

Minutes: CEPC Reference Detector TDR Meetings in 2024

CEPC Reference Detector TDR Meeting (Sep. 10, 2024)

Date and Time

- September 10, 2024; 09:00 - 12:30
- Participants
 - IHEP 122: Mingshui Chen, Haoyu Shi, Manqi Ruan, Joao da Costa, Zhaoru Zhang, Weidong Li, Yong Liu, Feipeng Ning, Zhijun Liang, Sen Qian, Yunyun Fan, Yiming Li, Huirong Qi, Fei Lik, Guang Zhao, Shaojing Hou, Xiaolu Ji, Shengsen Sun, Jinfan Chang, Xiongbo Yan, Linghui Wu,
 - Remote: Haoyu Shi, Suen.Hou, Xiaoting Li, Bo Liu, Fangyi Guo, Haijun Yang, Hengne Li, Hengyu Zhang, Zhilong Hou, Jinfei Wu, Jingbo Ye, Jingzhou Zhao, Quan Ji, Jun Hu, Mei Zhao, Mengzhao Li, Qi Yan, Qiongyao Liu, Shanzhen Chen, Tao Lin, Meng Wang, Wenxing Fang, Xiaolong Wang, Yang Zhang, Yuchen Cai

Mechanics: Quan Ji

- Status report
 - Overall schematics
 - Pre-installation point: detector installation scheme design
 - Dimension: 55.5x58.5
 - Shield between the IP (interaction point) and the pre-installation point
 - 25m as the distance between booster from collider beamline
 - Haijun: what's the status of geometry

- Quan: OTK, vertex, ECAL to be decided before end of the month
- ECAL mechanics progress report by Shaojing Hou
 - ECAL module assembly scheme: protective shell
 - Jingbo: need to estimate material budget of shell, and impact for ECAL resolution, making sure all the parameters are optimized
 - ECAL detector assembly and installation scheme
 - Haijun: considering possibility of assembly vertically and lay it flat after assembly
 - Quan: need more study for deformation calculation
 - Yong/Sen: will organize meeting with calorimeter and mechanics people for detailed discussion

Beam-induced Backgrounds: Haoyu Shi

- Status report
 - TDR documenting
 - BG simulation at Higgs mode

Vertex: Zhijun Liang

- Status report
 - Support mechanics update
 - Revisit MDI space for cabling and services
 - Stitching R&D with 30um dummy wafers (after thinning): 12mm radius tested, goal of 11mm for CEPC

Silicon tracker: Qi Yan

- Status report
 - ITK: mechanics studies with simplified design
 - OTK ASIC cooling with heat sink
 - OTK endcap: new design
- Jingbo: suggest to use 300mW/cm² which is agreed in electronics group

- Qi: OTK Mechanic design should be considered together with TPC design
 - Huirong: plan to have the mechanic design of interface between TPC and OTK/ITK in next week

Gaseous Detector: Huirong Qi

- Status report
 - Discussions: TPC and OTK boundaries
 - Data analysis framework in CEPCSW for beam test

ECAL: Yong Liu

- Status report
 - ECAL electronics (Jinfan Chang):
 - Estimated cable numbers (power, optical fibers)
 - Pending release after internal review (in electronics group)
 - ECAL mechanics (Shaojing Hou):
 - Proposed assembly procedures for barrel crystal modules
 - Beam-induced backgrounds (Weizheng Song):
 - Simulation results with 2 running modes
 - Software (Shengsen Sun):
 - Working on longer crystal bars (60cmx1.5x1.5cm)
 - Performance studies with beam test data on crystal calorimeter prototype
 - Updates on digitization, data analysis; meeting with CERN beamline physicists
- Weidong: need to consider time window for background simulation. The time window for ECAL is depended on trigger of TPC.

HCAL: Sen Qian

- Status report
 - Update of group organization and manpower arrangement
 - Update of study of glass-scintillator and SiPM
 - Update of mechanics
- Jingbo: any consideration for focusing system between glass and SiPM
 - Sen: several possibility: coating on glass, Femtosecond laser..
- Haijun: make sure birks constant in simulation is reasonable value

- Sen: will confirm the correct value asap
- Manqi: 100Mips is acceptable for SiPM design?
 - Jingfang: prefer a single type of SiPM for ECAL and HCAL, but will further investigate the limit of dynamic region

Muon detector: Xiaolong Wang

- Status report
 - Update of electronic design
 - Software update
 - Mechanics design update
- Weidong: consideration of paraffin
 - Haoyu: temporarily put 10cm in geometry, will further optimize it

Magnet: Feipeng Ning

- The chimneys of the magnet
- Physical design work is still ongoing
- Superconducting cable LTS and HTS, summary of the latest work and the next work arrangement

Electronics: Jingbo Ye

- Status report
 - Clock frequency selection from the accelerator
 - 43.3MHz (130MHz/3) is preferred
 - Power consumption increases with base clock frequency
- Jingbo: need Yifang's suggestion that whether a mini-workshop is needed to determine clock frequency between 43.3MHz and 65MHz

TDAQ: Fei Li

- Status report
 - Inviting 4 talks and confirmed 4 talks in TDAQ session of CEPC workshop
 - discussion background events compression at Belle II trigger system
 - Initial understanding of physics event rate and beam background at Ecal

Software: Weidong Li

- Status report
 - Matching between bunch crossing and time window
 - Optimized speed of sample generating
 - Vertex geometry is included in software, performance is ongoing

Physics: Mingshui Chen

- Oral updates
 - First physics meeting towards CEPC TDR to discuss benchmark studies
- Manqi: Demands on $\mathcal{O}(10\text{M})$ events in MC samples
 - Weidong: need further discussion based on specific requests, calorimeter can be simplified as fast simulation