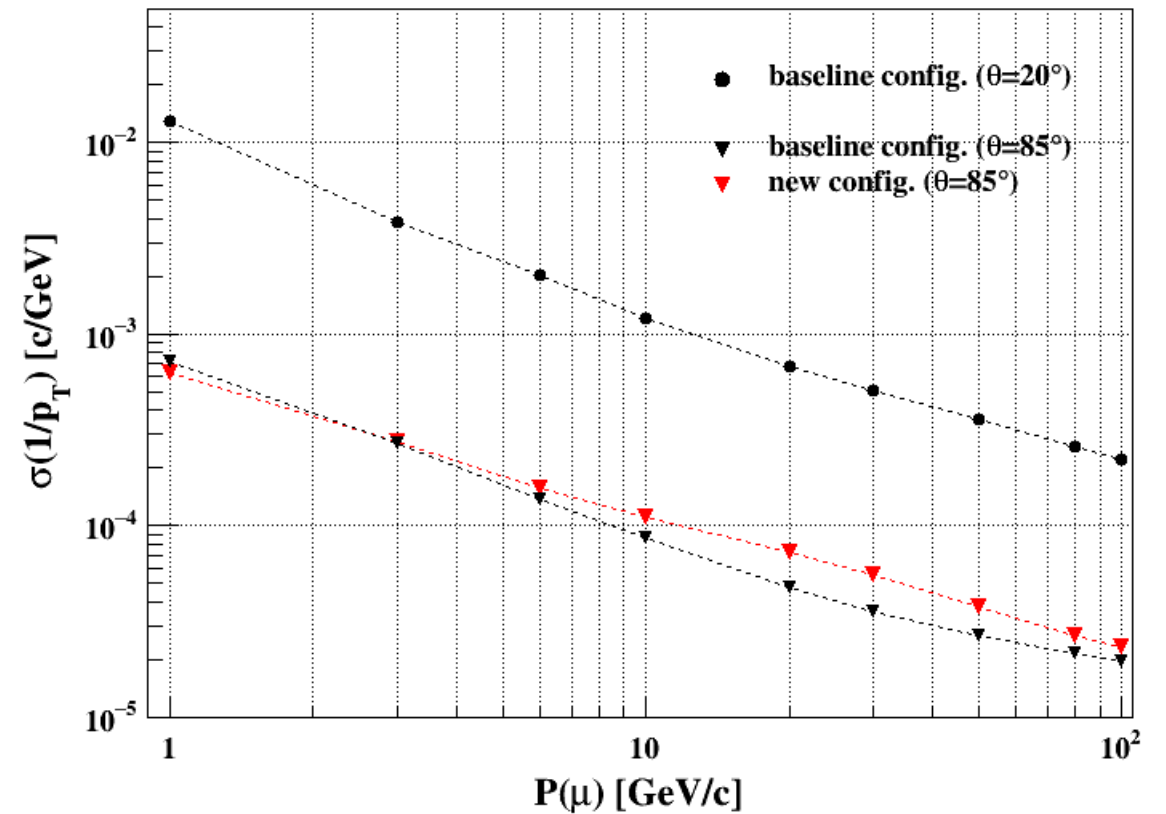
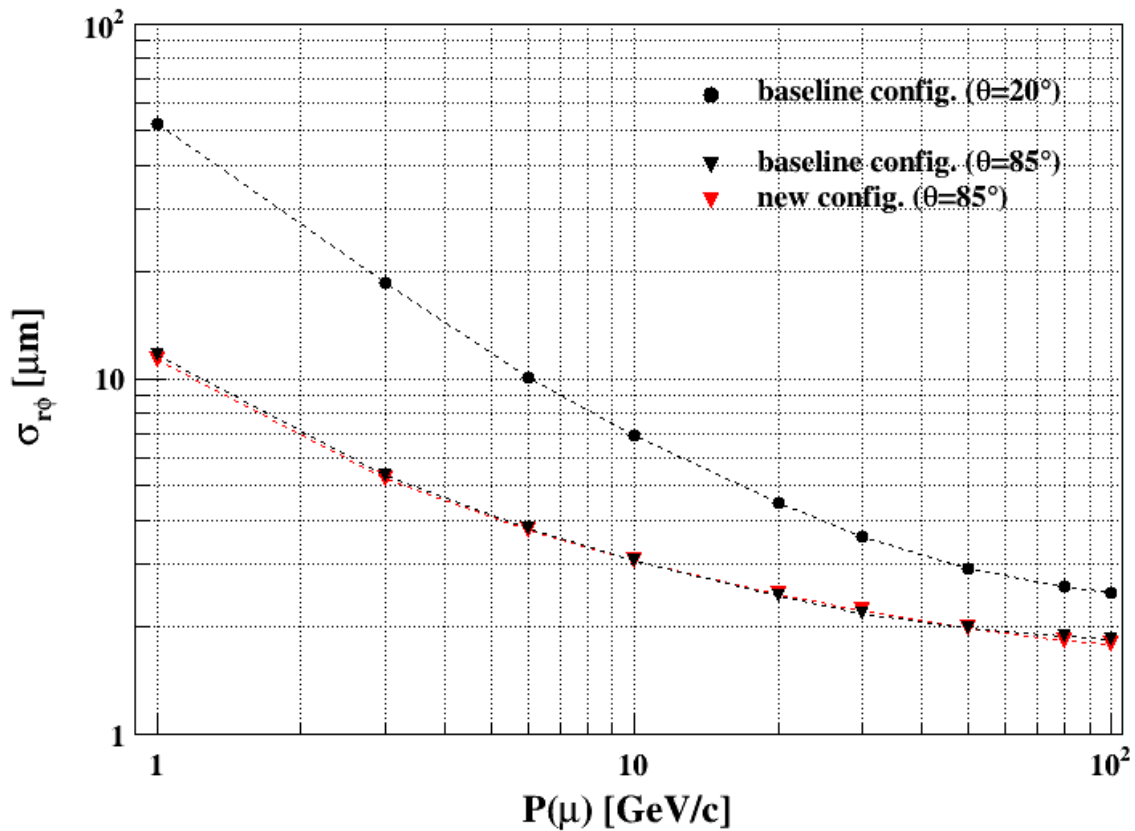
- Based on the baseline Silicon + TPC
- Replace TPC layers with two drift chamber layers



baseline



Impact parameter and momentum resolution



- No change for impact para reso. and slight degradation for barrel momentum reso.

Number of hit layers (per track)

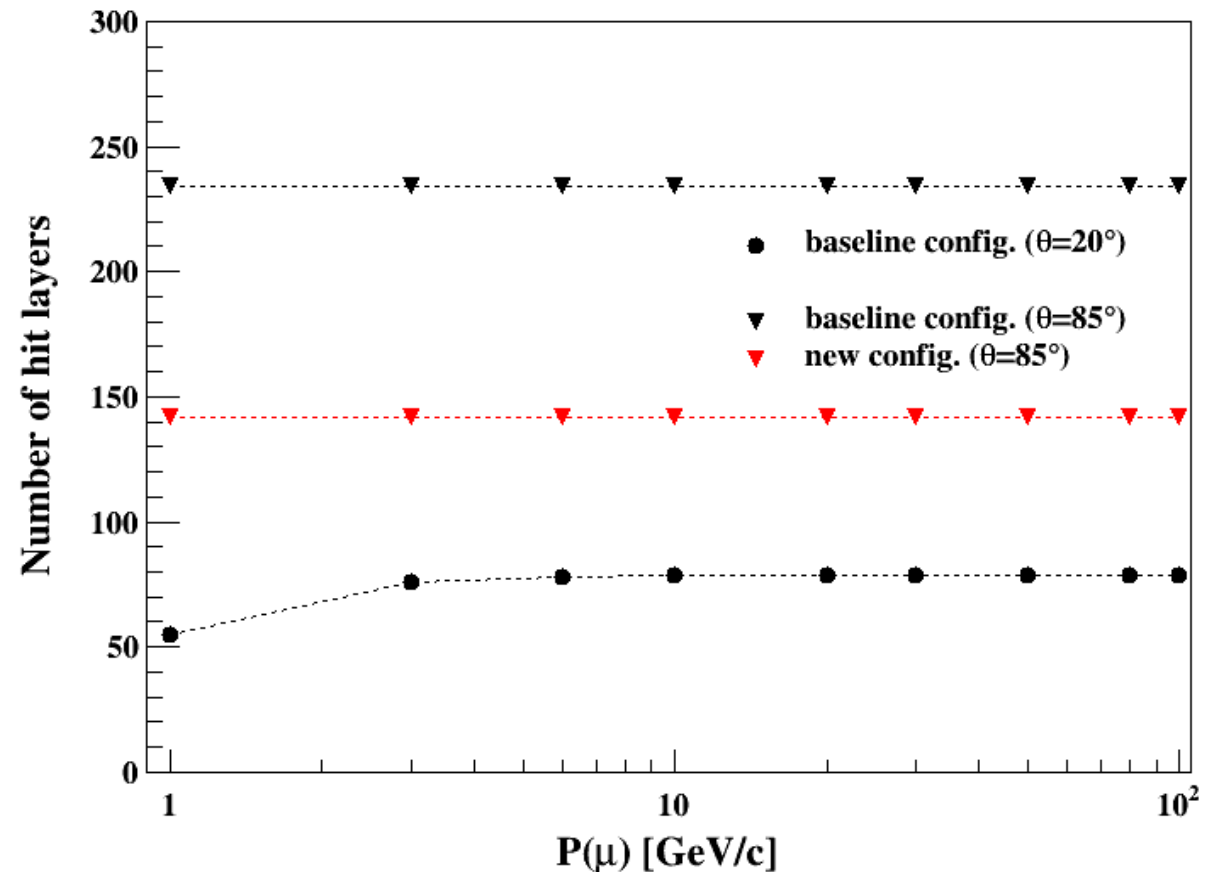
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40 40 Time Projection Chamber (TPC)
41 41  $\sigma^2 = \sigma_0^2 + \sigma_1^2 \sin(\beta)^2 + C_{diff}^2 * 6mm/h * \sin(\theta) * L_{drift} [m]$ 
42 42 Number of layers      : 222
43 43 Radii [mm]           : 384,1716
44 44 Upper limit in z [mm] : 2225
45 45 Lower limit in z [mm] : -2225
46 46 Efficiency RPhi      : 1
47 47 Efficiency z         : 1
48 48 Thickness [rad. lengths] : 0.00005194
49 49  $\sigma_0(R\Phi)$  [1e-6m] : 50
50 50  $\sigma_1(R\Phi)$  [1e-6m] : 900
51 51  $C_{diff}(R\Phi)$  [1e-6m/sqrt(m)] : 25
52 52  $\sigma_0(z)$  [1e-6m] : 400
53 53  $\sigma_1(z)$  [1e-6m] : 0
54 54  $C_{diff}(z)$  [1e-6m/sqrt(m)] : 80
    
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40 40 Time Projection Chamber (TPC)
41 41  $\sigma^2 = \sigma_0^2 + \sigma_1^2 \sin(\beta)^2 + C_{diff}^2 * 6mm/h * \sin(\theta) * L_{drift} [m]$ 
42 42 Number of layers      : 67,63
43 43 Radii [mm]           : 235,905,1085,1716
44 44 Upper limit in z [mm] : 2225
45 45 Lower limit in z [mm] : -2225
46 46 Efficiency RPhi      : 1
47 47 Efficiency z         : 1
48 48 Thickness [rad. lengths] : 0.00005194
49 49  $\sigma_0(R\Phi)$  [1e-6m] : 50
50 50  $\sigma_1(R\Phi)$  [1e-6m] : 900
51 51  $C_{diff}(R\Phi)$  [1e-6m/sqrt(m)] : 25
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53 53  $\sigma_1(z)$  [1e-6m] : 0
54 54  $C_{diff}(z)$  [1e-6m/sqrt(m)] : 80
    
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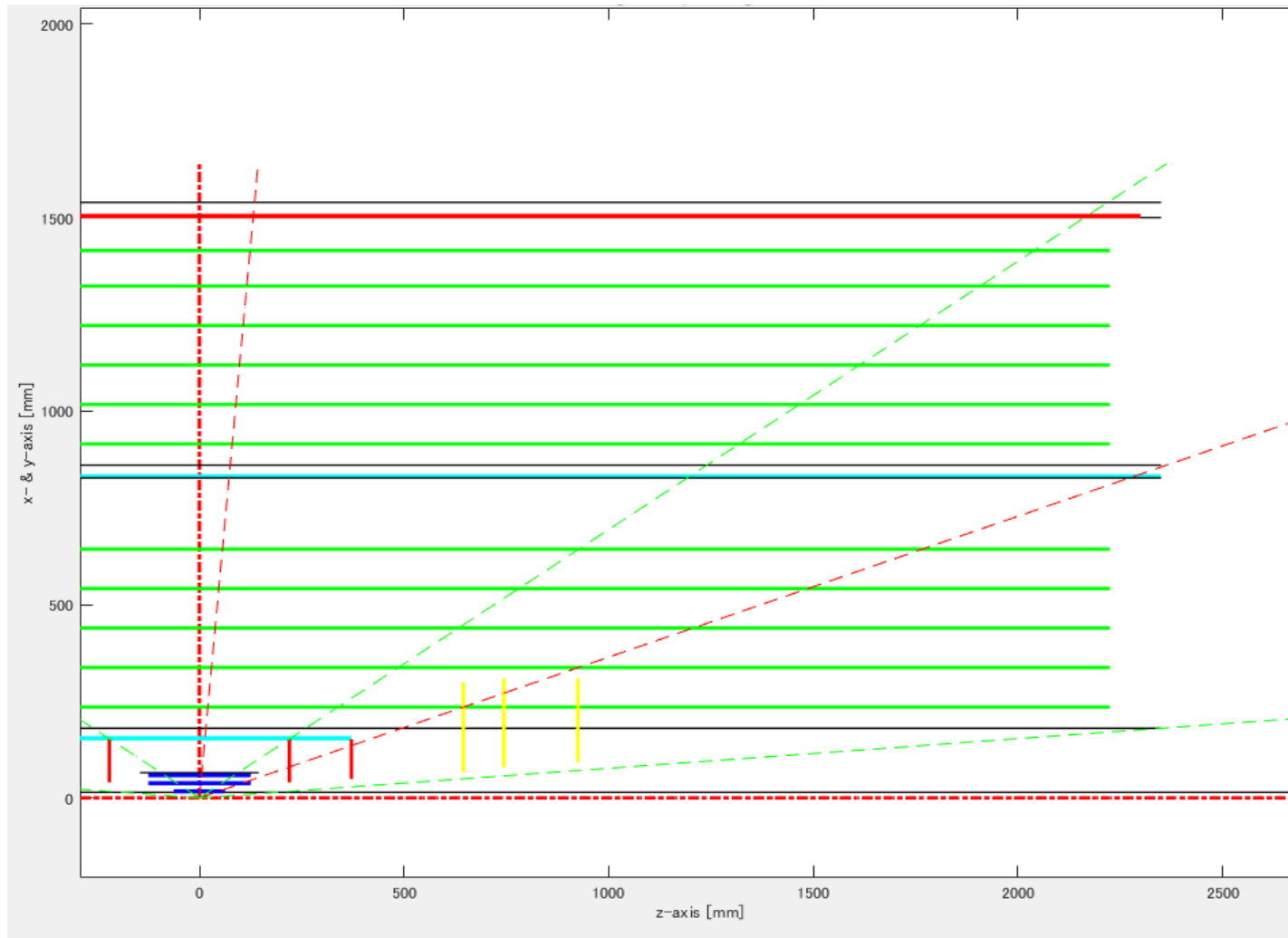
- Around 90 decrease for barrel with SDT v1.0



Silicon + Drift Chamber Tracker: v1.1

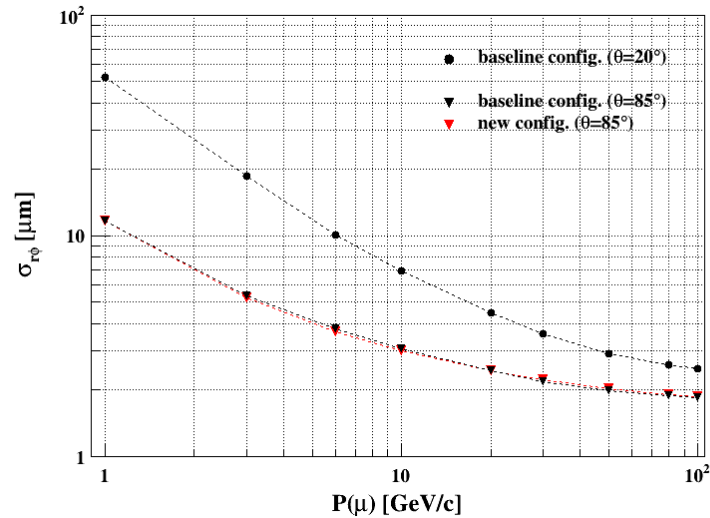
- Smaller radius : $R = 1.5 \text{ m}$ (reduced size for crystal ECal)

R=1.5m

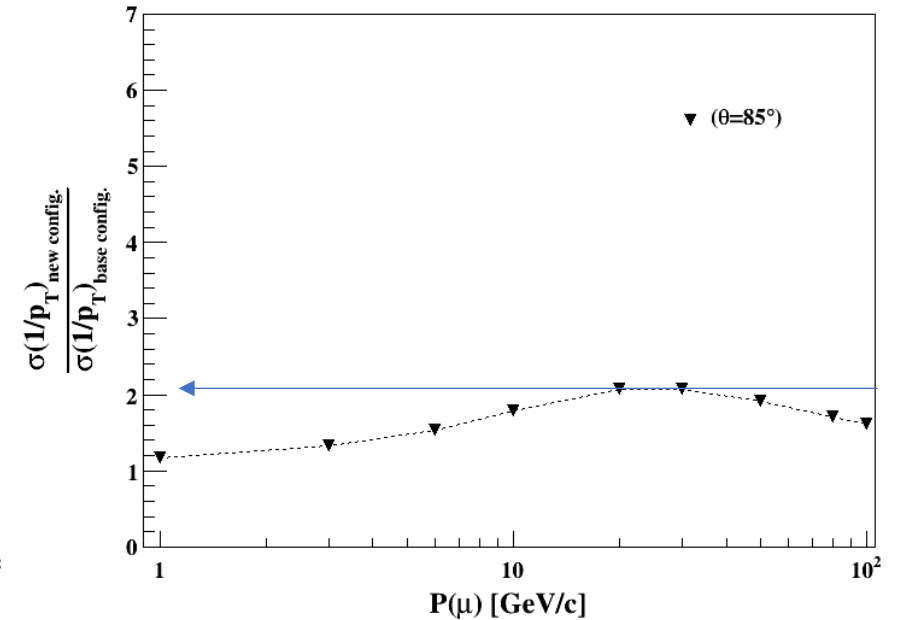
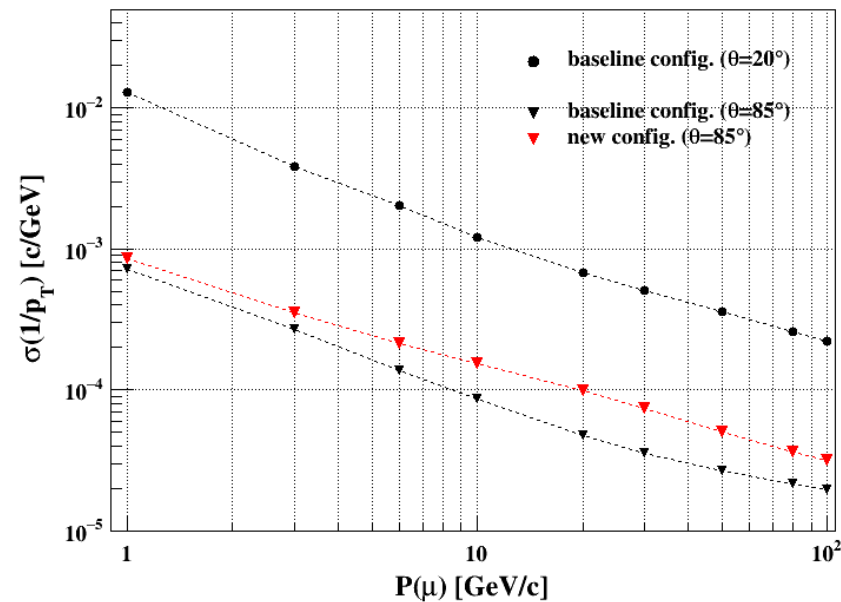


Performance comparison v1.1 vs. baseline

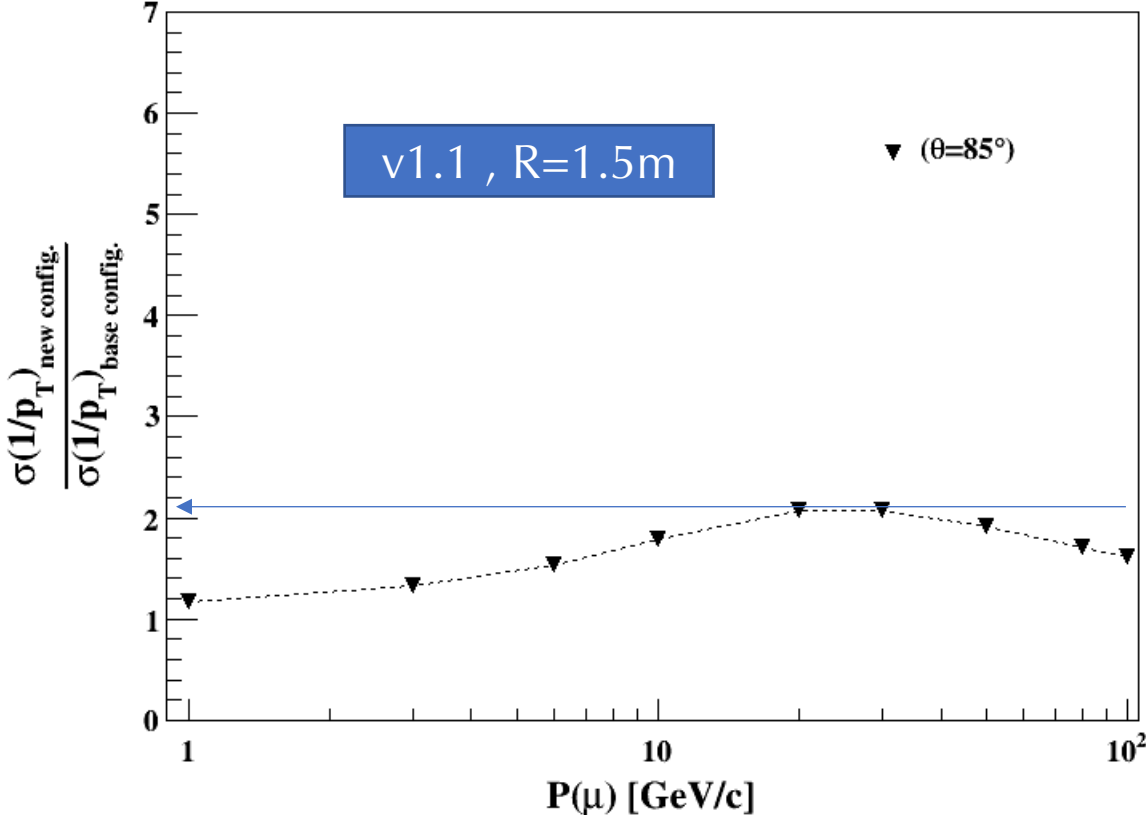
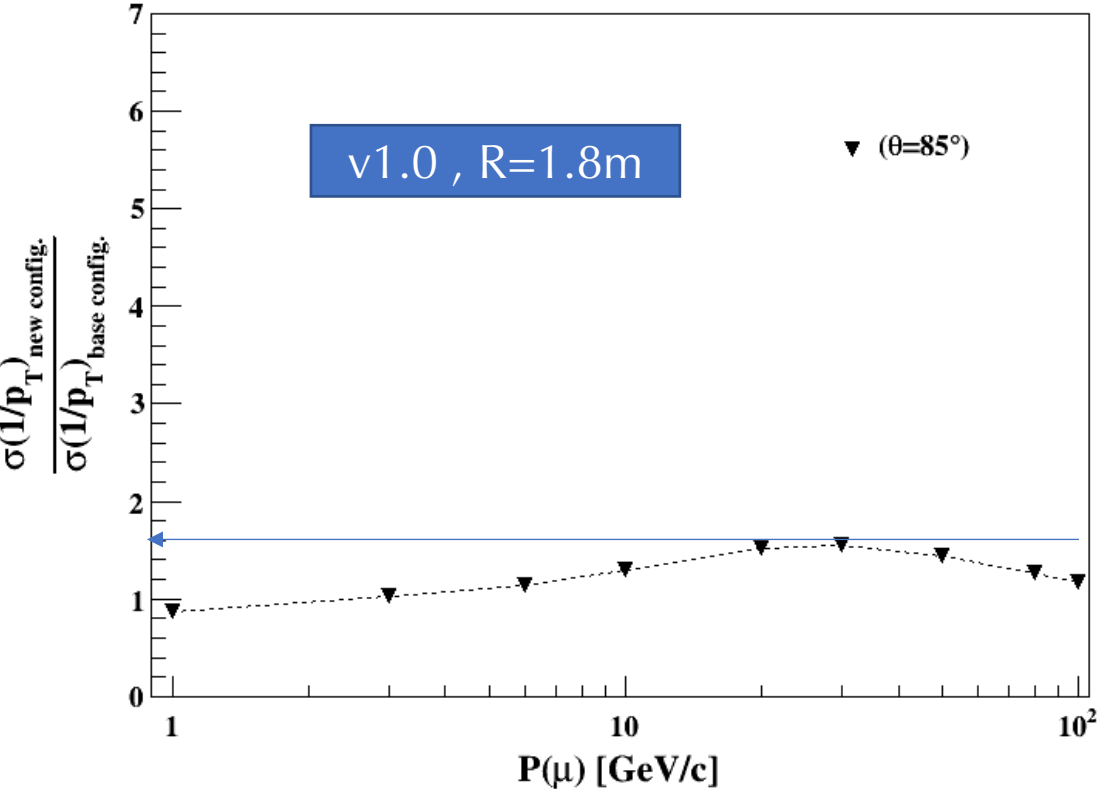
- No change for impact para. reso.



- Slightly increase for momentum reso. ($< \sim 2$)

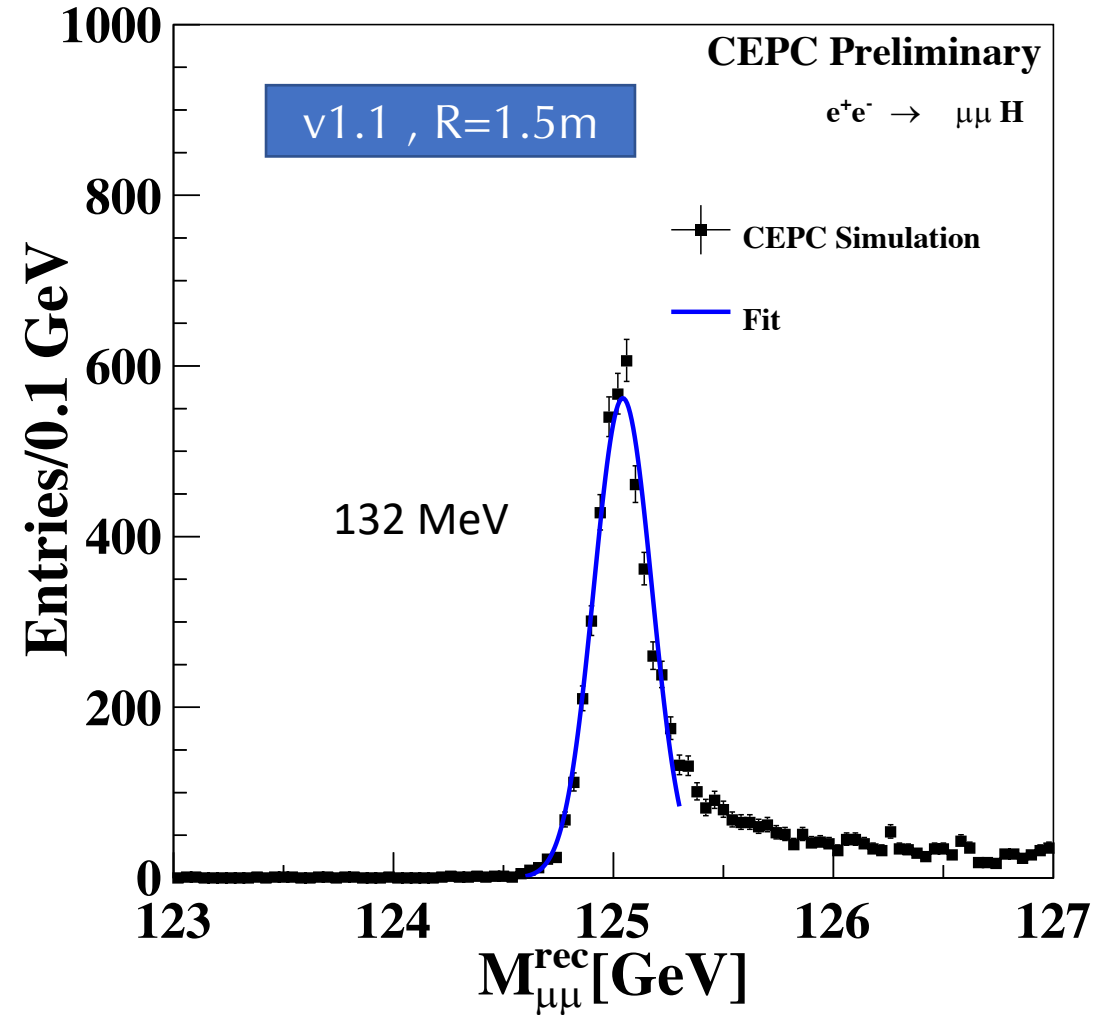
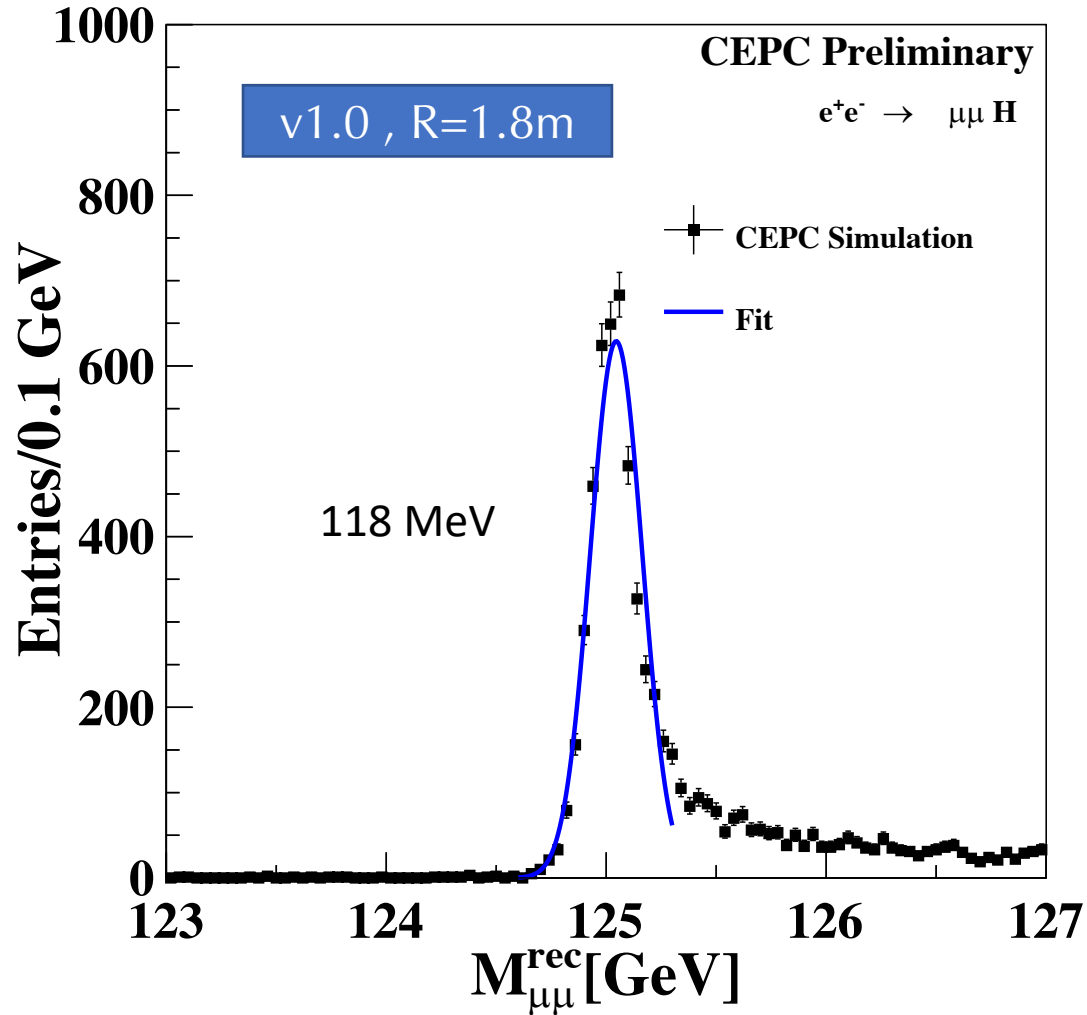


Performance comparison v1.0 and v1.1 vs. baseline



Recoil mass resolution v1.0 and v1.1

- ~12% increase



Summary and Plan

- SDT v1.0 with 2 Drift chambers has no change for the impact parameter resolution, but slight degradation for momentum resolution compared with baseline
 - Decreased 90 numbers of hit layers in barrel region.
- SDT v1.1 (R=1.5m) : no change for impact parameter resolution, increased momentum resolution for certain momentum ($< \sim 2$)
 - $\sim 12\%$ increase for the dimuon recoil resolution
- Next: material budget, dE/dx , S/D layers,...