

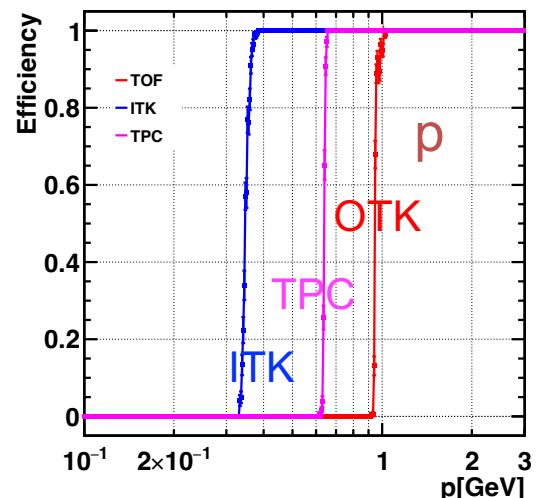
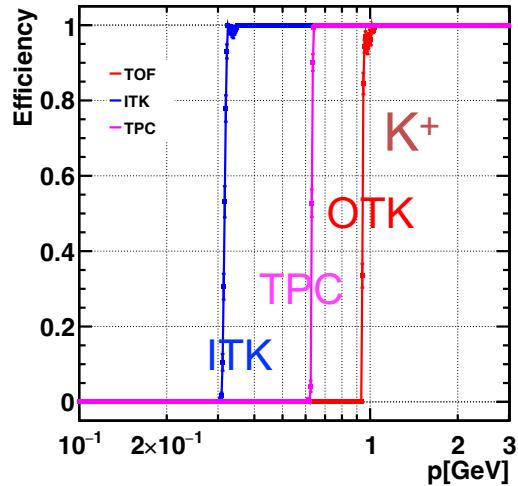
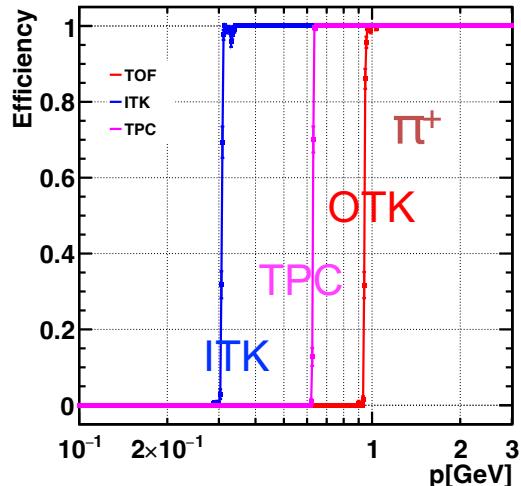
CEPC Silicon Tracker Progress Report (13)

Qi Yan on behalf of the Silicon Tracker Group

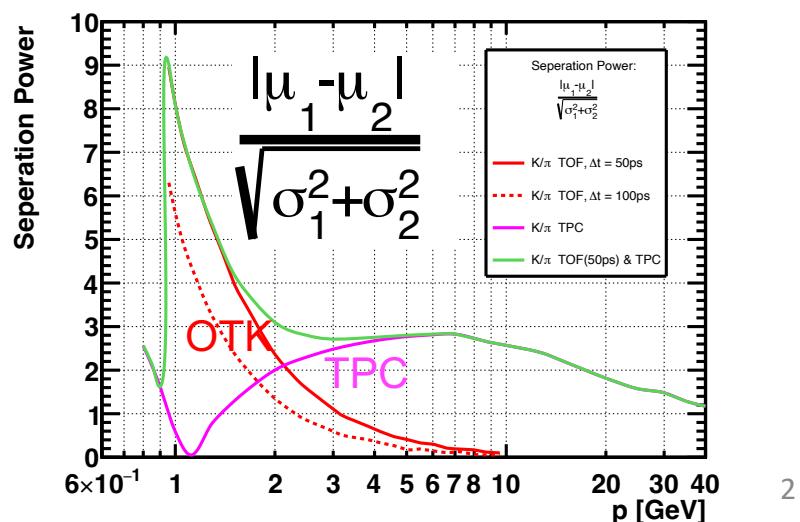
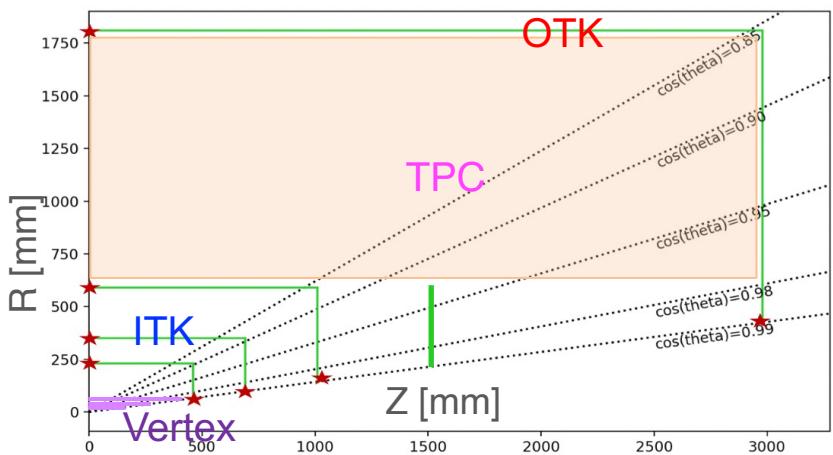
Dec 2, 2024, IHEP

The Latest PID Performance of TPC and OTK (TOF)

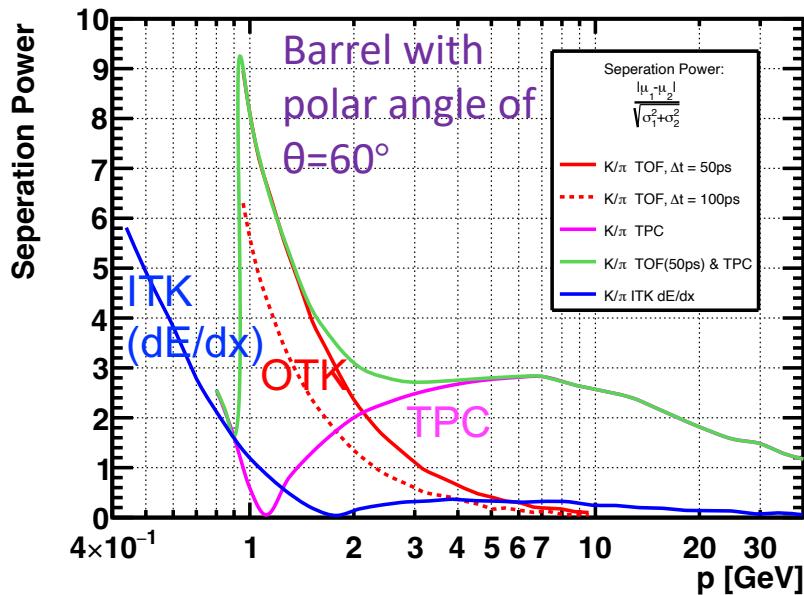
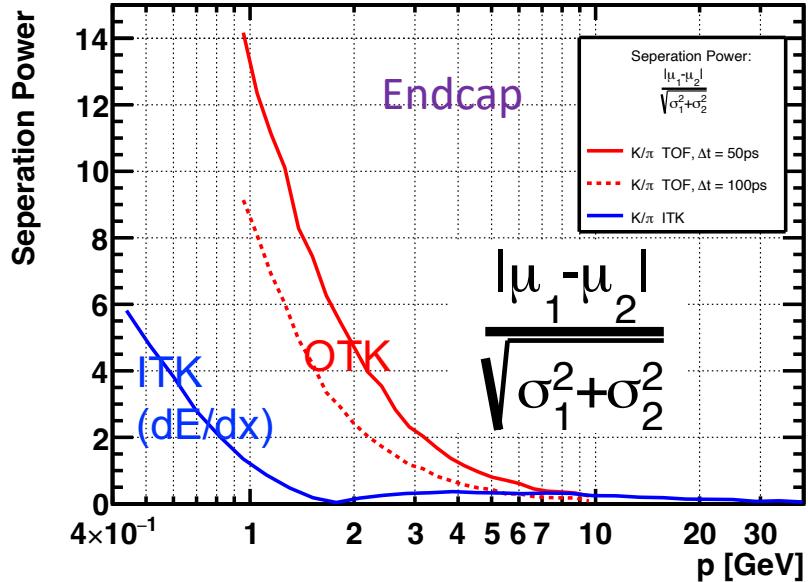
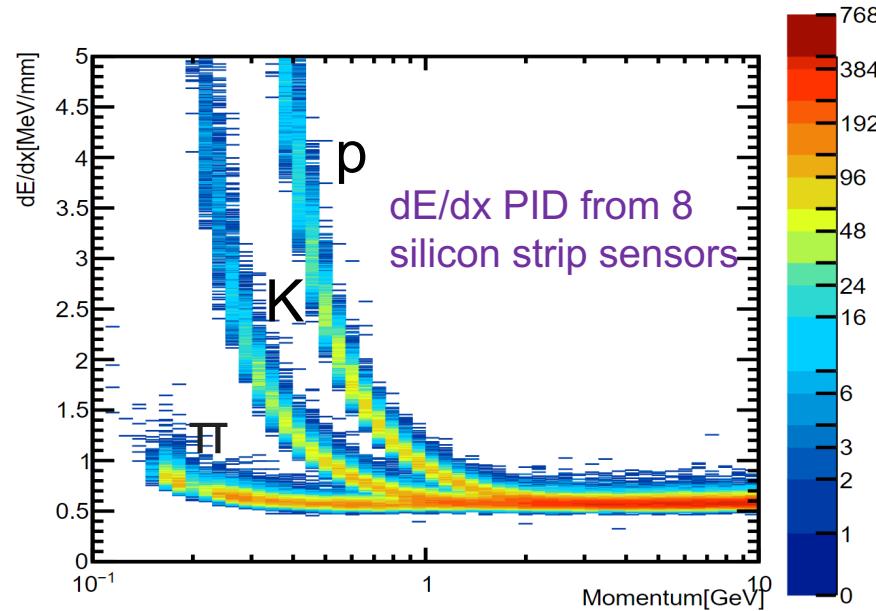
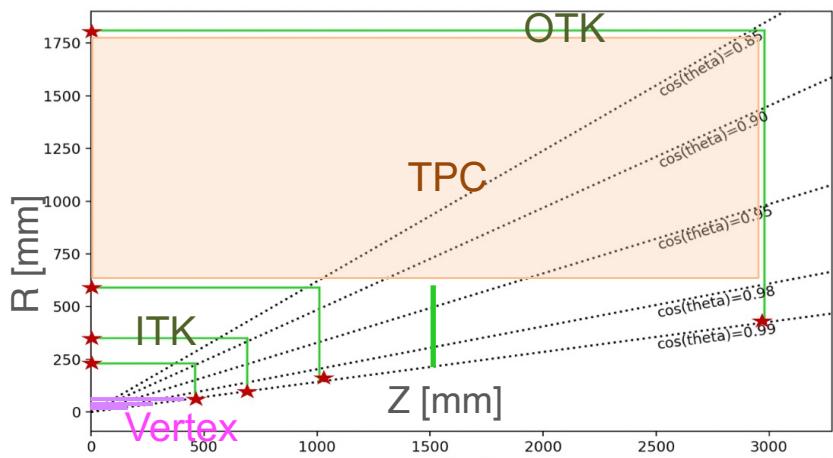
- Efficiencies of particles penetrating the ITK (3 barrels), TPC (half TPC), and OTK (barrel) at a polar angle of $\theta=60^\circ$. The cutoff momenta are $P \sim 0.3$ GeV/c ($P_T \sim 0.3$ GeV/c) for the ITK, $P \sim 0.7$ GeV/c ($P_T \sim 0.6$ GeV/c) for the TPC, and $P \sim 1$ GeV/c ($P_T \sim 0.9$ GeV/c) for the OTK, respectively.



- The latest PID separation power of the TOF and TPC at a polar angle of $\theta=60^\circ$. Nov 26



PID performance using dE/dx measurement from silicon detector.

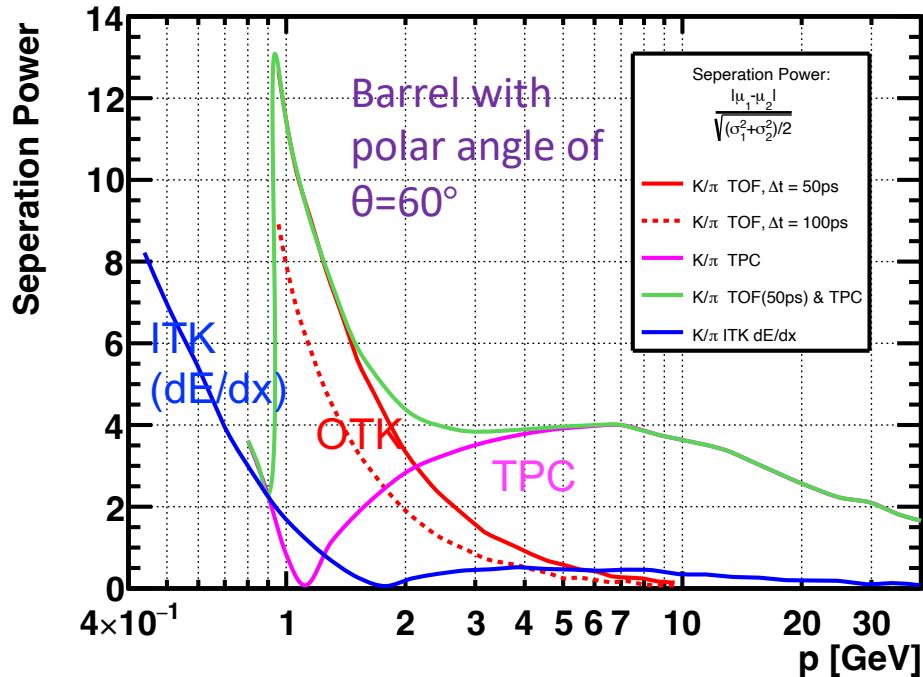
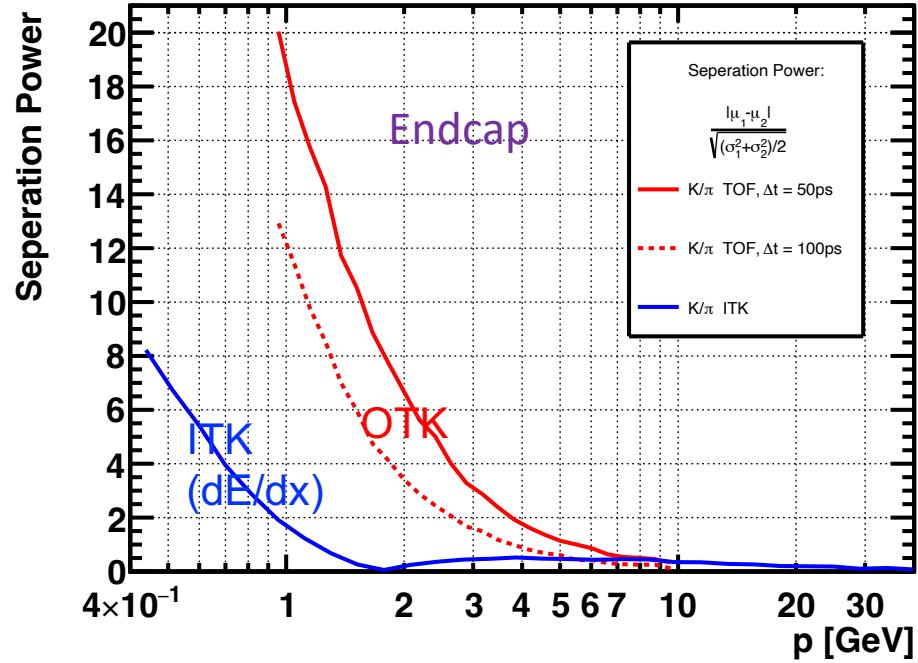


PID performance using dE/dx measurement from silicon detector.

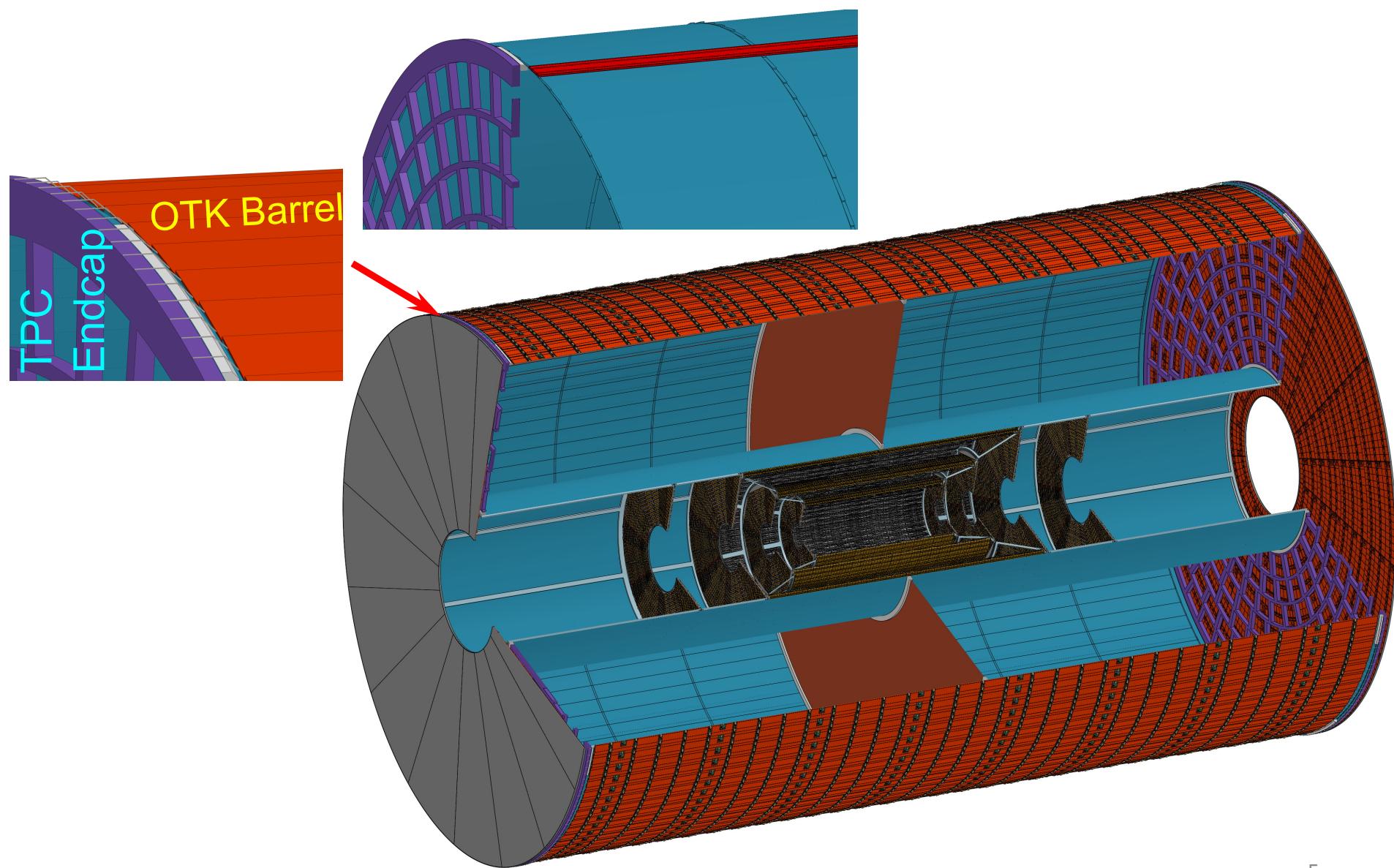
$$\frac{|\mu_1 - \mu_2|}{\sqrt{\sigma_1^2 + \sigma_2^2}}$$



$$\frac{|\mu_1 - \mu_2|}{\sqrt{(\sigma_1^2 + \sigma_2^2)/2}}$$



Safe Margins Between OTK Barrel and TPC Endcap



Remaining Ongoing Tasks for the Silicon Tracker TDR (Highlighted in Blue)

Chapter 5 Silicon Trackers

5.1 Requirements	✓
5.2 Overview of ITK and OTK	(a)
5.2.1 Tracker system layout optimization	
5.3 Inner silicon tracker (ITK)	
5.3.1 CMOS chip R&D	✓
5.3.1.1 HV-CMOS pixel R&D	✓
5.3.1.2 CMOS strip R&D	✓
5.3.2 ITK design	✓
5.3.3 Readout electronics	✓
5.3.4 Mechanical and cooling design	✓
5.3.5 Prospects and plan	(b)
5.4 Outer silicon tracker (OTK) with TOF	
5.4.1 AC-LGAD sensor and ASIC R&D	✓
5.4.1.1 AC-LGAD Sensor R&D	✓
5.4.1.2 AC-LGAD ASIC R&D	✓
5.4.1.2.1 General requirements	
5.4.1.2.2 ASIC architecture	
5.4.1.2.3 Single-channel readout electronics	
5.4.1.2.4 Data process and digital blocks	
5.4.1.2.5 Radiation tolerance	
5.4.1.2.6 Power distribution and grounding	
5.4.1.2.7 Prototype performance	
5.4.1.2.8 Monitoring	
5.4.1.2.9 Roadmap towards production	
5.4.2 OTK design	
5.4.2.1 OTK barrel design	✓
5.4.2.2 OTK endcap design	✓
5.4.3 Readout electronics	
5.4.3.1 Front-end board	✓
5.4.3.2 Concentrator card and power distribution	
5.4.3.3 Slow control and monitoring	
5.4.3.4 Clock distribution	
5.4.4 Mechanical and cooling design	(d)
5.4.5 Prospects and plan	(e)
5.5 Performance	(f)
5.5.1 The global performance of the tracking system	
5.5.2 The performance of silicon tracker (barrel)	
5.5.3 The performance of the transition zone (barrel+end-cap)	
5.5.4 The performance of forward tracking (end-cap)	

We are working on!