

CEPC Reference Detector TDR Meeting (May 14, 2024)

09:00 - 11:10 (Beijing Time)

Meeting agenda and minutes

- indico page: <https://indico.ihep.ac.cn/event/22493/>
- Participants
 - Present in the meeting room (M.B. 112)
 - Zhaoru Zhang, Jianchun Wang (chair), Zhijun Liang, Mingshui Chen, Wei Wei, Jingbo Ye, Manqi Ruan, Mingyi Dong, Meng Wang, Quan Ji, Hengne Li, Yiming, Zheng Wang, Yifang Wang, Haoyu Shi, Feipeng Ning, Yong Liu, Weidong Li; Guang Zhao, Huirong Qi, Xiognbo Yan, Jinyu Fu, Tianchi Zhao, Miao He, Linghui Wu, Shanzhen Chen
 - Online at ZOOM
 - Alexander Bondar, Junsong Zhang, Ying Zhang, Jinfei Wu, Shang Xia, Wenxing Fang, Jinfan Chang, Fangyi Guo, Chenguang Zhang, Jingzhou Zhao, Haijun Yang, Shu Xian, Sun Shengsen, Ling Zhao, Tao Lin, Chengdong Fu, Linghui Wu, Boping Chen, Suen Hou, Xin Shi, Hengne Li, Zhan Li, Mei Zhao, Weiguo Lu, Yang Zhang, Weisong Duan, Xiongbo Yan, Ye Chen, Hengyu Wang, Zijun Xu, Xiaolong Wang, Jun Guo, Kaili Zhang

Vertex and LGAD: Zhijun Liang

- Oral updates
 - Vertex detector
 - AC-LGAD: need to verify 1mm prevision along z is sufficient
- Discussisons
 - Jianchun: suggested discussions to formulate specs of electronics for AC-LGAD -> Jingbo, Wei

Tracker: Meng Wang

- Talk on the request of decision making on the option selection of TPC vs DC: [slides](#)
 - Cost table: breakdown of TPC and DC options
 - Discussions on the carbon-fibre structure
 - Pixelated readout for the desired performance: electronics + cooling
 - 65nm technology for TPC: power consumption and cost
- Discussions
 - Yifang:
 - need more justification in the tables without personal bias to determine if the cost difference is significant
 - ensure reliability through scaling existing equipment for high voltage.
 - to scale costs of existing components used at BES-3 Drift Chamber

- Yifang and Jianchun: a list of critical R&D topics
 - Beamtest of pixelated TPC and electronics
 - Development of a single cell in full length for DC since the DC is too long
- Decision on the tracker baseline option
 - **Pixelated TPC as the baseline option**
 - DC as an alternative option while keeping R&D activities to address critical issues
- Discussions
 - Yifang: 3 layers of silicon trackers: any optimisation studies?
 - Yiming and Jianchun: will perform further studies
 - Yifang: **full design of the tractor at endcap region will be major issue and need to come up with plan asap.**

Mechanics

- Status report: [slides](#)
 - Updates on dimensions: overall detector, ECAL, gap between TPC and ECAL, Outer Tracker, Yoke
 - A summarised table
 - Yifang: should separate beampipe and vertex
- Discussions
 - Yifang and Feipeng: optimisation on the yoke thickness for magnetic stray field
 - Feipeng: will provide a version with 30mm gap
 - Yifang:
 - **Each sub-detector should discuss the dimensions and make a clear decision to agree/disagree in next meeting**
 - Once first version is determined, further modification should have record with detailed explanation
 - Endcap mechanics designs for sub-detectors should converge for this converge

Magnet: Feipeng Ning

- Status report: [slides](#)
 - Dimensions of magnet: updates
 - Gap between barrel and endcap: 250 mm -> 60 mm
 - Stray field distributions (50/100 Gauss)
 - $B(1m) = 0.16-0.18$ T at 1m on top of magnet
 - CMS requirement: <0.12 T
 - Magnetic field distribution: requirements from tracking systems
- Discussions
 - Yifang: **add a layer of wax to shield neutrons**
 - Estimate of neutron flux

Calorimetry

- Status report: Yong ([slides](#) prepared by Jianbei)
 - Electronics designs: considerations of minimising gaps
 - Summary of performance: BMR and EM resolution

- Discussions
 - Jianchun
 - Better prepare slides in English
 - Prepare a talk on the calorimeter baseline option selection for ECAL and HCAL for decision making

Muon: Xiaolong Wang

- Oral status update
 - Progress on muon detector simulation

Software: Weidong Li

- Oral status update
 - Muon detector
 - DC with clustering counting
 - Event Data Model
 - Stick to the schedule: publish the CEPCSW with PID using Time-of-Flight
- Discussions
 - Yifang:
 - mechanics design implemented into the geometry of each sub-detector in CEPCSW
 - tracker endcap is missing part, give final design in 1-2 weeks

MDI and backgrounds

- Oral status update
 - Ongoing studies on background estimates
 - LumiCal update: expect a talk at CEPC Day
 - Endcap calorimeter: inner diameter -> any further requirements

Electronics

- Oral status update
 - Irradiation tests at CSNS
 - Wire-less readout scheme: expect a talk at CEPC Day
 - Electronics for the endcap LGAD detector