CEPC SDT on CEPCSW Status

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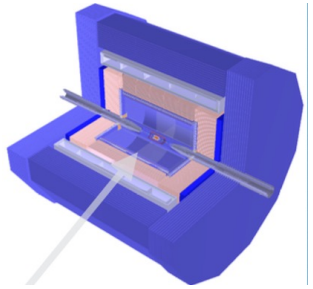
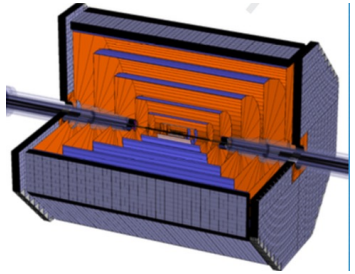
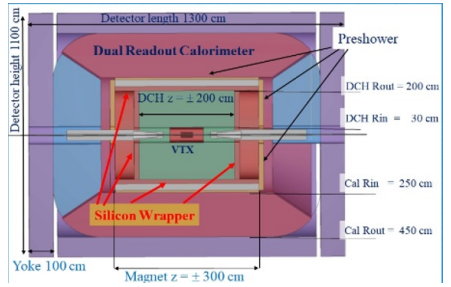
On behalf of CEPC Tracker Team

Introduction

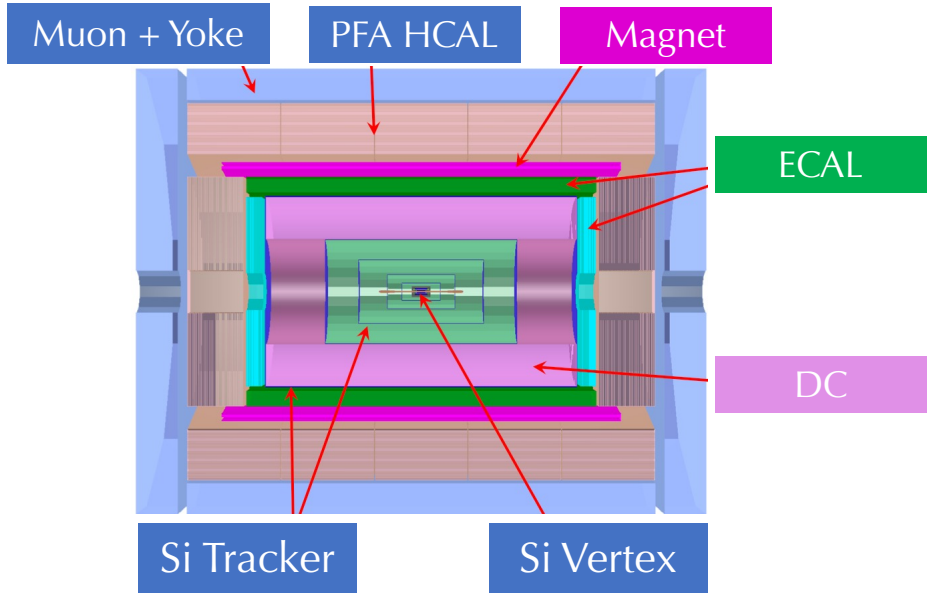
- Three existing detector concept for CDR
  - Silicon + TPC
  - Full Silicon Tracker
  - IDEA Concept







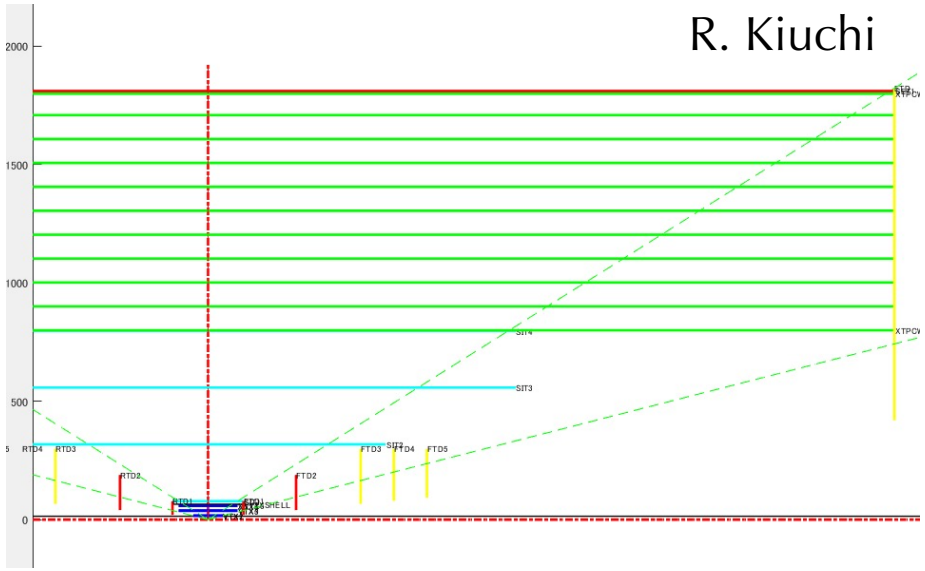
- The 4th detector concept
  - Silicon Vertex + Siliconn Tracker for momentum measurement
  - Drift chamber optimized for PID
  - Transverse crystal bar ECAL optimized for π^0/γ reconstruction
  - Solenoid magnet between HCAL and ECAL



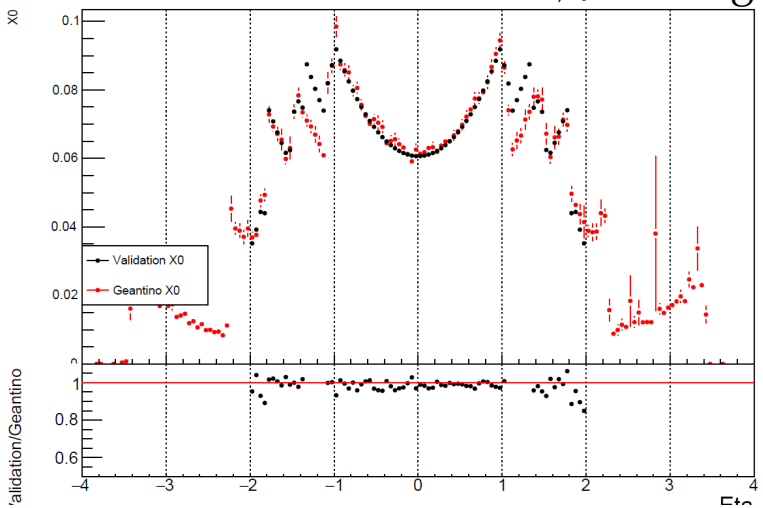
Studies based on LDT software

Configuration for simulation study from Yangzhou meeting (v0)

R. Kiuchi

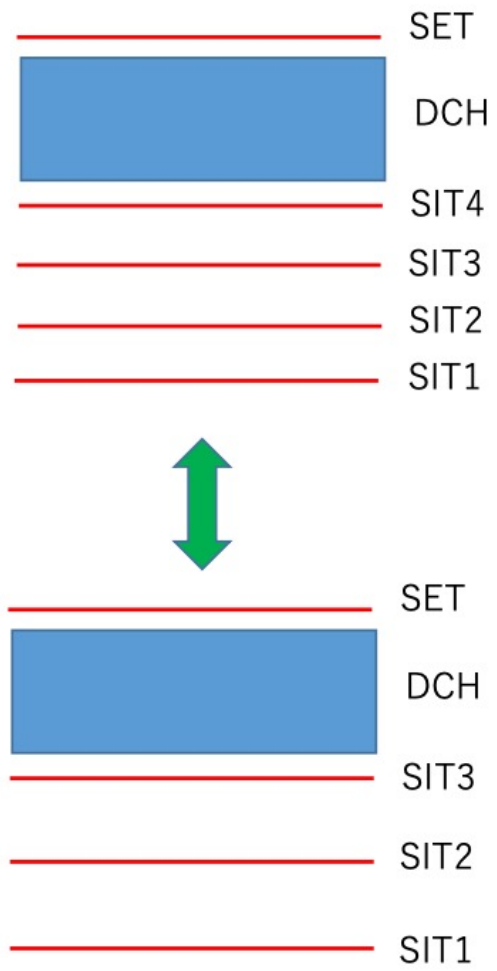


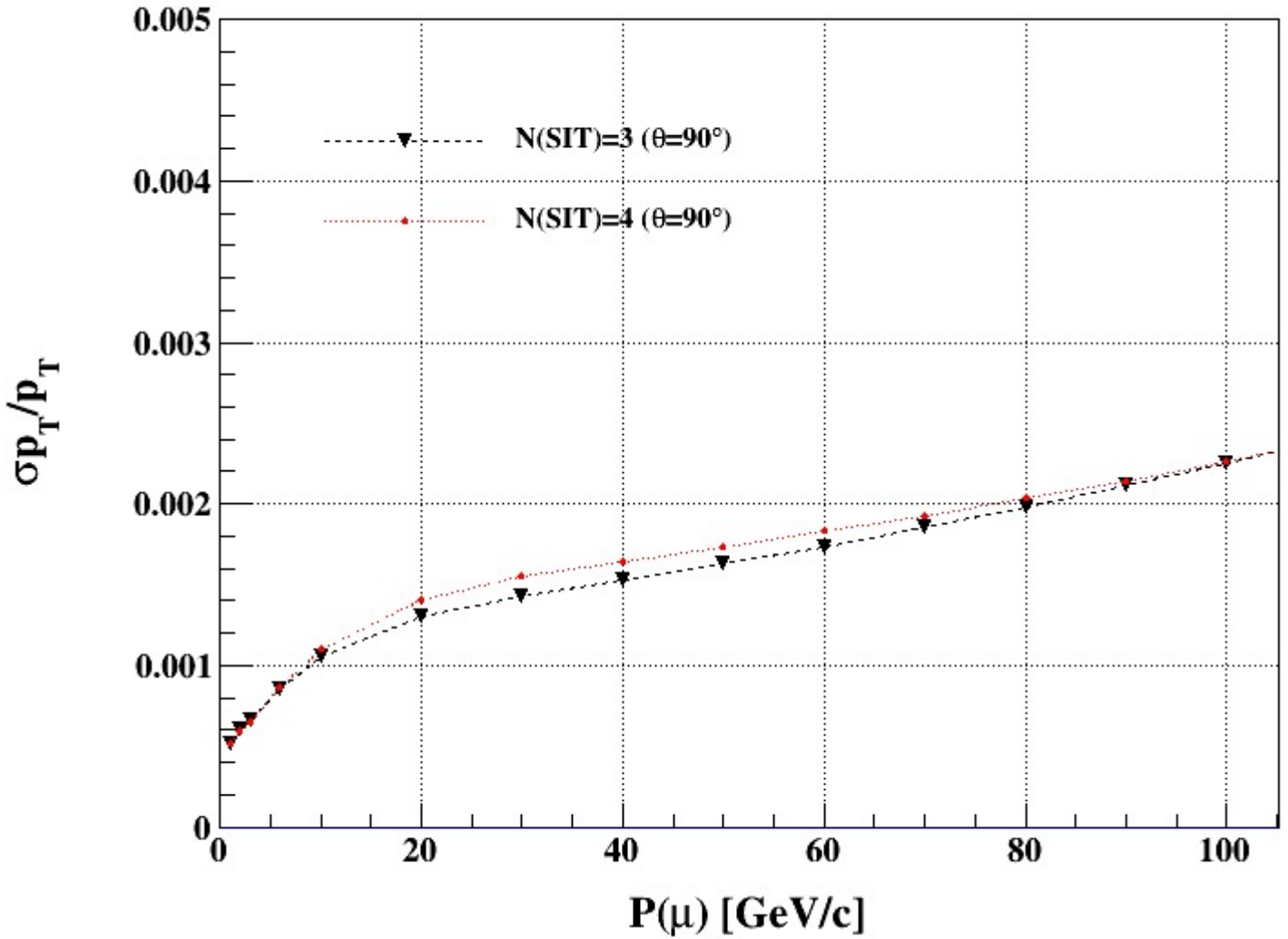
Y. Chen, J. Zhang



Sub detector	N layers	Resolustion (μm)		Material budget (%X_0)
		r-ϕ	z	
VXD	6	2.8 / 6 / 4 / 4 / 4 / 4	2.8 / 6 / 4 / 4 / 4 / 4	0.15 per layer
SIT	4	7.2	86.6	0.65 per layer
DC (cell 1x1cm^2)	100	100	2000	1.2
SET	1	7.2	86.6	0.65
Total	111	--	--	5.35

New config for Silicon + Drift chamber: 4 layers of silicon (v1)





shows better resolution at this momentum range

Switching to CEPCSW

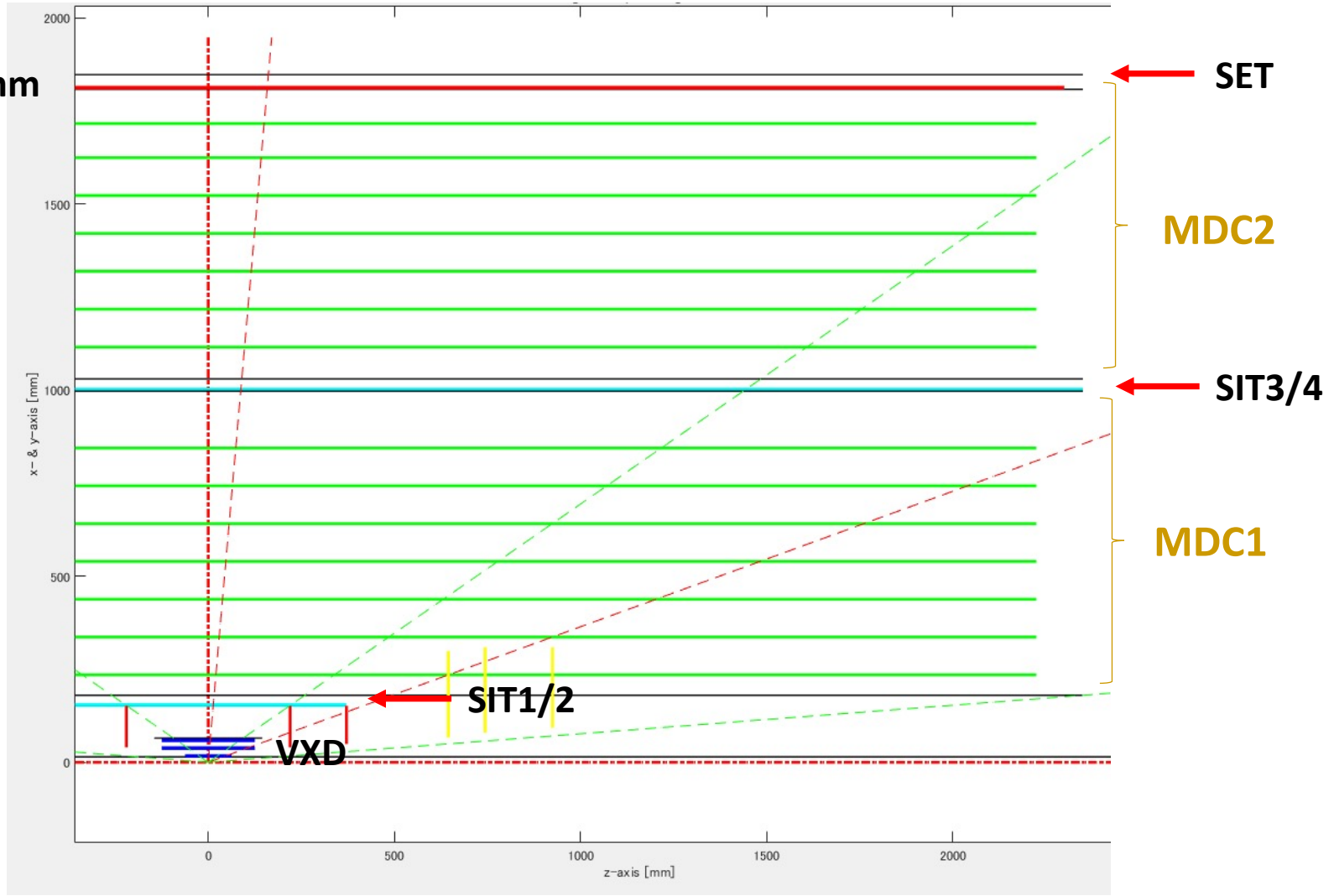
Configuration

showing only tracker part of the geometry set in the simulation

- Tracker geometry

VXD	default config. 6 pixel layers.
SIT	2xstrip sensors as a layer. Second layer locates between 2DCHs. (Res. =7μm)
DCH	2 DCHs. 10cm cell size, total 130 layers.
SET	2xstrip sensors

"CRD_o1_v01" configuration



- Particle injection

  -- muon, 100GeV, 85 degree

Current status from the CEPCSW (Drift chamber)

- Detector configuration: vertex + silicon + 2*drift chamber
- Fitting programme (Genfit2) with drift chamber + silicon detectors
  - SimHit → digi Hit → Tracking
- Outcome: could produce the momentum resolution

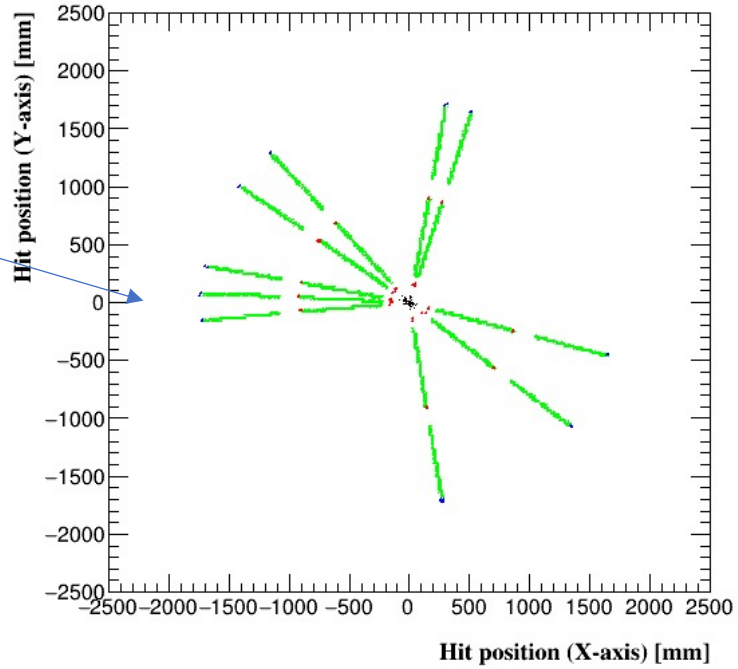
Hits information:

VXD : black

SIT : red

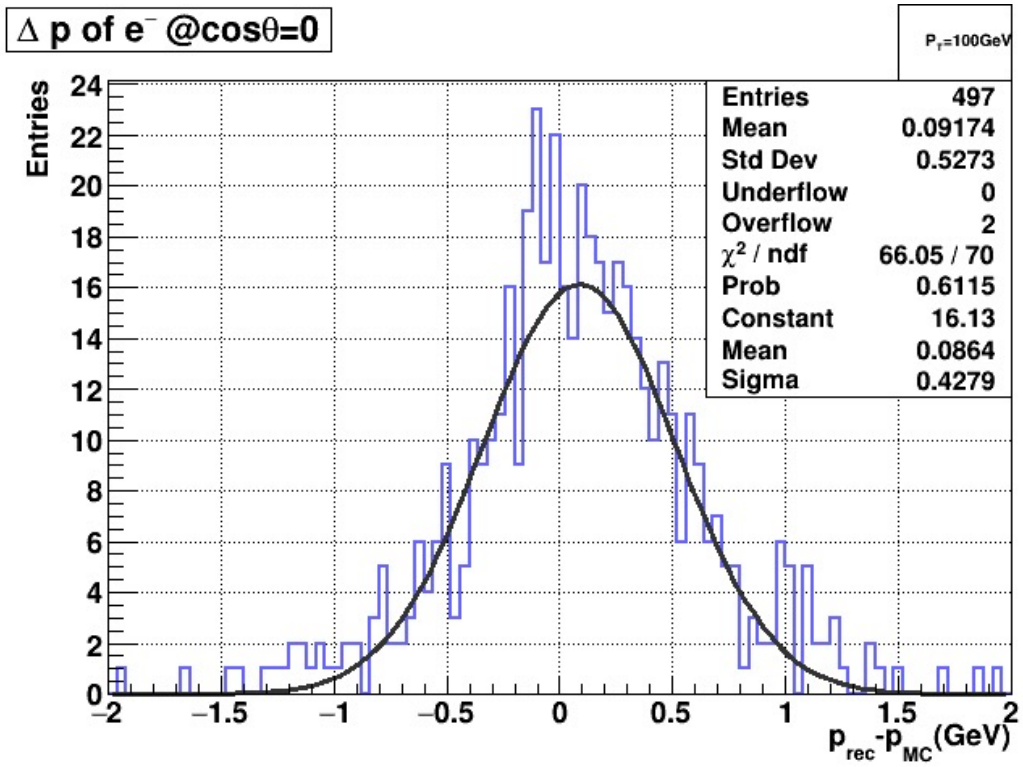
DC : green

SET : blue



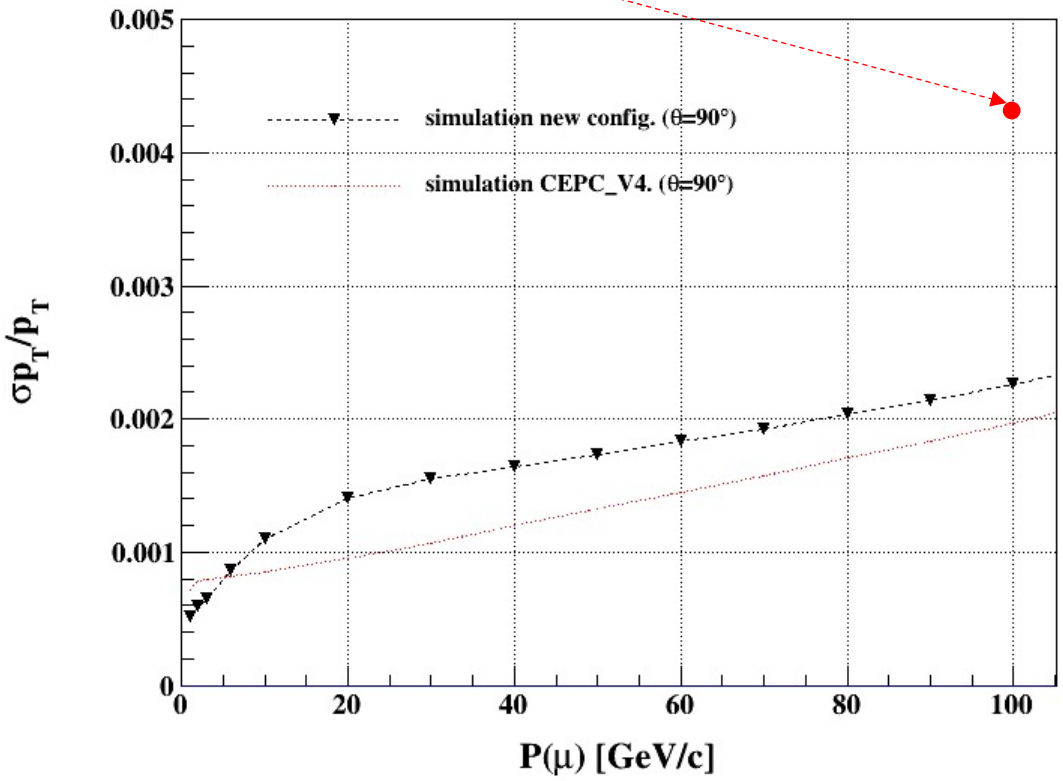
Momentum resolution

dp/p = 0.4279/100 = 4.279 × 10^{-3}



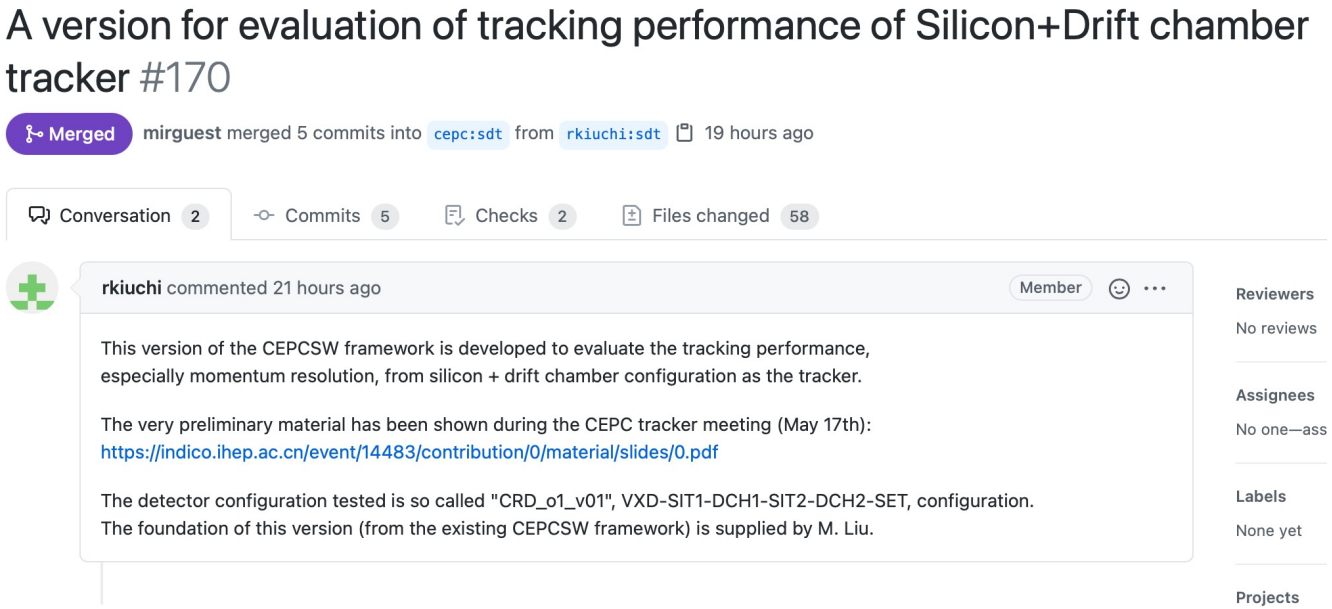
500event @ 100GeV

- ***different configuration (from the one shown in the Yangzhou meeting)***
- ***number of events***
- ***further verifications***



Tracking development on github.com

- https://github.com/cepc/CEPCSW/pull/170



- SDT team will maintain this branch “sdt”
  - Keep the dialog between the detector and software team

Plan for SDT on CEPCSW

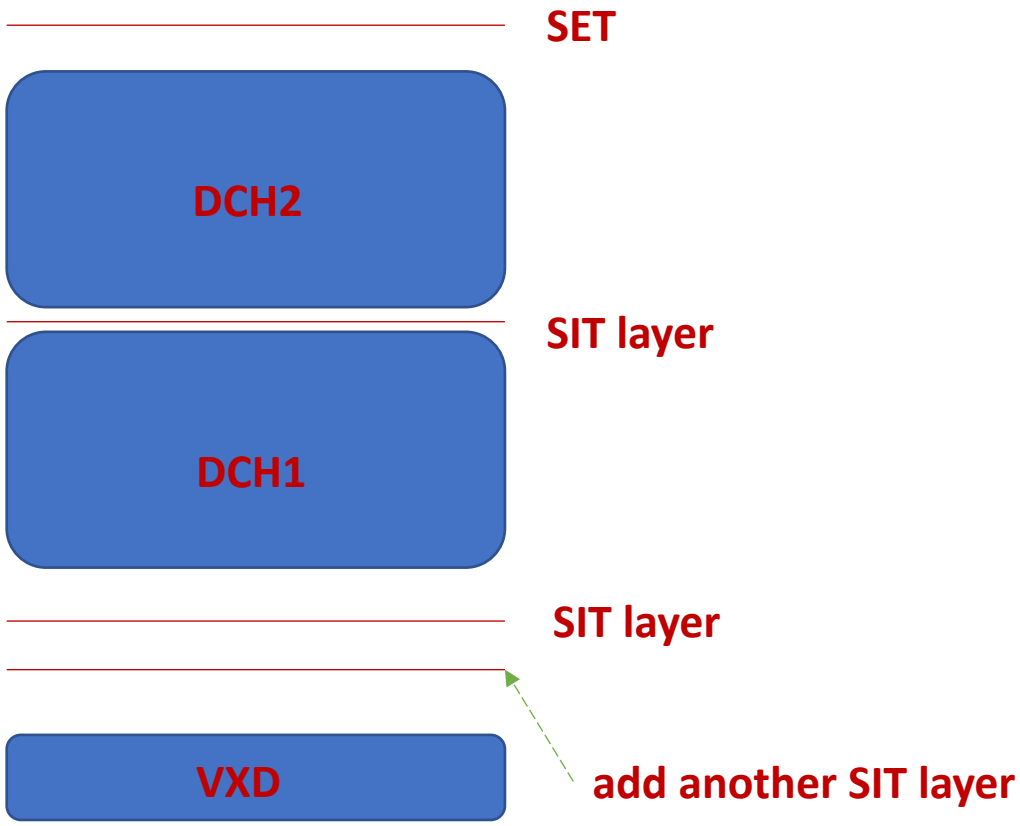
- Prepare the detector config file for v1 (i.e. 4 layers of Si + 1 DCH)
- Use “issues” on github to keep track the development
- Obtain the momentum resolution figure
  (with the help from CEPCSW developers)
- Focus on the barrel region
  - Material buget dependent from DCH (which side)
  - Momentum reso. w/ and w/o DCH
  - Parameters of DCH (thickness, cell size, gas)
  - Other angles in barrel
  - PID performance

Thanks a lot from software team !

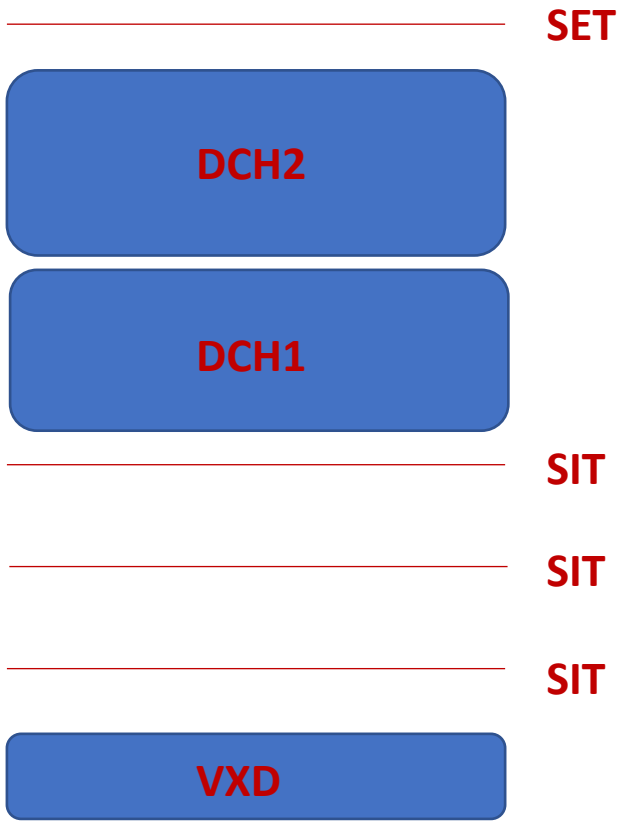
Backup

Customize the configuration

Example 1 :
insert another SIT layer



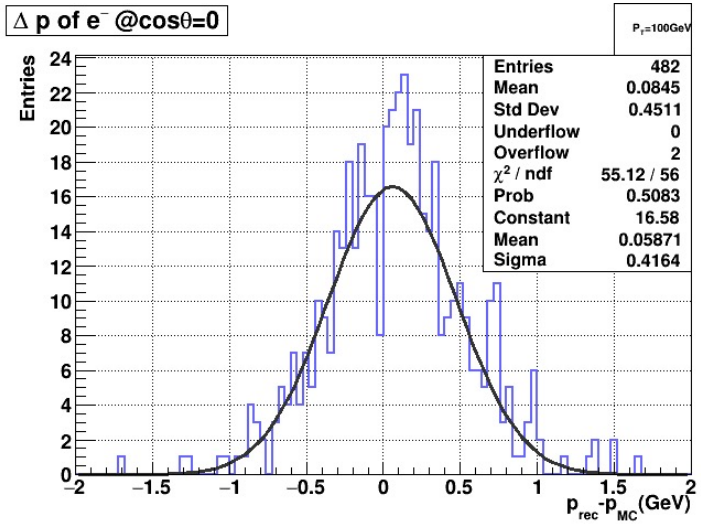
Example 2 : Shrink the DCHs (800-1800) and set 3 SIT layers correspondingly

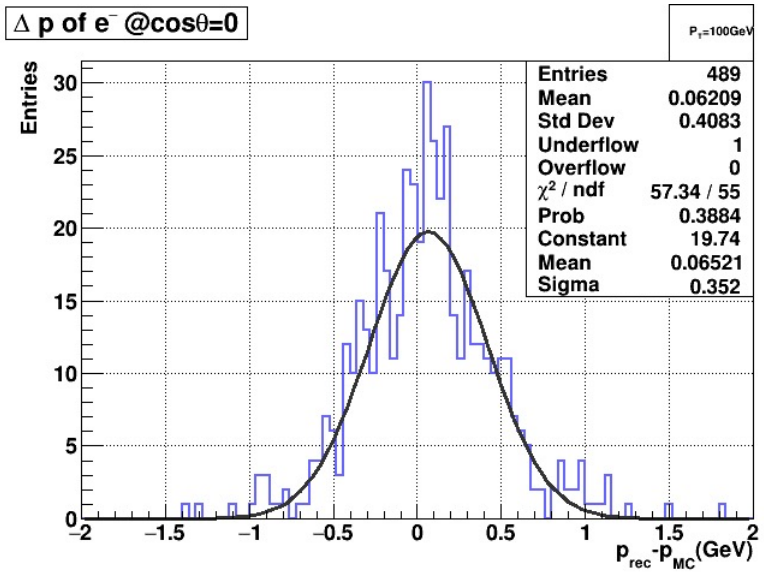


Users can modify and update the geometry

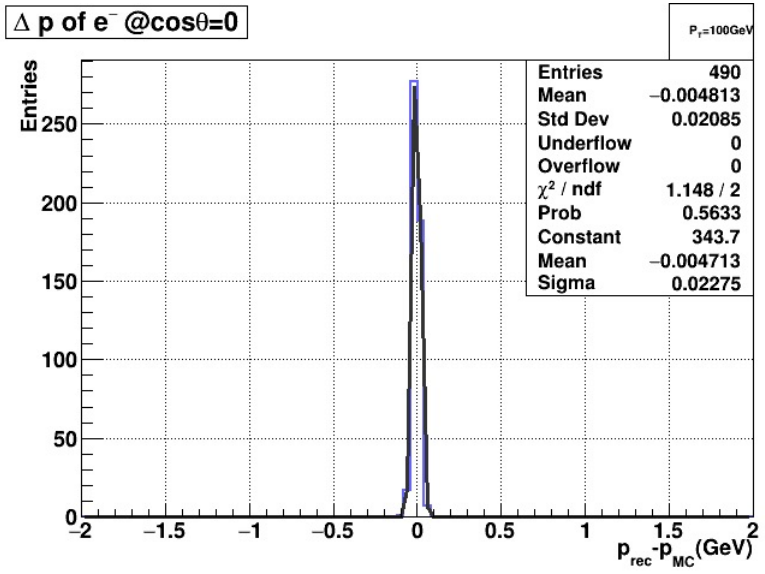
preliminary numbers. Need further confirmation of geometry settings.

Example1, P=100GeV, dp/p~4.2 × 10^{-3}





Example2, P=100GeV, dp/p~3.5 × 10^{-3}



Example2, P=10GeV dp/p~2.3 × 10^{-3}