

Minutes: CEPC Reference Detector TDR Meeting in Feb 11, 2025

Attendances: Weidong Li, Miao He, Yong Liu, Feipeng Ning, Zhijun Liang, Sen Qian, Yiming Li, Quan Ji, Huirong Qi, Haoyu Shi, Qi Yan, Wei Wei, Mingshui Chen, Manqi Ruan, Jianchun Wang, Jingbo Ye, Yunyun Fan, Linghui Wu, Jinyu Fu, Jingzhou Zhao, Zhaoru Zhang

Remote Yifang Wang, Xinchou Lou, Bo Liu, Jinfan Chang, Fangyi Guo, Gang Li, Guang Zhao, Haijun Yang, Huaishen Li, Huaqiao Zhang, JUNHAO YIN, Jinfei Wu, Kaili Zhang, Lei Zhang, Mei Zhao, Mingyi Dong, suen.hou, Sun Shengsen, Xia Shang, YAN Xiongbo, Zhang Ying, Zhao Ling, Zheng Wang

Cost estimate

- Computing network needs to be considered separately.
- Definition of common system:
 - Yifang: Computing here does not refer to offline data analysis for detector itself, but rather as the infrastructure support that provide to connect with other parts of collider. For example,
 - ◆ The cooling station for magnets is for sharing between the accelerator and detector.
 - ◆ Shielding: it involves implementing shielding before reaching the collision area.
- Zheng: Should we consolidate electronics into one chapter?
 - Jianchun: Each chapter should include electronics to ensure completeness. Electronics should be introduced clearly in the earlier chapters. Independent chip-level electronics can be placed later as per Wang Zheng's suggestion. Those fully integrated into the detector should come first.
 - Jingbo: When describing electronics in the system, focus on how electronics work within the system rather than how they are developed. Refer to the relevant chapter or section for discussions on circuit development.
 - **Yifang: for sub-detectors, the electronic circuit board costs should be included in electronics, and SiPM costs included in sub detector.**
- Yifang: finalize a TDR version by Sunday 6pm, and print a copy for Yifang on next Monday.
- **Yifang: Starting from next week, review each system's documentation and costs. Each system should have at least 2 terms of review before end of March.**
 - For the cost table, if you cannot achieve level four, at least aim for level three. We hope to have at least 500 lines for the detector. So, if we have 10 systems, each system should have a minimum of 50 lines.

Chapter 1

Gang: outline is still in discussion

Silicon:

- Xinchou: It is important to assess the proportion of long-term R&D activities. An excessive focus on long-term R&D may raise questions from the review committee.
 - Jianchun: The following R&D should get results by April review:
 1. AC-LGAD long strip test

- 2. COFFEE chip test
- 3. mechanical prototype of silicon detector
- Xinchou: If others have already done similar work abroad, we can reference it.

TPC:

- Jianchun: status of test beam?
- Huirong: target for May, will firstly using cosmic ray test at IHEP for IDRC review

ECAL:

- Miao: Prof. Zhu from California Institute of Technology (Caltech) will come to IHEP in March, as the expert of calorimeter
- Manqi: yield rate?
- Yifang: no need to emphasis in cost table

HCAL:

- Yifang: Efficiency of SiPM with 40% is not good enough, should be 50% in minimum and target for 70%. Research the impact of the refractive index of the surface material and how it connects with the glass.

Magnet:

- Magnetic support structure: Further refinement of internal structure, focusing on the design of the suspension system base and the cryogenic system.
- Helical coil design: Currently undergoing collaborative design with the accelerator.

Software

- on going issues to be solved soon.
- Mingshui: In the physics analysis, we do not consider the impact of beam background, but we will ultimately evaluate the impact on tracking and PID.
- Computing:
- Yifang: Weidong report the progress in next week

Mechanics:

- Yifang: need to add a section on grounding design. Weak and strong electrical components should be placed in separate rooms.
- Yifang: Mechanic design of superconducting magnets should be included in the first chapter.
- Yifang: Please invite Xiaoyan Ma and Wei He officially join CEPC.
- Jianchun: For the experimental hall, when designing electronics for power-related components, we need to ensure there is room for upgrades.

Performance:

- Jianchun: study the impact of changing outer layer of inner tracker to TOF, at 3T Z mode.
- Mingshui: did some test, and have improvement below 1 GeV