Gaseous detector chapter towards CEPC TDR

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Weekly meeting of CEPC TDR Group, July 16, 2024

Gaseous detector chapter for CEPC TDR

- Updated contents of the gaseous track detector chapter in CEPC TDR
  - Includes issues from physical requirements, selection, simulation, performance and cost.

Chapter 4 Gaseous trackers

Chapter 5 Gaseous trackers

Writing Team of gaseous detector chapter – Weekly meeting

- **Core of the writing team**
  - IHEP: Huirong Qi, Linghui Wu, Guang Zhao, Mingyi Dong, Yue Chang, Xin She, Jinxian Zhang, Junsong Zhang
  - Tsinghua: Zhi Deng, Canwen Liu, Guanghua Gong, Feng He, Jianmeng Dong, Yanxiao Yang
- **Collaboration groups of the writing team**
  - CIAE (原子能院): Xiaomei Li, Jing Zhou
  - Shandong University (山东大学): Chengguang Zhu
  - Nankai University (南开大学)，Zhengzhou Unviersity (郑州大学) and Liaoning University (辽宁大学)
  - LCTPC collaboration and DRD1 collaboration

Shared editing chapter from overleaf

- **Organization of team**
  - Regular weekly meeting on **10 July**
  - ILD Collaboration meeting on **12 July** after LCWS
  - DRD1 WP4 kick-off meetings on **15 July**

Updated material budget of TPC barrel and endcap

- **Low material of the TPC endcap**

$15\%X_0$ in total, including

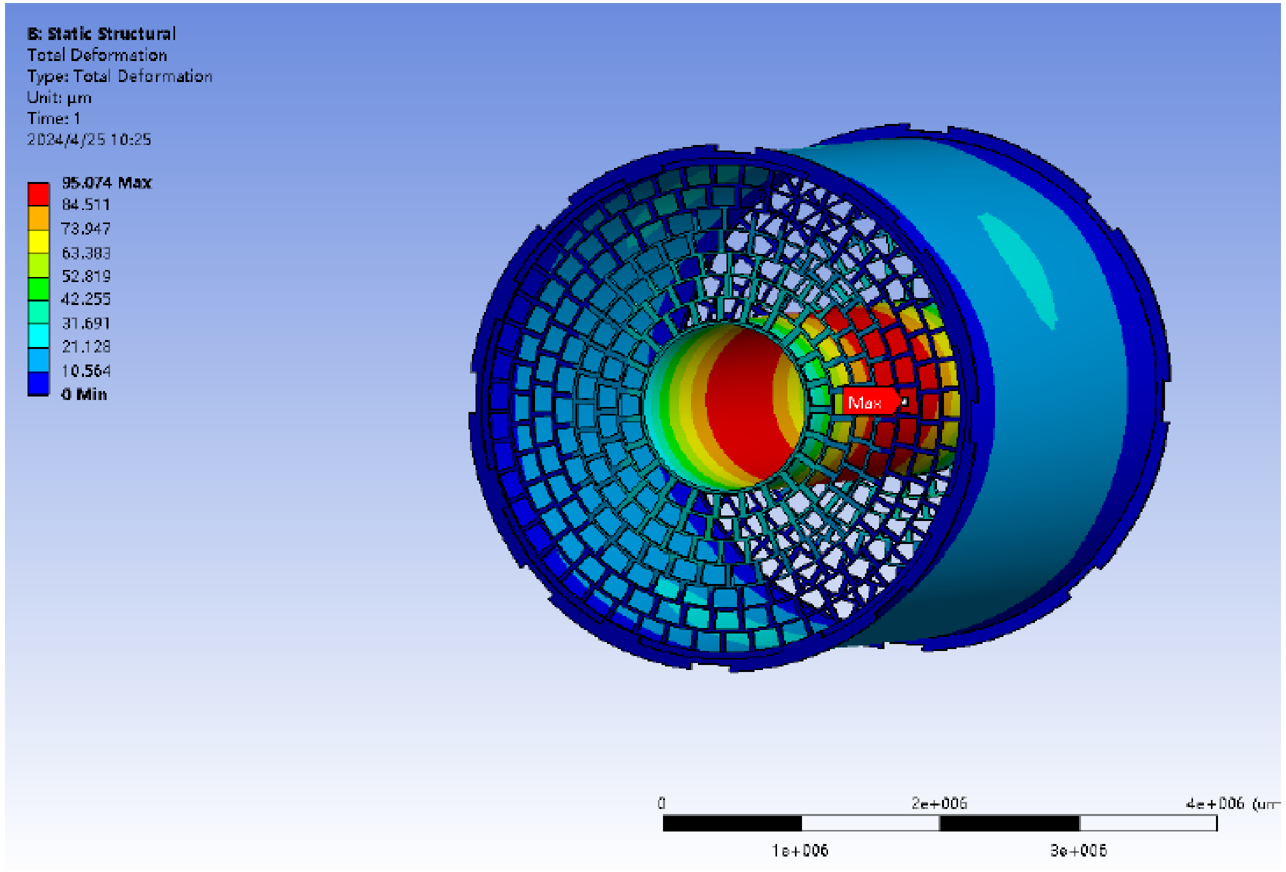
Readout plane, front-end-electronics 4%
Cooling 2%
Power cables 9%

- **Low material of the TPC barrel**

0.59% X_0 in total, including

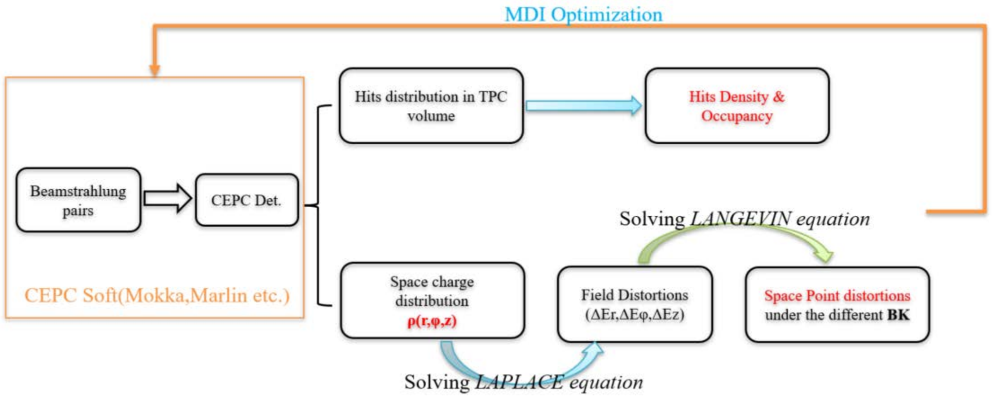
Material budget of TPC barrel

Layer of the barrels	D[cm]	X_0[cm]	d/X_0[%]
Copper shielding	0.001	1.45	0.07
CF outer barrel	0.020	25.28	0.08
Mirror strips	0.003	1.35	0.19
Polyimide substrate	0.005	32.65	0.02
Field strips	0.003	1.35	0.19
CF inner barrel	0.010	25.28	0.04
Sum of the material budget			**0.59**

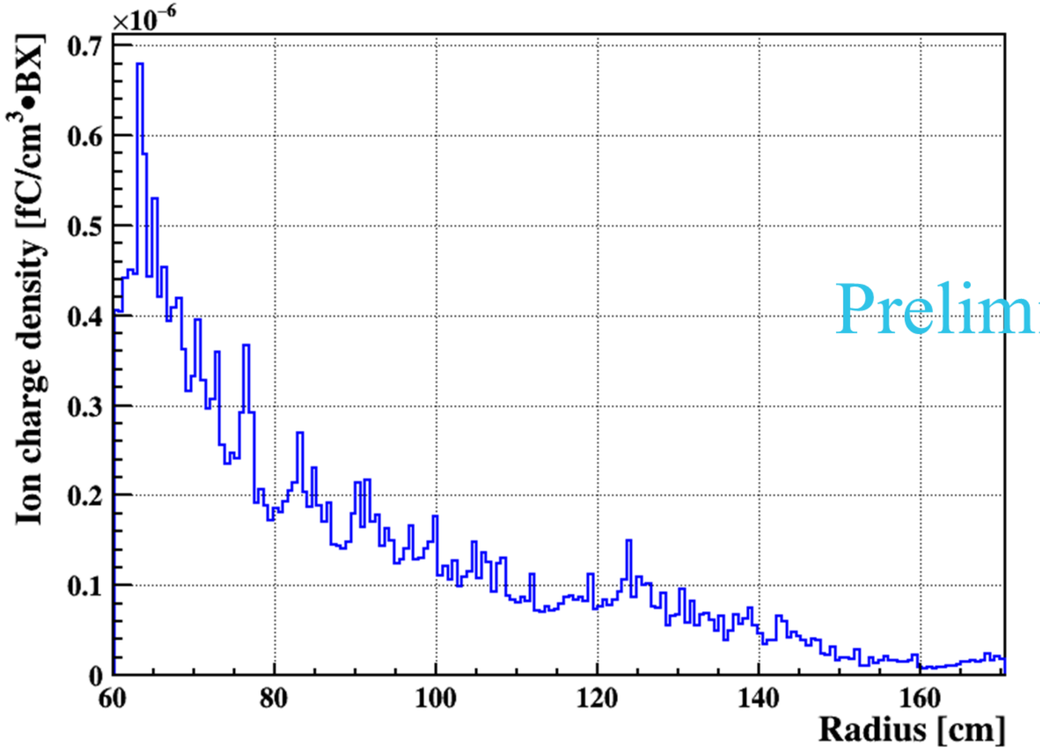


Updated of the hits density & occupancy at Tera-Z with BK

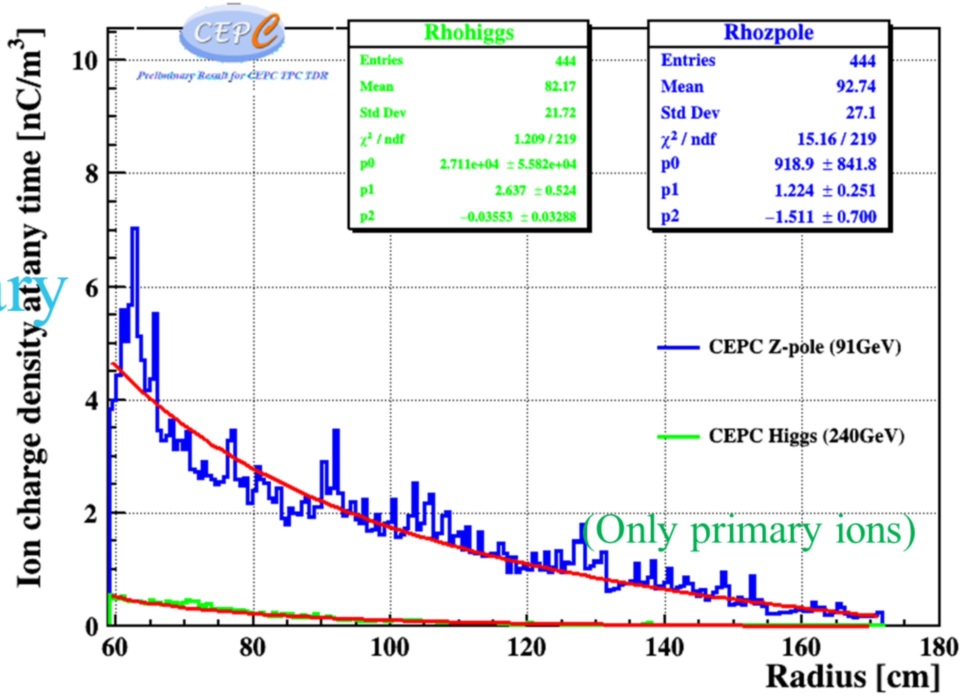
- **Updated simulation results from CEPCSW**
  - Single BX , ρ_{sc}(single BX)~ 0.6e-6 nC/m^3/BX @Z-pole
  - ρ_{sc}(steady state)~ ρ_{sc}(single BX) × BX freq. × max. drift time × 50% × η = 5.46 nC/m^3 (r=60cm) @Z-pole
    - **×5 smaller than FCCee -91**



Ionization efficiency(90%)



Preliminary



(Only primary ions)

$\rho_{sc}(r)$ (single BX) distribution Left & $\rho_{sc}(r)$ (steady state) Right

Many thanks!