

CEPC Reference Detector TDR Meeting (June 11, 2024)

09:00 - 11:00 (Beijing Time)

Meeting agenda and minutes

- indico page: <https://indico.ihep.ac.cn/event/22720/>
- Participants
 - Present in the meeting room (M.B. 112)
 - Mingshui Chen, Wei Wei, Xinchou Lou, Zhaoru Zhang, Yong Liu, Miao He, Feipeng Ning, Haoyu Shi, Zhijun Liang, Gang Li, Mingyi Dong, Tianchi Zhao, Qi Yan
 - Online at ZOOM
 - Jianchun Wang (chair), Yifang Wang, Haijun Yang, Yunyun Fan, Quan Ji, Mei Zhao, Zhan Li, Yang Zhang, Ling Zhao, Shu Xian, Jinfei Wu, Ying Zhang, Boping Chen, Chengdong Fu, Jinyu Fu, Ziyang Deng, Wenxing Fang, Shang Xia, Jingzhou Zhao, Weiguo Lu, Junsong Zhang, Suen Hou, Ye Chen, Weizheng Song, Mengzhao Li, Baohua Qi, Hengne Li, Jinfan Chang, Linghui Wu, Guang Zhao, Xiaolong Wang, Yao Zhang, Yatian Pei, Fei Li, Xuai Zhuang, Xin Shi, Jun Guo, Huirong Qi

Misc.

- DocDB for CEPC: Manqi
 - <http://cepcdoc.ihep.ac.cn/cgi-bin/DocDB/Document/database>
 - Common user and password: cepec
 - Discussions
 - Miao: management of IHEP SSO accounts and groups
 - Xinchou: collection of technical notes, clarify version number
 - Xinchou: Manqi and Miao report progress in next week
- CEPC TDRrd outline
 - Draft from Jianchun
 - Draft from Manqi based on the Feb. salon
 - Discussions
 - Tianchi: tracker system combined with silicon, gas, LGAD
 - Tianchi: more supporting materials for crystal calorimeter, e.g. readout channels and calibration schemes
 - Jianchun/Manqi: support the idea of general physics can be reduced due to physics white papers
 - Wei: suggest to clarify logic of electronics in first chapter
 - Xinchou: suggest to change detector to instrument
 - Yifang: try to merge two versions into a new one -> to be presented next Tuesday TDR meeting

Software: Shengsen Sun

- Oral update
 - BMR of long-bar crystal calorimeter: tentative 3.8 - 3.9% achieved
 - Updates: 8-sided polygon (current) -> 32-sided polygon design (mechanics, cooling, electronics)
 - Implementation of new design from sub-detector groups
- Discussions
 - Guang: dN/dX and ToF ready for release

Electronics-TDAQ: Wei Wei

- Status report by Wei: [slides](#)
 - Dynamic range: 0.1 MIP - 10^3 MIP
- Discussions
 - Manqi and Yifang: dose in endcap regions
 - Tianchi: consider laser calibration
 - Yifang: no need for single photon calibration, using typical barbar, di-muon for calibration

Calorimeters: Yong

- Status report by Yong: [slides](#)
 - CEPC Hadron Calorimetry and Software Framework CEPCSW in June 5
 - New task force for AHCAL in CEPCSW -> ScintGlassHCAL geometry + digitisation
 - Electronics & TDAQ Meeting in June 6
 - Dedicated discussions on crystal calorimeter requirements
 - CEPC Calorimeter Weekly Meeting on TDR in June 7
 - Beam-induced backgrounds for endcap calorimeters: new taskforce arrangements
 - Mechanics design for crystal ECAL, HCAL barrel + endcap
 - Brief updates on the electronics-related requirements on crystal ECAL
 - Brief revisit to criteria for calorimeter option select

Mechanics: Quan Ji

- Status report: [slides](#)
- Discussions
 - Xinchou: try to discuss with and learn from senior/experienced staff on designing, commissioning and operating silicon detectors (e.g. ATLAS)
 - Yifang: decide geometry of outer tracker asap, further modification can use some TPC space

MDI: Haoyu Shi

- Status report:
 - Table: beam-induced backgrounds
 - LumiCal
 - IR design optimisation
- Discussions

- Jianchun/Manqi: to have quick small-scale samples for background + validations of sub-detector geometry
- Manqi: final focusing and machine protection -> more clear timelines

Vertex detector: Zhijun Liang

- Status report: [slides](#)
 - Vertex detector: long barrel layout -> stable version CEPCSW
 - BSRF testbeam of vertex prototype in June-July to validate vertex detector digitisation, esp. with large inclined angles
 - Cooling design updates for $40\text{mW}/\text{cm}^2$ and running at 20 degrees Celsius
 - Reference TDR outline
 - Background data rate: to be updated in CEPCSW
- Discussions
 - Mingyi: temperature for real running scenarios at CEPC
 - Zhijun: yes, simulation done at CEPC low-lumi Z

Tracker: Yunyun Fan

- Outer tracker updates: [slides](#)
 - Re-estimate thickness of electronics: 85 mm -> 58 mm
 - Endcap designs
 - Sensor arrangement and readout channel
- Discussions
 - Qi: double-sided strip modules, wire-bonding from 10cm/20cm sensors
 - Jianchun: Z-precision of 18mm sufficient? -> to be validated and further discussions
 - Quan: suggest to have combined mechanic design for TPC and outer tracker
 - Manqi:
 - Studies impacts from inner tracker from Hengyu -> further discussions
 - Feasibility issue of wire-bonding of 7 sensors in a row
 - Jianchun: in digital world
 - Tianchi: sensor dimension considerations in endcap, fixed dimension versus different types of sensor dimensions
 - Yunyun: buttable area can be achieved with sector-shaped sensors, gaps from one-sized sensors

Muon: Xiaolong Wang

- Oral status updates
 - Geometry implemented in CEPCSW
 - Prototyping: plastic scintillator production
 - Wavelength-shifting fiber: MIP response (25 pe -> 75 pe) and muon detection efficiency
 - RPC-based muon detector: updated design at SJTU

Magnet: Feipeng Ning

- Oral status updates
 - Ongoing designs in cryogenic and magnet supporting structure