

CEPC Physics and Detector Plenary Meeting

Time: Wednesday, November 27, 2019 from 15:00 to 17:00 (Asia/Shanghai)

Location: IHEP (A419)

Attending: Joao Guimaraes da Costa, Zhijun Liang, Feipeng Ning, Xin Shi, Ling Zhao, Zian Zhu, Huirong Qi, Manqi Ruan, Gang Li, Shengsen Sun, Junguang Lv, Fangyi Guo, Hanhua Cui, Zhen-An Liu, Zhaoru Zhang (Minutes)

Attending remotely: Weidoong Yoo, Haoyu Shi, Jianchun Wang, Gabriella Gaudio, Fox Harald, Mang Wang, Yanyan Gao, Daniel, Ivan, Jianbei Liu

Joao summarized and analyzed the review comments from IDRC and IAC and put forward the important implementation for the near future steps.

1. During the first IDRC meeting, the committee found some issues and problems that we need to improve:
 - 1) Requirements on sub-detectors should not be viewed in isolation, but increasingly in the context of studies of global detector performance.
 - 2) Requirements on the muon sub-detector should be clarified
 - 3) A common timestamping strategy should be defined, capable of dealing with 25ns running at the Z pole.
 - 4) A clear overarching trigger and readout strategy for the CEPC detectors should be considered.
 - 5) There's some overlapping proposals for calorimetry. A clear set of requirements and a path to a baseline design choice need to be established.
 - 6) We need a coherent and flexible fast simulation tool, capable of supporting parallel studies of different detector concepts.
 - 7) The machine-detector interface and LumiCAL are complex and challenging aspects of the overall detector design. Close cooperation between accelerator and detector teams must be reinforced and maintained.
 - 8) A clear strategy for optimization and technology selection criteria to be defined well in advance of the collaboration-building stage.
 - 9) The wide-ranging R&D programme should be maintained for the time being.

According to these issues, IDRC gave several recommendations:

- 1) Assemble a coherent list of R&D activities
- 2) Each current R&D project should provide the key information to the IDRC before the end of 2019, which includes the objectives with the anticipated schedule, the funding available to the project, the leadership arrangements, and the extent to which the project is a CEPC-specific development.
- 3) Complete an update to the CDR within 12-18 months, which can be an internal technical note.
- 4) A conservative full-detector concept, potentially deliverable on an aggressive time scale, should be specified by the CEPC Management
- 5) A set of short-term requirements on simulation and reconstruction tools should be established
- 6) Increase the rate of progress should be found for certain R&D areas
- 7) Sufficient time should be allocated during CEPC workshops for IDRC discussions.

2. Then for the IAC meeting, they also gave several recommendations:

- 1) We need a high-level executive working group between accelerator and detector group to define a workable scenario for MDI.
→ Joao said that he will talk with Jie Gao to implement the regular meeting for MDI.
- 2) Engage engineering expertise to assess various engineering aspects of the detector options under study.
→ Joao said that it's true that detector group needs more engineers and we will keep looking for it.
- 3) Continue to pursue studies of the solenoid yoke in view of magnetic stray fields and their influence on the booster beams and on other surrounding equipment.
→ Joao said that we need a careful study of magnetic field, cannot just shrink the yoke and not think about the rest of the things.
- 4) Reinforce efforts towards an engineering design of the IDEA detector.
- 5) Perform detailed simulation studies to better understand the physics needs from the detector at the various CEPC energy stages; draw consequences about the

corresponding detector performance requirements and study how this influences the detector design.

6) Set up a system for reviewing/rehearsing public CEPC presentations.

a) Joao: We need discuss this issues with Steering Committee.

3. Based on the comments from IAC and IDRC, Joao listed several things we need to do for the next steps:

1) The Detector Technical Design Report (TDR) is not of the responsibility of the current CEPC Working Group. This is to be taken by the International Collaborations that will be formed circa 2022-23. Our job is to promote detector R&D in key technologies applicable to circular e^+e^- collisions: Taking into account the CEPC timescale and keeping an open mind to more challenging emerging technologies.

2) Accelerator group updated the parameters of Collider Ring since CDR, however, these possible luminosity increases have not yet been absorbed into physics and detector studies. We need to agree the number with accelerator people and study the performance for updated parameters.

3) We should re-evaluate the physics requirements, aiming to present the updated result at workshop in Hong Kong.

4) We need to know the clear timescale for CEPC new software. Gang said that it will take about 1 month to finish the software for sub-detector, but needs more than 1 year to finish the integration for the whole detector.

5) For the detector performance study, we can use a mixture of fast simulation and full simulation, taking in to account the engineering aspects and costing issues. The work needs to be shared and coordinated at common Detector Plenary Meeting, aiming for a document sometime before collaborations are proposed is reasonable. So the first step is to integrate better detector and physics performance people to study different options.

Manqi reported the study of impact at Higgs Measurements by reducing B-Field to 2 Tesla.

By decreasing to 2T, the $\mu(H \rightarrow \mu\mu)$ and recoil mass are significantly degraded by 20/10%

respectively, the Xsec measurement of $\mu\mu H$ are degraded by 2%. Then the BMR is reduced by 2.5%, which leads the three 2-jet benchmarks reduced by 0.2 – 0.5%. Flavor Physics Signature finding: typical impurity can increase by 50%.