TDR Editing

Tuesday CEPC TDR Meeting
Sep 30, 2025

Joao Guimaraes

Updating the figure for cover and talks

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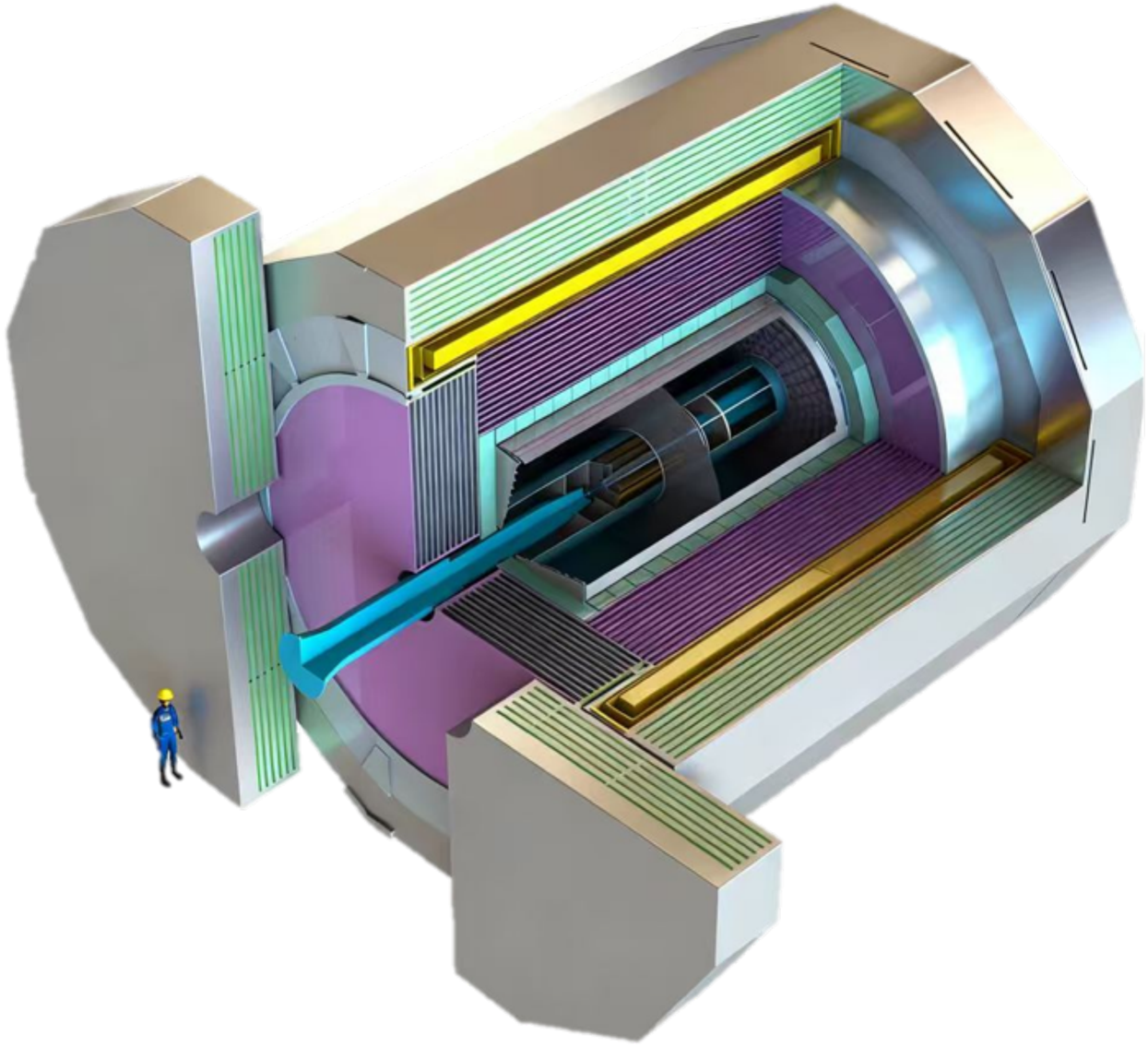
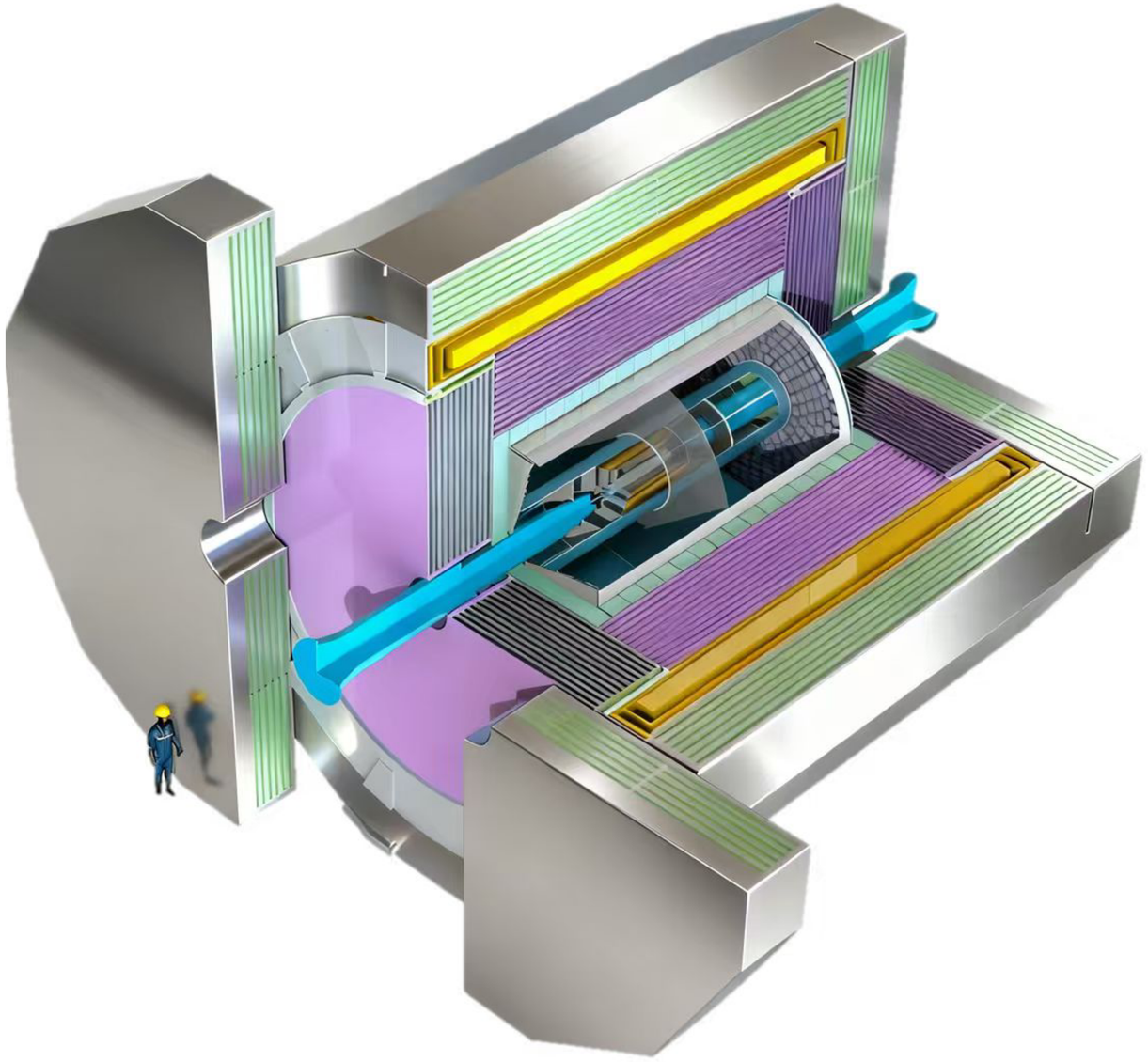


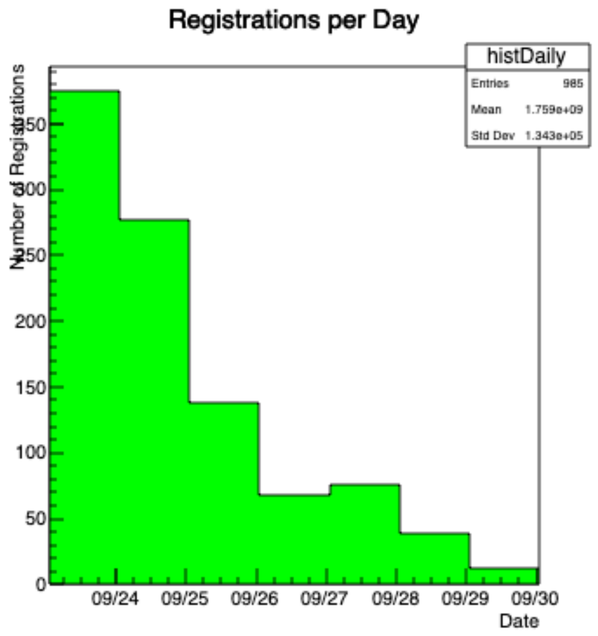


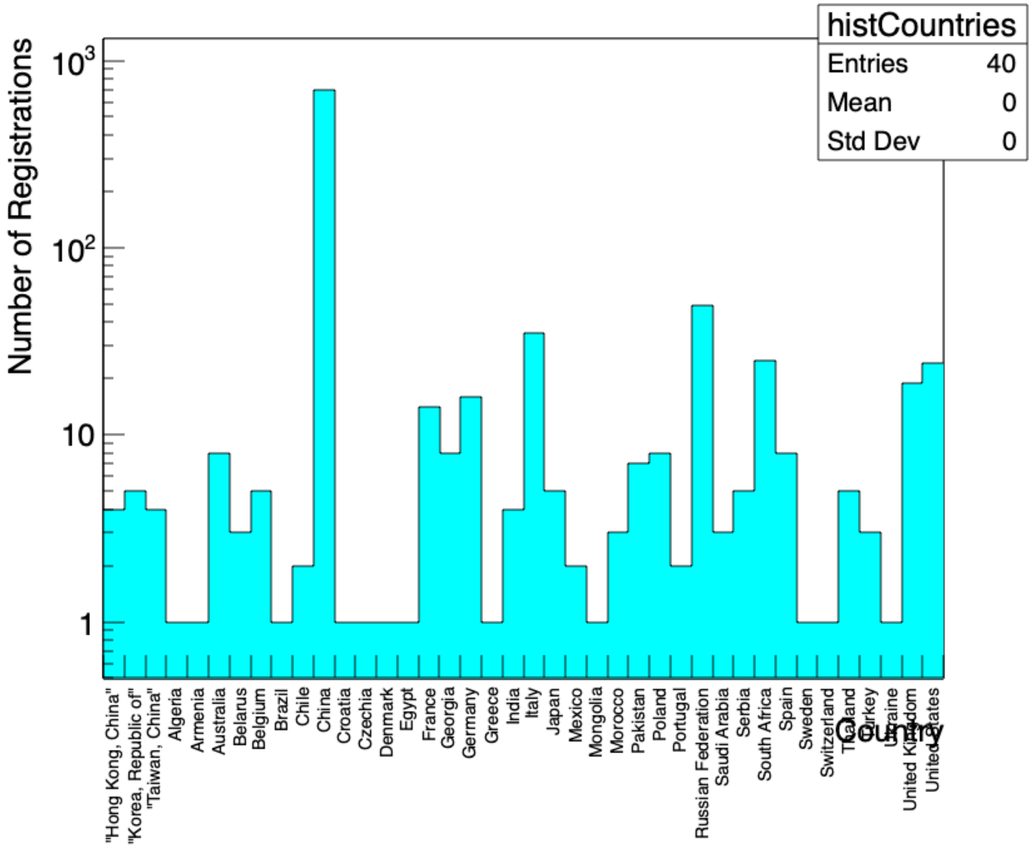
Authorlist situation

985 authors by September 29, 2025

On track to get as many authors as the accelerator TDR

Major drops so far: China (18%), Korea (75%), USA (29%), France (30%), Netherlands (100%)





Country	TDR - Sep 29	Accelerator TDR	Difference
Armenia	0	1	-1
Algeria	1		1
Armenia	1	1	0
Australia	8	9	-1
Belarus	3	1	2
Belgium	5	1	4
Brazil	1	1	0
Chile	2	1	1
China (mainland, Taipei, HK)	705	858	-153
Croatia	1	1	0
Czechia	1	0	1
Denmark	1	1	0
Egypt	1	5	-4
France	14	20	-6
Georgia	8	1	7
Germany	16	9	7
Greece	1	0	1
India	4	8	-4
Italy	35	32	3
Japan	5	7	-2
Korea, Republic of	5	20	-15
Mexico	2	2	0
Mongolia	1	0	1
Morocco	3	3	0
Netherlands	0	4	-4
Pakistan	7	7	0
Poland	8	4	4
Portugal	2	1	1
Russian Federation	49	28	21
Saudi Arabia	3	1	2
Serbia	5	8	-3
South Africa	25	3	22
Spain	8	5	3
Sweden	1	1	0
Switzerland	1	7	-6
Thailand	5	7	-2
Turkey	3	1	2
Ukraine	1	0	1
United Kingdom	19	19	0
United States	24	34	-10
Total	**985**	**1112**	-127

Authorship List - email lists

- **Email lists used:**
  - cepc_general
  - cepc_physdet
  - cepc_accelerator?
  - CEPC workshops since 2016
    - European edition workshop: Barcelona, Edinburgh, Oxford
  - FCPPL
  - Lepton-Photon 2025
  - Higgs Workshop 2025, Beijing

- **Email lists not used:**
  - BES?
  - General IHEP lists?
  - cepc_accelerator?
  - CEPC Marseille workshop

Next Steps

- **Goal**: TDR in arXiv archive by October 14 (with arXiv number)
- **Submission to archive:**
  - Weiren confirmed that it takes about one week to submit a large document like our TDR to archive (same happened for CDR)
    - Needs manual intervention and emails back and forth
  - Submit on October 6-7 (rather than Oct 11, as previously planned)
    - Vacations from October 1 to October 8.... means submission should be today!
  - ***Two possible workarounds:***

    1. **Submit a short document as a placeholder** to acquire the arXiv ahead of time, October 10-11, then update it with the full TDR around October 11-12. Not sure if TDR will be available by October 15, but the number will be. This allows for the automatic online submission.
       - Disadvantage: Tricky? but don't believe we are breaking any rules. Update of documents in the arXiv is standard procedure.
    2. **Submit a draft not fully vetted** by Oct 6-7 (ideally as soon as we get approval by IDRC but that might not come in time) with partial authorship. Then, update the draft with the full document when approved by IDRC and full authorship list is available

Next Steps

- **Most challenging:**
  - Implement final feedback from IDRC committee
  - Decide on what to do regarding the background rates → modify chapters accordingly (see Haoyu's talk today)
  - Collect and finalize authorship list
- **Editorial Issues:**
  - Make final modifications including responses to IDRC committee
  - Correct format for submission → need active help of all
  - Update acknowledgements, including IAC committee (to be moved to the end according to journal)
  - Collect all references at the end of the document (asked by journal) → my skip this for lack of time
  - Update chapters to remove work specific to IDEA and ILD (to be addressed)
- **Editors should have certified that their chapters reached Publication Quality by end of last week… no one did**

Status

Draft v0.7.0

Acknowledgements

The completion of the CEPC Reference Detector Technical Design Report (TDR) owes its success to the diligent efforts of the CEPC detector research team, spearheaded by the Institute of High Energy Physics (IHEP) of the Chinese Academy of Sciences (CAS). Collaborations with both domestic and international institutes played pivotal roles by offering invaluable advice and support, contributing significantly to the TDR's creation.

We are thankful to the members of the international detector review committee:

Daniela Bortoletto, University of Oxford, UK
Jim Brau, University of Oregon, USA
Anna Colaleo, NFN-Bari, Italy
Paul Colas, CEA Paris-Saclay, France
Christophe De La Taille, OMEGA Laboratory, CNRS, France
Cristinel Diaconu, CPPM, France
Frank Gaede, DESY, Germany
Colin Gay, University of British Columbia, Canada
Liang Han, University of Science and Technology of China, China
Bob Kowalewski, University of Victoria, Canada
Gregor Kramberger, Jožef Stefan Institute, Slovenia
Roman Poeschl, IJCLab, France
Burkhard Schmidt, CERN, Switzerland
Tommaso Tabarelli de Fatis, INFN-Milano-Bicocca, Italy
Roberto Tenchini, INFN-Pisa, Italy
Maxim Titov, CEA Paris-Saclay, France
Ivan Vila Alvarez, University of Cantabria, Spain
Akira Yamamoto, KEK, Japan
Hitoshi Yamamoto, Tohoku University, Japan

Funding

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New parts preparing for Journal submission

Will add IAC committee to acknowledgements

Plan to add the IDRC committee members only after they approve and provide report

First submission to archive before that?

Status

Spreadsheet monitoring the status in IHEP docs:

https://docs.ihep.ac.cn/link/ARF4C648FCA57D4CF281A8E821A110229E

Please report to me the real status of the work

If the spreadsheet is not up to date, i might have to contact people during the vacation

	Chapter leaders	
Chapter	Overall Complete (%)	Still need to change
	Tag: 2025/9/24	
Executive summary	96%	Implement comments from Daniela
1 Introduction	90%	Need motivation for top physics. Implement comments from Daniela
2 Concept of CEPC Reference Detector		Implement comments from Daniela
3 MDI and Luminosity Measurement	95%	Implementing the comments received on Tuesday, including the update of Fig3.10
4 Vertex Detector		
5 Silicon Trackers	100%	
6 Time Projection Chamber	95%	Check PID permormance with distortions and update the module dimension
7 Electromagnetic calorimeter	98%	To polish the newly added paragraphs and plot captions after the September IDRC review
8 Hadronic calorimeter	100%	all noticed issues have been fixed.
9 Muon Detector		
10 Detector magnet system	100%	
11 Readout Electronics	100%	latest comments also updated according to the IDRC review on 09/24
12 Trigger and Data Acquisition	99%	Need mod text according to new comments.
13 Offline software and computing		
14 Mechanics and integration	100%	
15 Detector and physics performance	90%	integrated lumi of ZH to be updated to 21.6/ab for 240 GeV analyses
16 Timeline and Future Plans	100%	
17 Reference detector costing	100%	
18 Summary/Glossary		

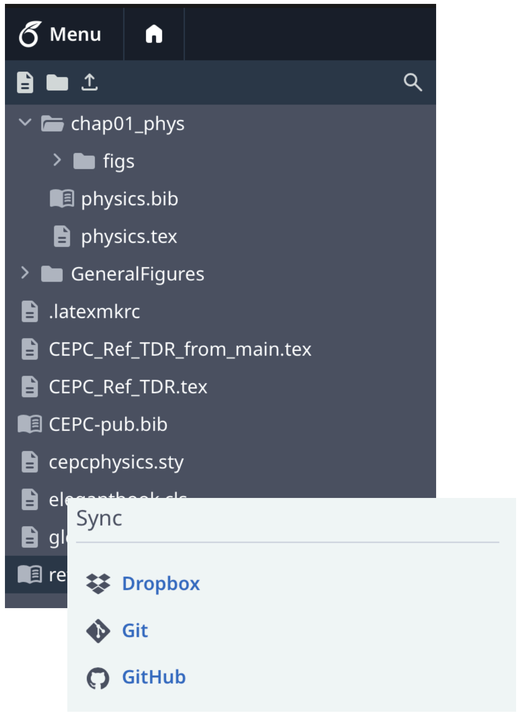
Preliminary comments received from IDRC

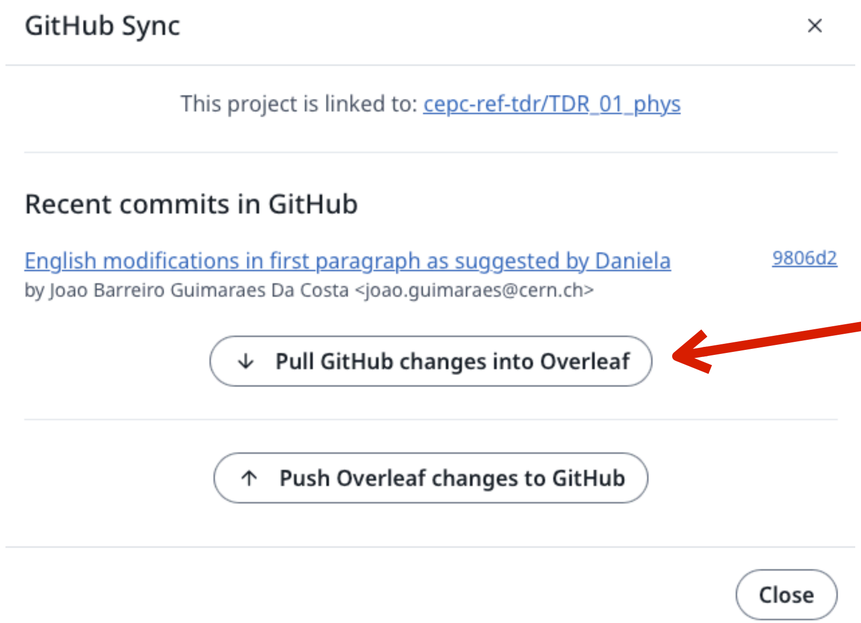
- **Since last review:**
  - Executive Summary, Introduction, Concept, Cost, and Timeline chapters
    - Sent in pdf format
    - Daniela, Sep 26
  - Vertex Detector, TPC, ECAL, HCAL, Muon Detector, Electronics, Software, Mechanics and Physics Performance
    - See following slides

- **Missing:**
  - MDI, Silicon Tracker, Trigger and DAQ
  - **Magnet** report seems to be finished but no need for further modifications, however this comment is still there:
    - There is some concern on the field uniformity/distribution of 7% in the TPC region, because of strict requirement on the field uniformity to minimize distortion on the particle trajectory specially required in the TPC sensitive volume.

Update and logs

- **IDRC has asked us to provide a change log for all modifications from now on**
  - Provide proper **summary** of modifications each time you change something in overleaf
  - Include your name and the description of what was modified
    - Push and pull





Accept modifications

Update and logs

- **IDRC has asked us to provide a change log for all modifications from now on**
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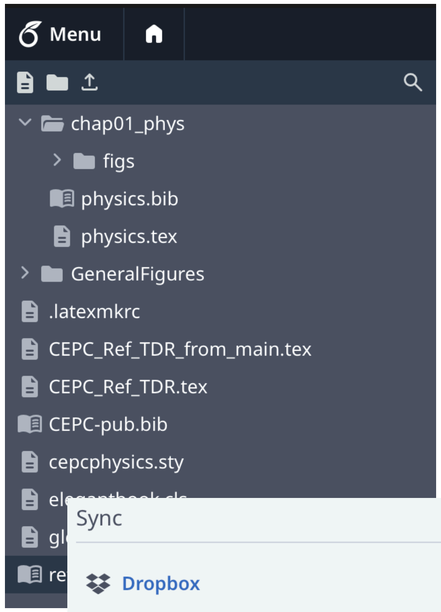
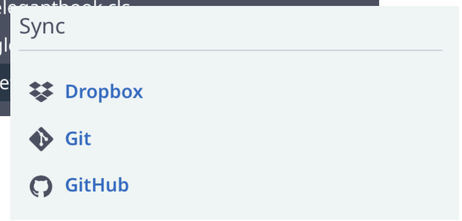
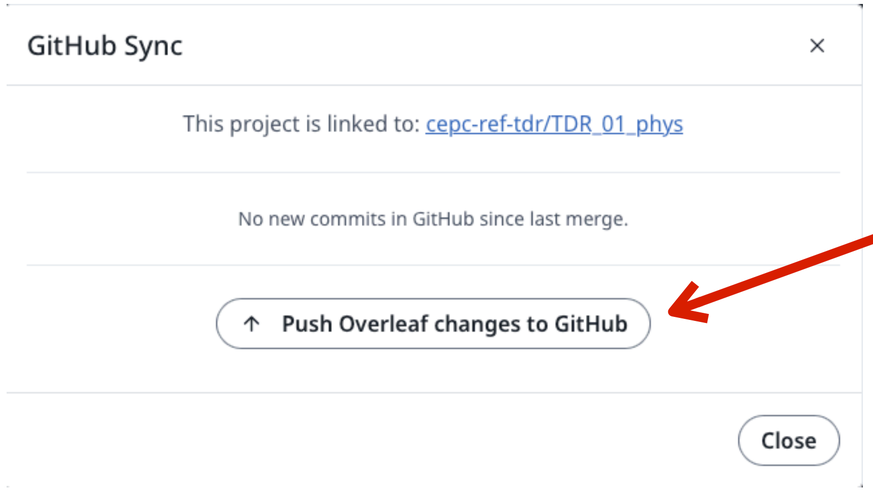
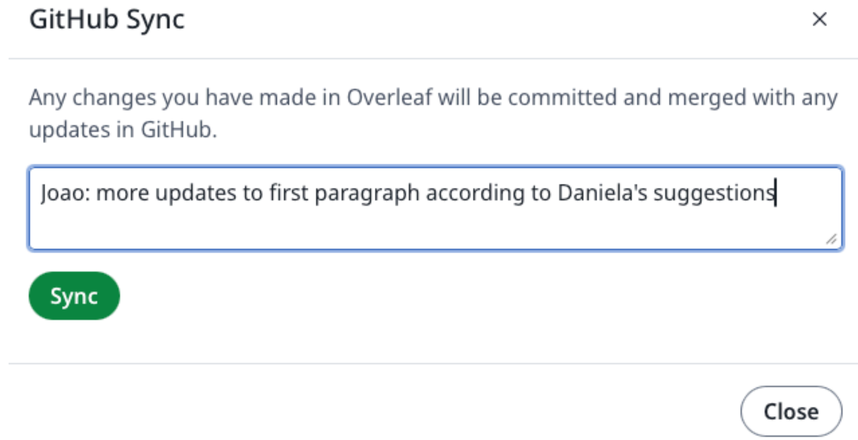
    - Push and pull







After modifications



IDRC Comments on Vertex

We would recommend the data format of hits in the TDR (32 bit).

We would recommend to add few details about the current design of the pixel element (size of the electrode, its position, minor details about planned implants and possible consequences of more relaxed requirements in Higgs mode).

We would recommend the comment on the impact of higher temperature (e.g. in case of the reduced air flow) on the sensor performance.

Below is the list of some smaller suggested corrections:

L2316 - design values - > design goals

L2444 - omit the different operation modes as there is only one .

Figure 4.10 - please mention how RPB will be serviced at z=0 for outer layers of CVTX

L2508 - some initial guidance in dimensions need to be given also in order to understand the efficiency studies.

Apart from changes in the TDR there are also a followup recommendations on topics that would need special attention:

We highly appreciate the design and implementation of the laser alignment system which will facilitate monitoring of mechanical deformations of the VTX as well. We recommend a construction early demonstrator taking into account the features of the sensors.

We would advise you to revise the calculations of the cooling (required flow, pressure drop) and take into account the non-homogenous heat dissipation. A complex and realistic mockup/demonstrator will be crucial.

Design of the data and power lines across the RSUs need to be designed with care ensuring proper shielding to minimize the pickup.

The required radiation hardness of ~21014 neq/cm22 is far from negligible for unbiased substrates (diffusion collection) and there can be a significant impact to operation. ITS3 has almost an order of magnitude smaller requirement. It is crucial that these studies are done promptly. Substrate bias would require also redesign of power services (FEB).

IDRC Comments on TPC

Comments

The 500x500 μm² pad size, together with the T2K gas choice, is probably suboptimal for the dN/dx-based particle identification.

Beam-induced backgrounds need to be further studied, and recent improvements in their assessment and mitigation should be used to iterate.

The space-charge distortions need more studies to assess if they can be corrected in each running condition.

Ion backflow suppression needs to be prototyped, whatever solution adopted (double mesh or graphene filter).

Chip protection against sparks need to be proven.

CO2 as a coolant fluid should be considered as a replacement for water, as it does not provoke shorts and can remove heat at constant temperature.

TPC Recommendations

The definition of the separation power (Eq. 6.8) with the linear half-sum of dE/dx resolutions of the two species at the denominator is probably not correct and leads to much ‘too good’ pi-K separation. Please switch to the ILD definition where a quadratic sum is used at the denominator. The effect of distortions in Fig. 6.36 looks very much underestimated. This Figure should be corrected or removed.

Line 4825 : interpose -> interposer

Line 4717 : Designing as fine a readout granularity as possible will minimiize the occupancy.

Please remove ...caused by the maximum drift time in the TPC.

IDRC Comments on ECAL

We welcome the addition of a dedicated section to describe the SiPM non-linearity calibration and the clarification of a few inconsistencies in the SiPM dynamic range that were spotted in earlier TDR versions. However, the latest version of the ref-TDR (Aug 15) does not support the statements with quantitative results, as those of the analysis shown in the latest review (Sep 10). We recommend adding those results shown in the review and updating the discussion of the strategy accordingly. The proponents should convince the readers that their approach to calibration is sufficient.

We recommend updating Fig. 7.32 with the newest TB results. A plot showing a stochastic term of 2%, which can be reduced to around 1.6% after subtracting a beam momentum spread of 1% is more convincing than a result where the target performance is achieved after the subtraction of a 3.5% beam spread.

We recommend changing the title of this Section 7.4 to ECAL Prototyping instead of ECAL R&D One claim of the TDR is that the ECAL Technical Readiness Level is 9, which implies R&D completed and construction ready.

We thank the ECAL team for having addressed the misunderstanding of the timing resolution. The RMS of the distributions of the time difference ($\Delta T=T2-T1$) and of the time sum ($\Sigma T=T2+T1$) from the readings of the two SiPMs provide consistent estimates of the time resolution **if** the impact point is fixed. For uniform impact points over the crystal-SiPM unit, only ΣT provides a first-order correct estimate, while ΔT is broadened by the spread in the length of the light paths. This confusion is still present in the TDR text. Even if timing is not the major focus for the calorimeter in the ref-TDR, we recommend clarifying the text at L6022-6024, for consistency and future reference. A minimal correction would be: “The timing resolution of a crystal-SiPM unit is defined as the standard deviation of differences between time stamps of SiPMs signals from two ends of a crystal **for fixed impact-point position** …”

We would also welcome the new $\pi 0/\gamma$ performance plots shown on Sep 10, if they can be added to the ref-TDR before the final release.

We add here a list of more specific suggested edits:

L5423 – In this latest version, there is no mention in the text of the crystal cross-section of 1.5x1.5 cm2. The information can now only be inferred from Fig. 7.1. We recommend adding it to the text, as it was the case in earlier TDR versions (4.0.1).

L5405 – We advise adding the chemical formula of BGO and LYSO, to stay consistent with what you do for alternative crystals, CsI and PbWO4.

L5441 – “The detailed design *will be* presented… ” → “The detailed design is presented…”

L5451 – “is expected to disentangle” à “disentangles” or “is designed to disentangle”. We think you should be beyond the expectation level.

L5456 – “Precise alignment is *critical*… ”. The consequences of this criticality are not covered in the TDR.

L5498-99 – Please check the language of the sentence.

L5513 – Please check the language of the sentence.

L5575 – Please list the reference within square brackets separated by commas, for consistency with other occurrences.

IDRC Comments on HCAL

We wThe section has considerably improved w.r.t. “Barcelona draft” and in particular w.r.t. the version from April. The English is very good which makes the text well readable. The draft benefits from the fact that some details have been dropped in this version. The draft contains also some new sections that have not been there earlier (e.g. Sec. 8.4.5), At several places new results are presented (e.g. Fig. 8.15).

New results have also been presented in the September review. Based on this

we recommend to add the discussion of the tile characterisation from the three vendors has to be added to the ref-TDR;

we recommend to also pay great attention to “intra tile variation” in particular in view of the design choice of only one SiPM per tile;

we recommend to quickly set up an efficient QA/QC chain taking example and building up where possible on the QA/QC Chain developed for the PS-HCAL;

we recommend to include recent testbeam results in the ref-TDR, e.g. Slide 7 of presentation.

In the following comes a list of further specific comments to draft v0.6.1:

The Sec. 8.4.2.1 in v0.6.1 (was 8.4.1.1 in Barcelona draft): Test of 9 tiles in DESY beam test -> to be replaced by the presentation of the recent tile tests as presented in the September Review.

Figure 8.18 (in v.0.6.1): What is the difference between Fig. 8.18c in v.0.6.1 to Fig. 8.19c in v0.4.1 (“Barcelona Draft”)?

Line 6487: Here still 100 Gy, was 20 Gy at review -> please correct

Line 7072: “within” -> “for the”

Line 7097: Please check the logic at the end of this sentence.

Line 6880: Typo, “theoritical” -> “theoretically”

IDRC Comments on Muon Detector

CEPC TDR Muon Detector Review Report – TDR (v0.6.1)

Muon Detector

Findings

The Muon System chapter in v0.6.1 represents a clear step forward compared with the Barcelona Edition (v0.4.1), with significant progress achieved in R&D activities. Many of the recommendations made for the previous version have been implemented, and the logical flow is now well established.

The baseline choice and technological solutions are clearly delineated. New R&D results are presented both for SiPMs (introduction of the EQR-20 devices with preliminary test measurements, Sec. 9.3.1) and for long plastic scintillator strips, including prototype studies up to 4–5 m in length (Sec. 9.3.3).

For the first time, integration aspects such as electronics and cabling are discussed: cable routing is described in Sec. 9.2.2.

Nevertheless, despite these important advances in R&D, compared with the Barcelona version the v0.6.1 text has become more qualitative, with fewer quantitative plots and fewer detailed R&D results included. This reduces transparency and makes it harder to fully assess the robustness of the design. Several technical and editorial issues also remain only partly addressed or undocumented.

Comments/Recommendation ***(issues, inconsistencies, missing information)***

Chapter organisation & figure consistency

- The **"Overview"** section would read more naturally as **"Performance Requirements"** (lines up to ~7547).
- I suggest starting a section **"Overall Detector Design"** at line ~7548; within it, describe in the order: "Geometry configuration", "Detector **Module" → "Electronics readout system" → "Cabling"**
- ·**Section 9.2.3:** The following sentence appears out of context: *"As discussed in Section 9.4.3, simulations indicate that the hit rate caused by beam-induced backgrounds is below 50 Hz/cm². The PSU design provides a rate capability significantly exceeding this hit rate. Consequently, no special measures are required for the regions near the beam in the endcaps."*
- **Fig. 9.8**
  - Caption refers to panels **(a)** and **(b)**, but these are not present/labelled.
  - Patch-panel and MB locations are unclear (inside modules vs outside/backend).
  - Colored arrows appear to denote different cable types but are not explained.
- **Fig. 9.10**
  - Caption is sparse; MB seem drawn on the sector, which conflicts with the patch-panel placement suggested by Fig. 9.8. Clarify consistency between figures and text.
  - Cross-figure alignment: Ensure the physical placement of MB, patch panels, and service routing is consistently stated in text, captions, and drawings.

SiPM R&D (Sec. 9.3.1)

- **Fig. 9.11 caption/axes**:

  Caption says "vs. overvoltage" for all panels; however **(b)** shows **DCR vs threshold**, and **(d)** is a **breakdown-voltage distribution**. Align caption and axis labels to actual plots.

- **Baseline device choice**: Text lacks a **clear conclusion** on **NDL vs HPK** and the **selection criteria** for the baseline SiPM (gain, PDE, DCR, cross-talk, afterpulsing, radiation tolerance, cost, operating overvoltage).
  - Consider stating explicitly that, despite lower gain/DCR performance than HPK, **NDL meets CEPC needs** within thresholds and offers a **cost advantage**—provided quantitative requirements are met.

PS strip R&D (Sec. 9.3.2)

- Current statements on **fiber diameter** and **reflective coating** are **qualitative**; **no plots or numbers** are given (light yield, attenuation length, uniformity, S/N).
- Useful Barcelona version section appears dropped: suggest to **reintroduce v0.4.1 Sec. 9.3.1.3** ("Improvements for the Photon Collection") including **former Fig. 9.7** with quantitative results, test setup (light source or cosmic configuration, trigger geometry, sensor coupling, electronics chain/shaping, threshold, calibration method).
- Provide again plots for **light yield vs z**, **attenuation length**, **uniformity**, **S/N**, comparing **1.2 vs 2.0 mm fibers** and TiO_2 **vs PTFE** wrapping.

Prototype performance (Sec. 9.3.3)

Fig. 9.12:

oDefine the **z coordinate** explicitly (origin, positive direction, measurement step).

o The caption claims **dual-ended** readout for all results, but some panels appear **single-channel**; correct caption and legends.

o Both Channel-1 and Channel-2 show **enhanced response at z=0**, I would assume that this is dual end readout. So please explain better the layout: trigger, light-injection point, coupling geometry, or reflective boundar.

Simulation & performance (Sec. 9.4)

- The chapter contains fewer results than the previous version; no studies on the pion fake rate are provided, and only qualitative statements are included.
- LLP/muon trigger concepts are briefly mentioned but should explicitly reference the TDAQ chapter and include more concrete details on architecture, latency, and expected rates.
- **Fig. 9.15** lacks units on the color scale; the caption should specify the quantity displayed (e.g. Hz/cm², occupancy) as well as the integration window and threshold assumptions.

Alternative RPC option (Sec. 9.6.3)

- A few results are shown, mostly from the literature, without details on setup, gas, or electronics. Given the modest rate requirements of the CEPC Muon System, standard RPCs would already be adequate and further R&D is only needed for gas mixture/GWP issues.
- If this option is kept in the TDR, the document should clarify whether RPCs are meant as a generic backup or if a concrete development plan is foreseen by the team.

IDRC Comments on Mechanics

Minor editorial feedback to Section 14 of draft v0.6.1:

- “standby parallel equipment automatically activate when primary system failures” (Sec. 14.4.2) --> "... activates .... fails"
- “details of the muon detector are provide in Chapter 9” (Sec. 14.2.1) --> "... provided ..."
- “The installation of the barrel yoke and superconducting solenoid magnet are the typical case of the ‘no-tooling’ installation idea” (Sec. 14.3.3) --> "The installations ... are ..."
- “To addressing this, the shaft is designed as a three-section modular structure.” (Sec. 14.3.3) --> "To address..."
-

IDRC Comments on Electronics

Point to clarify: in Table 5.12, the minimum threshold cannot be 4 fC if the noise is specified as 1.5 fC. A minimum threshold should be at least five times the noise, and typically ten times. Here, the noise seems too high (0.3 fC should be achievable), and the minimum threshold could also be larger, since the MIP is relatively large.

IDRC Comments on Software and Computing

We add here a list of more specific suggested edits (based on v0.6.2):
- l 11454 (in 13.3.1) missing reference for ILD tracking code : (DOI: 10.1088/1742-6596/513/2/022011)
- l 11492 pixelate TPC -> pixelated TPC
- l 11522 pion-muon separation is not very likely !
- l 11533 branch crossing -> bunch crossing
- l 11605 ZH->nunugg -> ZH->nunu gamma gamma ?
- l 11619 Podio data -> EDM4hep data (using extension mechanism ?)
- l11621-11642 13.3.4 Muon reconstruction: you state that the energy of the muon is measured in the muon detector yet muons are typically only identified by distinct patterns in the muon system and the energy/ momentum is measured in the tracker - is this different here ?
- l11806 ff (13.5.2 fast calorimeter simulation) the models and papers you cite here all all rather old and treat the calorimeter showers images in a 3d fixed grid whereas since some time now point cloud based diffusion models have been shown to provide better performance in particular in highly granular calorimeters (see e.g: JINST 18 (2023) 11, P11025 e-Print: 2305.04847) and many others

IDRC Comments on Performance

CD: Detailed comments are based on the CEPC_Ref_TDR.v0.6.1 version

L 13268: mechanics ⇒ geometry

L 13271: remove “In this chapter,”

L 13275: “.... are not selected to demonstrate….performance” ⇒ “...are selected for their complex and complementary final states, thereby demonstrating the reference detector capability to fulfill the CEPC physics program.”

L 13282 (or elsewhere in the introduction) would it be useful to have a footnote describing the detector reference system “The reference cartesian system is chosen to be aligned with the z-axis along the incoming e- beam and the Y axis perpendicular to the accelerator plane. Forward(backward) direction indicate particles at polar angles theta close to 0 (180 deg.).” - or something equivalent.

Caption Figure 15.2 insert p and p_T notations: “ … momentum p or (b) transverse momentum p_T versus….

L 13340 “.... number of hits. “ and remove the rest, since muons are treated below

L 13341 distinguished “distinguished from hadrons”

L 13343 remove “In contrast,”

L 13351 “.....time-of-flight variables, described in section 15.1.4, can offer….”

And remove the phrase “These variables…..” in L 13352

L 13372 Being an ⇒ Beyond this

L 13406 can be seen ⇒ is described

IDRC Comments on Performance

L 13409 is shown ⇒ is presented

Figure 15.6 (not critical:) the y-axis cover 6 orders of magnitude, so the signal efficiency is inevitably a straight line; can this be optimized? (maybe 4 panels instead of two, to separate electrons from kaons)

Figures 15.12 (optional) left and middle panel, the y-axis max =0.06 ? if the intention was to have the same for all plots, then adjust max to 0.7 for the left plot

L 13549:... CEPC aims at constraining ….

L 13563 have quotes around “confusion matrix” (serves as a definition)

L 13564 remove “highlightling….predictions” (unclear here)

L 13572 …. reduces the performance, which reflects the impact of the calorimeter…..

Figure 15.15 : is it useful to add here some remark about the statistical uncertainties? How many events are used to establish those numbers. Maybe a phrase saying the typical uncertainty of the matrix elements is in the range from 1 to 20%? Also a question, the numbers above the diagonal seem systematically larger (at least for then light quarks), is there a simple explanation to that?

L 13598 “..... computed as the following four momentum difference: “

Table 15.2 / Section 15.1.10 This is not a request, but it would be interesting to know if the initial requirements are fulfilled by the studies presented in this table. In several places this is claimed, and a number of potential improvements are mentioned as well.

Table 15.7: maybe insert a vertical bar befor (WW)sl column to indicat the this is background. Also, in the caption “.....processes (ZZ)sl. Other…..”

L 13757 remove the phrase “All background….” (since it is said at the end of the paragraph.

L 13782 the verb does not work for a limit, suggest “An upper limit of 0.2% at 95% confidence level is found for the H-> ss channel.”

L13807 I believe this is not “final”, since there is also the BDT playing a role of signal separation after (through fits), so maybe “The cut-based selection efficiency and the expected yields are ….”

Fig. 15.21 (c) it fluctuates a lot, can it be rebinned?

L13285 : The phrase “ As expected …..” is not clear, maybe reformulate “Versus the analysis presented in the CDR, the performance obtained by using the full simulation is only slightly improved

IDRC Comments on Performance

L 13409 is shown ⇒ is presented

Figure 15.6 (not critical:) the y-axis cover 6 orders of magnitude, so the signal efficiency is inevitably a straight line; can this be optimized? (maybe 4 panels instead of two, to separate electrons from kaons)

Figures 15.12 (optional) left and middle panel, the y-axis max =0.06 ? if the intention was to have the same for all plots, then adjust max to 0.7 for the left plot

L 13549:... CEPC aims at constraining ….

L 13563 have quotes around “confusion matrix” (serves as a definition)

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Fig. 15.21 (c) it fluctuates a lot, can it be rebinned?

L13285 : The phrase “ As expected …..” is not clear, maybe reformulate “Versus the analysis presented in the CDR, the performance obtained by using the full simulation is only slightly improved, as expected for an homogeneous calorimeter. “

IDRC Comments on Performance

Fig. 15.24 For the last phrase, “visibility/invisible” does not work; maybe “In order to visualise the discrimination power of the proposed method, the branching fraction BR(H->invisible) is set to unity.” Also: maybe change the legend signal by “H⇒invisible” (otherwise the plots are not identifiable for this channel)

L13592: a space is missing after “.....GeV”

L 13978 kinematics variables ⇒ kinematic variables

L 13999 “....LSP, difficult to explore by ATLAS and CMS at LHC.

L 14010 the phrase “The sign…” is redundant with the phrase in Line 14006?

L 14027 “ are from “ ⇒ “originate from”

L 14037 “The asymmetry estimated with this method AFB^obs corresponds to a restricted phase space, mainly due to the z mass window cut, and has to be corrected for this effect. A multiplicative phase space correction factor is calculated using MC events, as the ratio of the obtained AFB with no event selection, versus the value obtained by applying the event selection. This correction factor vdeviates from unity by around 9.10^-6, which is considered as a systematic uncertainty

L 14081 “...a total of 11 categories….” ⇒ …. The 11 categories …”

L 14148 the leading photon is not defined, I suggest: “The highest energy photon is required to have an energy above 0.5 GeV and is considered as the leading photon.”

Fig 15.31: the axis titles and labels are too smallL

L 14358 there is a spurious space after 1 °C ⇒1°C

L 14434: I am not sure complaining about time is a good strateg, and also it is not very helpful here. I suggest to replace by a phrase saying that the detector optimization will continue, this is more factual, since there is some time left until the detector design has to be final: "The period from the present TDR and the final production design will be used for further studies and optimizations. The following area will be considered: “

(done)

HL: Following comments etc are based on the CEPC_Ref_TDR.v0.6.1 version as

1) Page 571, L13549, “as CEPC offers a direct constraint to the Yukawa couplings of the first- generation quarks”. Since there is no discussion on JOI potential of distinguishing from u/d/s light quark flavors, it’s strange to see the above statement, better remove it;

2) Page 582, L13782, need to explain how to measure the H→ss Branch Ratio, which is contradictive to the statement of JOI “categories besides *b* and *c* quarks are merged into the light-quark category” in Rb measurement at Z-pole (Page 596, L14081);

3) Page 574, Fig15.17, the dashed versus solid lines in the plots are barely can be distinguished, either using color description in caption or making the all the data points/square smaller

Slides from previous meeting

Points to consider:

- Authorship at beginning of document
- List of editors?
- Abstract? (preamble can be adapted to become this)
- Check consistency of key chapters:
  - Executive Summary
  - Introduction chapter
  - Concept chapter
  - Future Plans chapter
- Reference Detector should be always capitalized (as a name) … Use macro: \refDet
- Capitalization of titles needs to consistent
  - Capitalize the first letter and keep the others small unless they are names (this minimizes the changes)

Format points:

- Check file with rules provided before
  - Sent by Zhaoru again recently
- Capitalization of titles consistent
  - Capitalize the first letter and keep the others small unless they are names
- Reference Detector should be always capitalized (as a name) … Use macro: \refDet
- Use definitions provided in **cepcphysics.sty**
  - Do not created alternative definitions without checking this file
- Number formats (e.g use 3×10^4 instead of 3E4)
- Check rules about units
- Check references carefully — many found to be referring to the wrong papers or not being reasonable to the topic

Reduce figures size

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- Will fill in input here, and **keep it updated** as we move along

- We will try to do the same!

- Provide feedback for improvements