



Gaseous detector chapter towards CEPC TDR

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Weekly meeting of CEPC Gaseous Track Group, July 10, 2024

5. Gaseous trackers

(Huirong Qi + Linghui Wu for drift chamber)

- a. Requirements (position and dN/dX)
- b. Technology survey and our choices (both baseline & backup options)
- c. R&D efforts and results
- d. Detailed design including electronics, cooling and mechanics
- e. Performance from simulation (tracking, momentum and PID)

Gaseous detector chapter for CEPC TDR

- Preliminary contents of the gaseous track detector chapter in CEPC TDR
 - As one separate chapter – Gaseous trackers
 - Includes issues from physical requirements, selection, simulation, performance and cost.

Chapter 4 Gaseous trackers

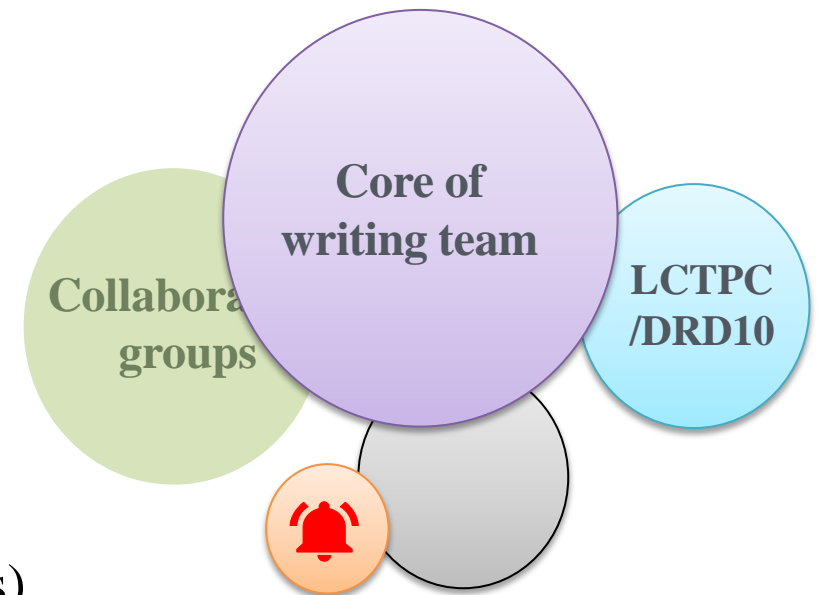
4.1	Physics requirements and detection technology
4.1.1	Physics requirements of Higgs and Tera-Z
4.1.2	Technology options of the gaseous chamber
4.1.3	Choice and the baseline main track detector
4.2	Pixelated readout TPC tracker
4.2.1	TPC detector and readout electronics
4.2.2	Mechanical and cooling design
4.2.3	Critical R&D
4.3	Performance of TPC tracker
4.3.1	Overall of simulation framework
4.3.2	Spatial resolution and particle identification
4.3.3	Potential for improving resolution
4.4	Costs estimation

<https://latex.ihep.ac.cn>

Granted the permission
specific to edit this chapter
according to email address
after.

Writing Team of gaseous detector chapter

- **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 University (郑州大学) and Liaoning University (辽宁大学)
 - LCTPC collaboration and DRD1 collaboration
 - NIKHEF: Peter Kluit
 - CEA-Saclay: Paul Colas, Maxim Titov
 - DESY: Oliver, Ron Settle
- **Organization of team**
 - Regular weekly meeting (Domestic meetings mainly)
 - Indico + Online meeting + Minutes released
 - LCTPC collaboration bi-weekly meeting (International meetings)
 - DRD1 WP4 unscheduled meetings

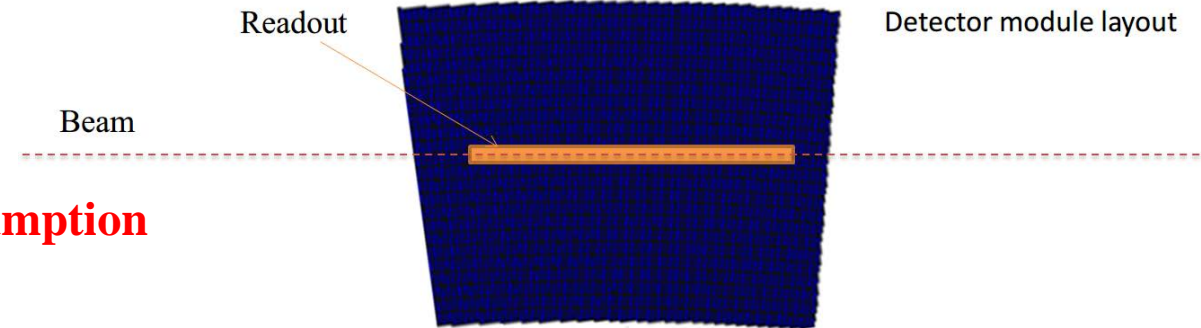


Many thanks!

- **Pixelated readout TPC for beam test**

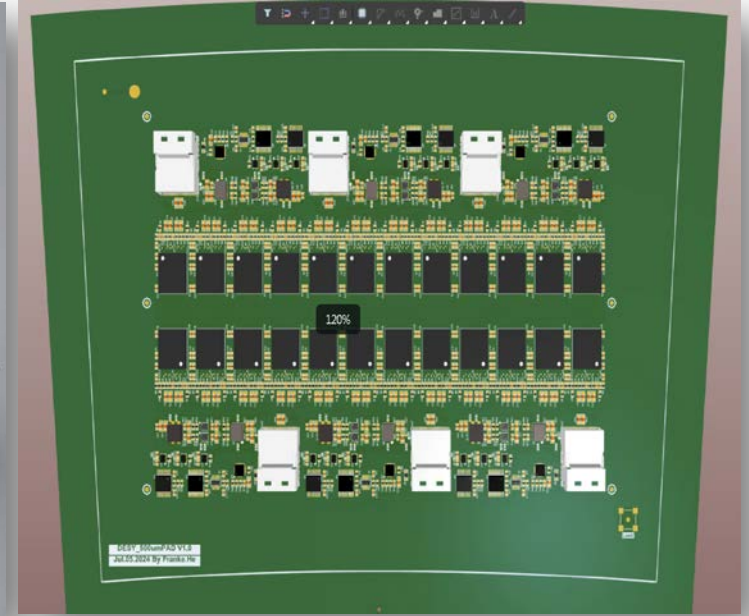
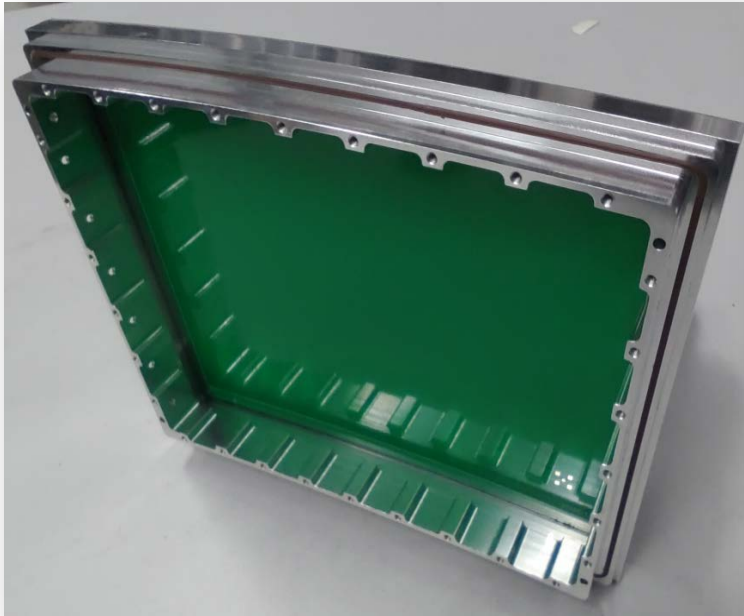
Some critical simulation and validation

- Pixelated readout TPC can be as a **realistic and promised** track detector in CEPC TDR, some key issues will be simulated and validated.
 - Material budget at endcap/barrel
 - Occupancy and hit density
 - **Improved $dE/dx+dN/dx$**
 - Ion backflow suppression
 - **Reasonable channels and power consumption**
 - Running at 2 Tesla
 - Beamstrahlung and distortion
 - **Cost estimation**
- LCTPC (Lepton Collider Time Projection Chamber) collaboration will continue to push this technology to $e+e-$ collider.



Design and assembled module of the beam test

- FEE、DAQ and BEE electronics collaboration are smooth and pushed quickly.
 - Two Aluminum backframes have been done.
- TPC with cluster counting and FEA calculation ongoing
 - Ultra-light material of the TPC barrel can be choose.



Some oncoming issues

- 1. Preparation of pixelated readout FEE, Status and plan ?
- 2. Readout PCB, Status and plan ?
 - 牧泰莱PCB加工讨论与确认、合同签订等。
- 3. Data structure, Status and plan ?
 - Shexin provides some information.
- Others discussion.