Second CEPC IARC EDR Review Report

CEPC IARC EDR Review Committee

19 September 2025

The CEPC Study Group, hosted by the Institute of High Energy Physics (IHEP), has been working on the design and development of a forefront e^+e^- collider as a Higgs factory that can extend to energies corresponding to the production of Z, WW and top-quark pairs, with the upgrade potential to a ∼100 TeV pp collider. The CEPC represents a grand plan proposed, studied, and to be constructed by Chinese scientists in close collaboration with international partners. The CEPC Accelerator Technical Design Report was released in December 2023, which documents the design, the outcomes of the R&D of key technologies, the technical systems, and the cost estimate of the CEPC e^+e^- collider. Going beyond the accelerator TDR and preparing the CEPC for the construction that may begin in 2027-8, the CEPC Study Group has started the Engineering Design Study for which the outcome will be documented in a formal report (EDR). The CEPC Study Group plans to submit a proposal to the Chinese government requesting the inclusion of the CEPC in the 15th Five Year Plan. The International Accelerator Review Committee (IARC), chaired by Dr. Maria Enrica Biagini (INFN, Frascati) is asked to conduct the review on the development of the CEPC accelerator technical systems within the context of the EDR study. The Committee is specifically asked to review and comment on the following aspects:

1. Have the CEPC accelerator activities been carried out according to the EDR plan?
2. Has the CEPC accelerator team implemented or been addressing the recommendations and suggestions given by the IARC and the IAC in 2024?
3. Are the studies and replies to the concerns of the IARC's and the IAC's concerns satisfactory?
4. Is the overall EDR progress on track since the 2024 review?
5. Are there weak points in the CEPC accelerator EDR program? If so how can they be remedied?
6. Any other issues you notice or any improvements you may suggest.

It is requested that a Committee report responding to these charges be forwarded to the CEPC Steering Committee Chair, Professor Yifang Wang by October 20, 2025.

1 Executive Summary

The second CEPC IARC EDR Review meeting was held in-person (with a few members joining on Zoom) at IHEP over the period of September 16-19, 2025.

The committee was invited to evaluate the advancement made since last year's review (September 2024) of the Engineering Design Study towards the construction of CEPC. A total of 26 talks were presented on the most challenging topics.

The committee wishes to congratulate the CEPC accelerator team for the excellent progress toward completion of the EDR phase.

The committee appreciated the quality of most of the presentations and was impressed by the achievements shown. The committee was pleased to see that many of the key systems, such as, for example, the high-efficiency klystron R&D, are progressing at full speed and with successful results.

An important change since the previous meeting of the committee is the choice of the site, which represents a major milestone for the project. Many work packages can now become more concrete.

2 Response to the Charge Questions

2.1 Have the CEPC accelerator activities been carried out according to the EDR plan? Is the overall EDR progress on track since the 2024 review?

The committee was pleased to see that the activities in the several work packages included in the EDR plan are being carried out proficiently, although with differing speed and success.

2.2 Has the CEPC accelerator team implemented or been addressing the recommendations and suggestions given by the IARC and the IAC in 2024?

The IARC prefers to reserve comments on the IAC's concerns to the IAC itself.

The committee acknowledges that most, but not all, of the recommendations and suggestions given in the last IARC meeting have been addressed. It was particularly appreciated that some of the talks addressed the IARC recommendations. In sections A.1 to A.26, detailed comments and suggestions are given for each talk.

2.3 Are the studies and replies to the concerns of the IARC's and the IAC's concerns satisfactory?

The committee was impressed by the amount of work carried out, and that the most important systems are being dealt with competently.

2.4 Are there any weak points in the CEPC accelerator EDR program? If so how can they be remedied?

The committee was unable to detect any really weak points in the EDR program, but it is noted that work on some of the work packages, for example the MDI and alignment, seem to proceed at a slower speed.

2.5 Key Recommendations

The Committee has issued comments and recommendations for the different topics and presentations, which are given in Section A. The most significant of these recommendations are shown below:

1. (**A.3.2.2**) Pursue a highly reliable and sustainable CEPC cryogenics system enabling to realize full helium resource recovery and conservation in any major failures in superconducting magnets, RF system operations associated by fundamental infrastructure;
2. (**A.4.2.2**) Define, build and measure the surface geodetic network; prepare the corresponding geodetic reference frames and the related transformation systems to be used for the civil engineering tender documents, survey layouts and CAD systems;
3. (**A.4.2.4**) Develop and qualify an automated measurement system and its specific alignment targets to fulfill the alignment requirements in the arcs;
4. (**A.5.2**) Progress and optimize the MDI region design, after deciding on the compensation scheme, and start prototyping work, especially for the final focus quadrupoles;
5. (**A.13.2.2**) For conventional facilities, analyze dynamic changes on various timescales to ensure that the necessary stability and environmental condition can be maintained during operation and periods of shutdowns and access;
6. (**A.25.2.2**) As civil engineering work now concentrates on a specific site, exploit the new opportunities to make rapid progress on the many systems that are closely connected to civil engineering and need site-specific guidelines and parameters.

A Reports on the presentations to the Committee

A.1 CEPC general status and news (Xinchou Lou)

A.1.1 Comments

The committee was impressed by the range and extent of progress detailed, mostly in the specification and details of the detector and progress towards its TDR, which is therefore outside the terms of reference of this committee. The progress on the proposal to CAS and on the preparations of the preferred site choice was appreciated by the committee. The committee noted that the current baseline for civil engineering at this site has now changed to accommodate geological factors, resulting in a tunnel depth of 300 m, which has cost implications.

A.1.2 Recommendations

No recommendations are appropriate for this summary report.

A.2 CEPC Accelerator EDR Status and beyond (Jie Gao)

A.2.1 Comments

The committee appreciated this comprehensive overview of the status of the Accelerator EDR. In particular, it was grateful to the project management for the organisation and successful conclusion of the mini-reviews for critical aspects of the design that it had recommended at its previous meeting. These are invaluable for the committee's understanding of critical aspects and the committee records its gratitude to the colleagues who carried out the mini-reviews for their excellent work. The committee noted progress in many aspects of the project, in particular the further specification of the civil engineering of the preferred site.

A.2.2 Recommendations

No recommendations are appropriate for this summary report.

A.3 Summary of cryogenic system mini-review (Rui Ge, Mei Li)

A.3.1 Comments

The committee congratulates for the significant progress in the CEPC general cryogenics system design and calculation, including overall design optimization and consideration on actions required for abnormal conditions in individual systems. The committee acknowledges that suggestions and recommendations from the cryogenics system mini-review, held on May 13th, 2025, have been responded to well.

The committee recognises that the main refrigerator system design with the general layout and calculations to confirm overall thermal balance, as well as the safety margin, have sufficiently matured in this stage towards the EDR.

As an important advice, helium-resource conservation is expected to be a significantly critical issue on a global scale in the future. Full recovery of helium resource in any case of emergency modes shall be carefully prepared.

The committee understands that the cryomodule (CM) design and R&D for the collider (650 MHz) and the booster (1.3 GHz) are in progress for prototyping, including performance demonstration. It will be very important to learn from the experience of other projects.

A.3.2 Recommendations

1. Complete the overall cryogenics system design, including smaller system designs at IP1 and IP3 for the SCQ and the detector solenoids;
2. Pursue highly reliable and sustainable CEPC cryogenics system, enabling to realize full helium resource recovery and conservation in superconducting magnet and RF system operation associated by fundamental infrastructure;
3. Advance the CM design, in particular for two remaining issues: proper thermal balance with proper radiation shield design, and 2-phase He supply pipe design;

4. Establish the safety design for protecting the superconducting magnet and SRF systems, in case of quench and other failures.

A.4 Summary of alignment mini-review (Xiaolong Wang)

A.4.1 Comments

A mini-review on the accelerator alignment was held in April 2025 to review the work performed, focusing on 4 activities: the geodetic studies, the fiducialization of specific magnets, the MDI alignment, and the development of a visual instrument to automate measurement in the tunnel. Key results have been obtained, with no showstoppers identified.

The committee is pleased to note that significant progress has been made in the alignment work for the CEPC since the last IARC meeting. The alignment methodology has been clearly defined.

The committee congratulates the collaboration put in place with universities for geodetic studies and measurement, with as a first priority the definition of a high precision quasi-geoid model and the establishment of a 3 level control network. Given the new location of the 300-m underground collider, these geodetic developments are even more important.

Significant progress has been achieved on key magnet components. Concerning the booster combined dipole and sextupole, answers to IARC 2024 recommendations were provided on the impact of the sextupole alignment, concluding, after simulations, that the beam dynamics requirements can be met. Deformation tests on supports of a storage ring dipole have been performed. Even if the deformations exceed the alignment accuracy requirement, this was not assessed as an issue.

A strategy to perform the alignment of MDI components (beam pipe, LumicaCal, BPM and accelerator superconducting magnets) was introduced, from the fiducialization and initial assembly to the installation.

A lot of work has been achieved on the development of a visual instrument to automate the measurement in the tunnel. However, further efforts are required to enhance measurement accuracy.

A.4.2 Recommendations

1. Engage with more specialized institutions and companies to prepare the geoid model, and to conduct practical measurements;

2. Define, materialize and measure the surface geodetic network; prepare the corresponding geodetic reference frames and the related transformations systems to be used for the civil engineering tender documents;

3. Finalize the alignment strategy in the MDI area and start qualifying the proposed specific solutions. Evaluate the radiation hardness of the multiline laser gap measurement system (as a back-up solution, capacitive based sensors could be considered);

4. Finalize the development and qualification of an automated measurement system to fulfill the alignment requirements in the arcs;

5. Study the impact of tunnel temperature on the alignment of components between different stages (installation, operation, maintenance), and propose mitigation solutions;

6. Express alignment errors according to international standards;

A.5 Summary of MDI mini-review (Sha Bai, Haoyu Shi)

A.5.1 Comments

The committee noted the main changes to the design compared to last year: the baseline operating temperature of the cryostat is now 2K (from 4.3K); and only one BPM close to the IP is retained. The committee notes the new estimations presented regarding the thermal analysis that indicate that there is no need for HOM damping.

Compared to other systems presented during this meeting, the committee felt that progress in the design and hardware prototyping of the MDI region is insufficient. The committee also feels uncomfortable about the length of the cryostat and the very high field gradient of Q1a. An optimization of the IR region might be considered. This should happen after a decision on which compensation scheme (local or non-local) will be used is taken, followed by optimization of field gradients, L* value and distance between Q1 and Q2.

A gradient of 140 T/m would be difficult to achieve with adequate margins for stable operation if NbTi technology is used and if the final-focus aperture is 40 mm. The use of epoxy resin and plastics as the main supporting element of a final-focus magnet in a high radiation environment looks risky.

The necessity of the BPM inside the cryostat should be evaluated with the collaboration of the optics group. Also, the necessity of the ”Timing BPM” should be considered, because such feedthroughs near IP could cause a larger cost, and, likely, it will not be used much except during the initial commissioning phase.

Studies on power losses due to HOMs and the resistive wall (RW) were presented, with additional input from private discussions with colleagues responsible for the impedance budget. Results show that power losses in the Interaction Region are similar to those of FCC-ee. HOMs contribute more strongly than the RW, though so far they do not appear to be of major concern. However, two important trapped modes (one transverse and one longitudinal) were identified in simulations, and further investigation is planned to determine whether damping is required.

Manufacturing errors or misalignments of the beam pipe could have a sizeable impact on SR power distribution. A cooling test with a mock-up beam pipe should be conducted to verify safety margins of the current cooling strategy.

There was a dedicated mini-review on the subject of MDI in the summer. The committee of the mini-review made a series of recommendations (around 30) which, however, could not all be implemented over the intervening period, and which were not discussed during the presentation but only listed as back-up material.

A.5.2 Recommendations

1. The choice of technology (NbTi), method (direct winding CCT), aperture (40 mm) and field gradient (140 T/m) does not give sufficient margin for reliable operation. One or more of the above choices should be revisited;
2. Proceed with the construction of a final-focus quadrupole prototype;
3. Verify with the optics group that a single BPM in this very sensitive region would be sufficient for reliable optics tuning;
4. Investigate the possibility of separating Q1 and Q2 quadrupoles by a sufficient distance, so as to split the cryostat in two individual cryostats, reducing the cantilevered length of the system and allowing a BPM to be installed between cryostats;
5. Further investigate whether the trapped HOMs found in simulations need to be damped;
6. A further study of SR power distribution, including the effects of beam-pipe fabrication errors and misalignments, needs to be conducted;
7. Build a mock-up IP beam pipe and validate the performance of the cooling strategy;
8. The radiation tolerance of each sensor component used in the TDR detector should be carefully assessed and compared with beam-loss simulation results to determine the safety margins of the estimated beam-background rates;
9. The committee asks that the mini-review recommendations be addressed at the next meeting of the IARC.

A.6 Summary of Booster dipole magnet+sextupole mini-review (Dou Wang)

A.6.1 Comments

Following the recommendation of the IARC committee in 2024, a mini-review on this topic was held on May 29th, chaired by Dr. Mika Masuzawa (KEK).

The mini-review committee has supported the decision of the CEPC team to adopt the combined dipole-sextupole scheme, based on careful consideration of power consumption, manufacturing feasibility, and cost efficiency. However, both the mini-review committee and the CEPC team acknowledged the importance of continued validation through simulation, prototyping, and alignment studies to ensure a successful implementation in the Booster ring.

Four presentations were given during the mini-review:

- Booster design and philosophy of combined dipole magnets;
- Design and production tolerance analysis of the CEPC Booster dipole-sextupole combined magnets;
- Alignment scheme and analysis of the CEPC Booster dipole-sextupole combined magnets;
- CEPC booster error analysis and corrections.

Many recommendations can be found in the report issued after the mini-review. This committee endorses them all. However, it should be noted that the presentation at this IARC did not address these recommendations, except for two: a change in coordinate system was made in the tracking program APES, and the installation and alignment task was reported in a dedicated talk. The other recommendations were only listed as back-up material.

A.6.2 Recommendations

1. The committee would like the mini-review recommendations to be fully addressed at the next meeting of the IARC.

A.7 Summary of vacuum chamber mini review (Guangyi Tang)

A.7.1 Comments

The committee notes that the positioning of the CEPC collider and booster is on the inside of the CEPC tunnel, contrary to common practice and the FCC-ee, for instance. The amount of radiation released on the outside of the accelerator is greater than the one released on the inside, so this geometry maximises the radiation released in the tunnel. The simplest mitigation of high radiation doses is to move the accelerator to the outside of the tunnel.

In response to a request from the previous IARC meeting, item A9, a mini-review has compared the two versions for shielding the machine components and the tunnel from the strong synchrotron radiation (SR). The first version is the one implemented in the TDR, with the SR fan hitting all along the external wall of the chamber. The second solution is a version of the FCC-ee round chamber with winglets in the plane of the orbit, to accommodate, on the external one, the SR absorbers. FLUKA calculation of the radiations doses and fluences have been shown for the cross section of the tunnel and also for a sample length of the storage rings in the arcs. Pros and cons of the two versions have been shown and discussed. Doses for electronics, fiber optics, and cables have been computed for the two versions of the vacuum system and its shielding.

A new cross-section of the chamber, still with 56 mm internal diameter (ID), has been produced. It has two ears left and right of the center line, and a horizontal width of 109.5 mm, hosting on the external side a co-extruded 10 mm ID cooling channel. The material is copper alloy. The wider horizontal width make its integration into the dipole and quadrupole magnet more difficult. In addition, the presence of localized SR absorbers every few meters call for a thicker shielding near and around the SR absorber, since they concentrate the SR that would otherwise be spread over several meters.

Detailed computations of the distribution of radiation doses, gammas and neutrons, have been realized for the TDR version, showing the effect on the cable trays placed along the vertical internal wall of the tunnel. The dose to the personnel 10 minutes after shutdown is at some locations and for the ttbar at 50 MW rather high. Normal operation conditions as well as sudden beam loss have been simulated.

The temperature rise along the dipole chamber has been computed, as well as the one for the twin opening quadrupole and the related cooling water on the shielding blocks. Lead or lead+tungsten shielding blocks have been considered. Adding tungsten increases shielding for gammas, but increases neutron production. It is apparent that the shielding blocks of the quadrupoles do not efficiently shield the coils, due to the geometry of the shielding blocks allowed by the present design. Both for the TDR version of the vacuum chamber and the new one with ears and SR absorbers, the coils in the quadrupoles are not expected to last the 18 years of expected operation, unless the shielding thickness is increased on the internal beam side.

Radiation level in the auxiliary tunnel are safe for electronics, cables and fiber optics, bringing though an additional cost. The version 2 vacuum chamber with SR absorbers is expected to be more difficult to fabricate, machine, and weld, in addition to introducing NEG coating complications due to the non-uniformity of the cross-section where the absorbers are located. Prototyping of this version will be tested soon.

Challenging implementation of the cooling water channels and the chamber supporting system are anticipated, and will be studied soon.

The idea of installing shielded walls to reduce radiation levels in the cable trays appears effective, but it is likely to make accessing the cable trays extremely difficult. Access to the cable trays will still be necessary even after construction, and countermeasures for unforeseen events such as fires will also be required. This could also impact the tunnel size, so thorough consideration is deemed necessary.

Cables using SiO_2 are highly effective due to their exceptional radiation resistance, but they are notoriously difficult to handle, prone to damage, and known to exhibit significant changes in characteristics when damaged due to humidity effects. Perhaps other types of cables, such as those made from PEEK material, should be considered.

A.7.2 Recommendations

1. Consider moving the collider and booster to the external side of the tunnel;
2. Consider the accessibility to the cable rack section after installing shielded walls;
3. Consider alternative types of cables than SiO_2, such as those made from PEEK material;
4. Carefully test the feasibility of the version 2 vacuum chamber with integrated SR absorbers, in particular the welding technique. Inspect the internal side of the chamber of the absorber welds: the interface should be as smooth as possible, in order to avoid any adhesion problem or peel-off of the NEG-coating;
5. Not mentioned in the talk, for version 2 of the vacuum chamber, check the feasibility of the deposition of the insulating layer and thin metal tracks for in-situ bake out and NEG-activation, due to the non-circular shape of the chamber and the presence of the SR absorber blocks;
6. Study in detail how to efficiently cool the shielding blocks, and how to arrange the areas between magnets populated by many cooling pipes and electrical connections. Accessibility of the fittings is important, as these connections will need to allow safe work for the technical staff any time a vacuum intervention such as a bake-out/NEG activation is needed. Take into account the presence of the supports for the magnets, chambers, and spool pieces with RF contact fingers and bellows, plus possible pumping ports.

A.8 CEPC layout and mechanical system progress (Haijing Wang)

A.8.1 Comments

The committee is pleased to see that the accelerator design has largely been completed, with extensive work carried out in areas such as determining the machine's scale, establishing the coordinate system, prototyping various types of equipment, conducting quantity surveys, and developing the overall accelerator layout. A digital twin system, under design, will significantly improve efficiency and reduce errors during the integration process. A naming convention for equipment and structures has been defined, and a 60-meter tunnel model incorporating typical curved sections and an RF model have been designed. An automatic support adjustment mechanism has been developed, and the prototype design of the MDI has been completed, including static mechanical and vibration analyses, leading to subsequent optimization. The committee looks forward to the smooth progress of the next phase and the achievement of the expected outcomes.

A.8.2 Recommendations

1. Prepare and integrate geodetic reference frames and transformations between reference systems to the survey layout and CAD systems;
2. Optimize the MDI mechanics and supports with all the involved stakeholders, in a collaborative approach, to finalize the designs and Finite Element Analysis, and launch the fabrication of a dedicated mock-up;
3. Confirm the (vertical and lateral) stability requirements in the MDI and tunnel, and perform the Experimental Modal Analysis and transfer functions analyses on the designed solutions.

A.9 Installation procedures of the Booster magnets beam pipe (Xiaolong Wang)

A.9.1 Comments

The committee is pleased to see that this report has clarified the alignment and installation process for booster magnets beam pipe and MDI, proposing specific alignment solutions for different types of vacuum tubes. While certain challenges remain in practical operations such as transportation, hoisting, and fixation, the technical methods can meet the requirements for engineering installation.

Two different schemes for the magnetic lattice of the booster have been considered, a long one and a short one. The short one is preferred and adopted, although it introduces a cost increase due to additional flanges being necessary for the vacuum system.

In response to a request by the previous IARC meeting, splitting open one magnet and then re-assembling it has been carried out, resulting in negligible change in its magnetic field.

The procedure of fiducialization of the vacuum chamber inside the magnet has been checked for accuracy and has met the requirements.

The supporting system for the vacuum chambers and the magnets (hanging from the tunnel roof) has been described.

The installation procedure in the tunnel has been detailed, together with an estimation of the needed personnel and the time to complete the job. The installation of all components will make use of the 12 horizontal shaft spaced around the ring, all 12 in parallel.

The use of specific lifting devices to fix all components on the ceiling of the tunnel is envisaged.

A rather big ventilation duct (1.4 m2 rectangular cross-section) runs at the top of the tunnel: it will limit the space to install the screws and bolts on the tunnel ceiling, for the booster magnet supports.

The alignment procedure was only briefly discussed; it will need more attention in the next review.

For the MDI area, a very preliminary scheme for the installation and alignment of the detector in the detector hall has been presented. A preliminary scheme for the installation of the vacuum chamber and magnets of the MDI has been outlined. It will make use of specific transportation vehicles.

The tunnel control network (the third-level control network) is installed on the tunnel floor, walls, and ceiling. Once on-site installation begins, the mounting of various supports and cable trays will occupy significant space within the tunnel. As can be seen from the presented renderings, subsequent alignment measurements relying on the control network are likely to encounter issues such as limited space and obstructed lines of sight.

A.9.2 Recommendations

1. For the MDI area, it is recommended to clarify the manpower and equipment requirements for the installation process, as well as the allocation of personnel and equipment for each working group, to provide a basis for the engineering budget;

2. It is recommended to clearly define the spatial arrangement of control network points during the initial design phase and use 3D simulation to verify their visibility.

A.10 Solenoid compensation scheme and alternative schemes (Yiwei Wang)

A.10.1 Comments

The committee acknowledges the vertical emittance growth at Z shown of 3.9 pm at a 3 T detector magnetic field, which agrees with the extrapolation of the 2 T result. This emittance is higher than specification and affects the luminosity performance, therefore needs mitigation. The mitigation proposed is to use the non-local compensation scheme, which reduces the vertical emittance growth by a factor larger than 10, but leads to further issues. The committee was told that reducing the detector solenoid field (which is the second way to mitigate the effect) would seriously harm physics due to the TPC backgrounds becoming larger. The local compensation scheme is considered at present to be a reliable method for the Higgs running, so it could be the baseline design for the IR at the Higgs. After the foreseen 10 years of Higgs running, a decision can possibly be made to change to the non-local compensation scheme (which involves hardware changes) or reduce the detector solenoid field to 2 T. Alternatively, a decision to adopt the non-local compensation scheme could be take now, if the problems associated with it (for instance, regarding polarization) can be mitigated.

A conical (i.e. with solenoid radius increasing with the distance from the IP) anti-solenoid would help to reduce horizontal field B_x at the ends, thus reducing vertical emittance. Solenoid with elliptical cross-section might help reduce B_x at the edges. Thus, conical and with elliptical cross-section anti-solenoid might help with keeping the nominal vertical emittance in the local compensation scheme.

A.10.2 Recommendations

1. Decide which compensation scheme will be used for the Higgs running (that for the CEPC comes first);

2. Investigate the possibility of reducing the detector solenoid field from 3 T to 2 T only for the Z running and its effect on physics performance and especially on the TPC;

3. Consider alternative geometries for the anti-solenoid.

A.11 Simulation of injection at commissioning and orbit correction (Daheng Ji)

A.11.1 Comments

Simulation of the first injection and orbit correction at commissioning of the booster was presented. The committee notices small emittance $\varepsilon_x = 1.26$ nm at 120 GeV and large damping time 3 s, acceleration time of

1 s. The studied errors of elements shifts, field values, and BPM readings are reasonable. The methods used for correction of orbits, optics, coupling etc. give satisfactory results. Horizontal emittance growth is within 1-2%, which is acceptable. Vertical emittance growth is controlled by skew quadrupoles. However, the influence of eddy currents and generated fields was not studied. From experience, the influence on beam dynamics by magnetic errors is smaller than the de-synchronization of power supplies of some magnets (due to the different field growth times). Considering a damping time of 3s, which is larger than acceleration time of 1s, misalignment errors might be less important than de-synchronization. Also, it is difficult to manufacture all the magnets from the same iron with identical magnetic properties, which will create different fields in similar magnets.

A.11.2 Recommendations

1. Estimate influence of the eddy currents in vacuum-chamber walls on the beam dynamics;
2. Simulate the realistic beam acceleration in the booster, find the acceptable values for de-synchronization of the magnetic fields. Evaluate the influence of fields different from the design values. Compare effects of de-synchronization during the acceleration in the booster and of misalignment;
3. Estimate the effect of the different magnetic properties of the iron used for magnets on beam properties.

A.12 Studies of the tolerance to machine errors at all energies (Yiwei Wang, Bin Wang)

A.12.1 Comments

Simulations of tolerance to the machine errors, their effects on emittances and energy spread have been performed at different energies (from Z to ttbar). Misalignment errors of final-focus superconducting quadrupoles from 30 to 200 μm and other elements with 100 μm/μrad were studied. Standard correction algorithms were used. From 50 random seeds, all of them converged with 30 μm and only 11 with 200 μm. Beta-beating is below 1%. Dynamic aperture decreases insignificantly (about 20%). It is shown that optics, dispersion and coupling correction is more efficient in restoring emittance and energy spread than orbit correction. It is possible to obtain design value of vertical emittance at all energies. Conclusion is made that alignment errors of 100 μm/μrad are acceptable for all quadrupoles of the ring including the final-focus.

All the simulations were performed for a lattice without solenoids. This clearly can be useful for the very first stage of commissioning, however for a meaningful study the solenoids need to be included in the lattice. Also, the two solenoid compensations schemes need to be compared for machine error tolerance. This will help to make a choice between local and non-local compensation schemes.

After the solenoids are turned on, the final-focus quadrupoles might move due to the magnetic forces. This will affect coupling, beta beating, dispersion, vertical and horizontal emittances. The tolerable shifts and rotations of the final-focus quadrupoles need to be determined. A method to compensate the shifts of the FF quadrupoles need to be found. The HEPS experience will indeed be very valuable.

A.12.2 Recommendations

1. Study error tolerances with local and non-local solenoid compensation schemes;
2. Estimate vertical emittance growth and orbit distortion from seismic vibrations of magnetic elements. The ring is long, the number of magnets is large. In the light sources a special fast orbit feedback is used. Study how this will affect the luminosity.

A.13 Conventional facility and control methods for the tunnel temperature (Jinshu Huang)

A.13.1 Comments

The progress in the areas of electrical distribution, cooling and ventilation is very reassuring. These systems are strongly linked to the civil engineering, so a thorough and complete understanding of them is urgent, even if the technologies themselves are industrially available at scale.

The overall parameters considered, loads and working points, are available, but some of them were questioned and discussed by the committee. A ventilation load of 45 MW seems very high. The assumption of 70% humidity in the tunnel appears potentially hazardous for high-voltage equipments. The systems need to be able to deal with future upgrades, with significantly higher overall power consumption. Safety margins need to be considered.

The tunnel temperature itself, at -300 m, and its variation were not understood by the committee. It was not clear if the beam-dumps are considered.

One important comment is that the temperature and humidity stability in the various zones were not discussed, even though specifications were said to exist. With very changeable loads and many different operation and non-operational modes, as well as failure scenarios, dynamic stability analyses are essential.

A.13.2 Recommendations

1. The specifications should be written up and reviewed, addressing, among others, the points mentioned above;
2. Analyse dynamic changes on various timescales (load changes, weather, seasons, operation/non operation, etc) to make sure the necessary stability and environmental conditions can be maintained during operation and periods of shutdowns and access;
3. Systematically address the requirements and specification for UPS and back-up generators, considering failure modes and recovery times.

A.14 CEPC booster magnet production line (Wen Kang)

A.14.1 Comments

The committee congratulates the team on the great progress in the construction of the booster dipole-sextupole combined magnet production line. The number of the combined magnets is 15000 and the production term is 5 years. To complete the magnet production in the scheduled time, the IHEP magnet group is developing the fully automated production line with computer and robots aid in the processes of assembly, welding, field measurement and its analysis.

The design of the production line was completed and the process design was reviewed in March 2025. The magnet group will construct four production lines; the first line will be completed at the end of 2025. The group is now assembling the prototype magnet by hand, and this construction is scheduled to be completed by September 2025. This experience will be transferred into the real production of the magnets. All production lines are scheduled to be completed by the end of 2026. The group can start the magnet production at the pace of 4 magnets per day from 2027. This matches the CEPC EDR construction milestones.

A.14.2 Recommendations

1. In the prototype magnet construction, try to measure the sextupole magnetic center axis with the single stretched wire measurement, and compare it with the mechanical fiducial measurement and the rotating coil magnetic field measurement;
2. With the prototype magnet, check the welding effect on the magnetic-field profile of the magnet;
3. In the production data file for each magnet, include the material data, such as the magnetic properties of the iron yoke;
4. From the prototype magnet-production experience, make an acceptance magnet production table.

A.15 CEPC vacuum chamber production line (Yongsheng Ma)

A.15.1 Comments

The committee commends the amount of work carried out since the last IARC meeting and most of all its quality.

Many new results have been presented, concerning the fabrication of the vacuum chambers, NEG-coating deposition facility, cold-sprayed resistive heating elements, and more. The situation seems to be under control, although there are still a number of items that need to be prototyped and analysed, namely the fabrication technology and welding procedure for the SR absorbers.

In particular, the complex facility for depositing NEG-coating in a horizontal position needs particular attention, although the present design seems feasible and capable of reaching the desired result.

The response to two recommendations made at the previous IARC meeting have been answered.

A.15.2 Recommendations

- No particular recommendation is made.

A.16 Control system (Dapeng Jin)

A.16.1 Comments

The committee congratulates the team on the significant progress on the overall CEPC control system design and development, with the collaboration of BEPCII-upgrade and the HEPS teams. The number of devices to be controlled and the data volume were specified, indicating that the project is progressing smoothly.

The radiation tolerance of optical fibers is being studied based on actual irradiation data, and the required amount of radiation shielding and associated costs are also under consideration. The timing system including the RF and revolution frequencies, fast beam abort timing was shown. The timing jitter of the evaluated system has shown satisfactory results.

The low level software developments such as device support or drive support in EPICS are assumed to be done by the hardware group, evaluated by the control group. It is not clear whether this method is practicable for all hardware groups. The graphical user interface will be developed by the control group.

If the microwave reference clock and the timing clock are distributed through separate fibers, the clock phase may slip over long distances, which may affect certain beam instrumentation. While the distribution of both clocks over a single fiber is planned, the clock stability, especially for the microwave reference, must be acceptable.

The development of the operator interface for the beam-dynamics online operational programs should be shared among the beam-dynamics group, the operations group, and the control group. At present, the control group is expected to take responsibility.

The human resources employed in the development of the control system still seem to the committee not adequate for such a big project.

A.16.2 Recommendations

1. Increase the number of staff in the Control Group to facilitate development and hardware group support;
2. Validate the clock stability for the reference line;
3. Establish common understanding on how to share the task involved in the development of the operation interfaces.

A.17 Collimators in the collider rings (Xiaohao Cui)

A.17.1 Comments

The committee is pleased to see recent efforts on beam-loss simulations for the four major failure scenarios. It would be even more informative to show the turn-by-turn beam-loss distribution, in order to identify the collimator that first sees the loss and should be capable of issuing the earliest beam-dump request with its equipped loss monitor. The collimator apertures are presented in millimetres, the committee would also like to see them expressed in units of the beam-size, to identify which collimator is effectively the narrowest.

The committee notes that in case of a final-focus superconducting magnet failure, the beams are lost in turn two.

The two collimators installed at locations with a large vertical beta function contribute significantly to ring impedance. It is important that there is a close collaboration between the team designing he collimators and the one working on minimising the impedance budget. In particular, the possibility of opening the collimators to gain more margin in the impedance budget should be considered, while ensuring that detector background levels remain acceptable.

In addition, the collimator hierarchy should be carefully optimized; for example, the primary (narrowest) collimator should be placed far from the IP to prevent secondary showers from a large beam loss from reaching the IP, while a secondary collimator just before IP is still necessary.

A.17.2 Recommendations

1. Investigate further the superconducting magnet failure mode, considering where particles get lost, whether there will be any permanent damage and construct a mitigation strategy;

2. Consider increasing the number of fast beam-abort systems (beam dumps) to enable quicker beam abort;
3. The collimator aperture optimization should be updated, taking impedance budget into account, not only minimizing beam loss rates at IP.

A.18 DeepC electronic documentation system (Song Jin, Lei Yei)

A.18.1 Comments

The committee congratulates the significant progress in development of DeepC system with the collaboration of HDEC. It is already evaluated by a part of CEPC project.

The data accumulating after accelerator commissioning is currently unrelated to the DeepC system. Investigating correlations after accelerator operation using powerful AI systems holds significant meaning for improving accelerator performance. Therefore, the committee recommends establishing methods to effectively utilize accelerator data.

A.18.2 Recommendations

1. Consider the data integration system with the accelerator operation archived data.

A.19 CEPC high efficiency klystron development (Zusheng Zhou)

A.19.1 Comments

The committee congratulates the steady progress in developing high-efficiency klystrons for both pulsed and continuous-wave microwave generation. Higher efficiency and higher power devices will enable more energy-efficient and environmentally friendly accelerator operation.

At 650 MHz, efficiency has improved from 60% to 78%, with an energy recovery design aiming at 85%. An 80-MW C-band klystron is under development to halve the number of required units and reduce costs. For the S-band, an 80-MW klystron with 55% efficiency is being pursued, while an L-band long-pulse version is in the design stage. Design, fabrication, and testing are progressing in parallel, with high-power trials scheduled for 2025–2026.

A dual-port output has been adopted for all types, reducing power load on windows and relaxing beam-symmetry constraints.

Careful development will be required to ensure long-term stable operation of these high-power devices. In particular, the resonant-ring test bench is extremely valuable for the accelerated development of microwave windows and other critical components.

Operational efficiency should also be assessed in relation to the expected lifetime of microwave components, and the balance between performance and durability re-evaluated. The achievement and adoption of the 80-MW C-band klystron could bring significant benefits in cost and reliability, but its lifetime may strongly influence maintenance requirements. A careful evaluation of component lifetime is therefore needed. Based on the expected lifetime, a replacement scenario and appropriate test-bench arrangements can be established. Even replacement during operation may be necessary, which could affect overall efficiency.

A.19.2 Recommendations

1. Continue to encourage the development of high-efficiency and high-power klystrons, while recognizing the challenges in evaluating their long-term performance;
2. Carefully assess the lifetime of critical components, and establish replacement scenarios and test-bench arrangements accordingly;
3. Pay particular attention to the 80-MW C-band klystron: although it promises significant cost and reliability benefits, its lifetime involves certain risks. Deliberate communication with the linac group is recommended to reach an adequate selection.

A.20 CEPC collective effects (Na Wang, Yudong Liu)

A.20.1 Comments

The committee congratulates the impedance and collective effects group and commends the progress made in determining the impedance budget and in reducing the total impedance, partly thanks to the decreased number of collimators. Additionally, there may still be room for further reducing the impedance budget, since only two collimators contribute most significantly to the overall impedance. Alternative solutions could be investigated, such as the non-linear collimator used at SuperKEKB.

However, these efforts are not sufficient to guarantee machine stability without the use of mitigation tools such as a strong feedback system and a high value of the chromaticity, particularly at the Z. This raises concerns at this stage of the project, since a complex machine like CEPC is intrinsically unstable, and can only operate reliably if sufficiently strong mitigation measures are available. This issue is well known and shared with other large colliders, such as FCC-ee.

Moreover, some impedance contributions from additional devices are still missing from the model, which could increase the total impedance budget and further reduce the stability thresholds.

The committee agrees with the impedance and collective effects group on the necessity of continuously developing the impedance model with more realistic hardware designs (e.g., those for collimators), identifying possible impedance mitigations, and updating beam dynamics simulations, consistently accounting for beam–beam and collective effects. In addition, more detailed studies of electron-cloud effects are recommended.

A.20.2 Recommendations

1. Update the impedance model with more realistic hardware designs;
2. Investigate possible impedance reduction methods (e.g., the use of non-linear collimators) and beam dynamics mitigation tools;
3. Revise instability thresholds as the impedance model and machine working point evolve;
4. Perform further studies on electron cloud effects;
5. Evaluate in detail the impedance budget and instability thresholds for the Booster Accelerator.

A.21 CEPC polarization studies (Zhe Duan)

A.21.1 Comments

The committee was impressed by the progress made since the previous review and by the responsiveness of the CEPC team to the recommendations then made. The topic of polarization is a complex one since it impinges on accelerator operation through energy calibration (transverse polarization), physics performance through measurements of specific channels (longitudinal polarization) and energy calibration. The preparatory measurements at BEPC-II almost constitute a significant experimental programme. In physics, precision measurement of the weak mixing angle and CP-violation measurements at the Higgs were highlighted.

Direct injection of polarized beams solves a lot of the problems associated with natural polarization build up. It is clear that provision of significant positron polarization for physics measurements will be challenging. However, the committee was pleased to note that sufficient transverse polarization of around 10% can be generated in the existing damping ring for the purposes of energy calibration.

The provision of electron transverse polarisation to a high level is relatively routine and the committee was pleased to note that it has now been established that by modifying the beam dynamics in the booster ring, depolarizing resonances after injection can be avoided. The long-term operation of GaAs polarised guns is in principle problematic and requires R&D.

To achieve longitudinal polarization, a task much more challenging than achieving transverse polarization for energy-calibration purposes, spin rotators are needed. The design of the spin rotators in the IRs is underway and recent work has halved its length and achieved 70% polarisation. They have been added to the overall machine lattice. These are welcome developments. The spin rotators require the design of sophisticated SC solenoids which is underway. Demonstration of simultaneous high polarization and high luminosity in simulations will be carried out.

The experimental development programme at BEPC is substantial and may be challenging. Achievements to date have included a test of a polarimeter that has observed a laser-scattering signal after roughly one year of design and development. The programme foresees results from the BEPC in 2027.

The team has considered the provision of a dedicated polarization ring in addition to the damping ring but this would be insufficient for the large polarization required for physics studies and is not required for energy calibration.

Although the resonator was not discussed during the talk, the committee was reassured that this is work under study.

A.21.2 Recommendations

1. Populate a table of requirements for % polarization and polarization-measurement accuracy separately for the major physics channels of interest;

2. Continue polarization studies for the Z and WW modes;

3. Continue collaborative R&D on long-term operation of polarised electron sources with a view to minimising poisoning of the cathode.

4. Continue the design of the resonator.

A.22 Injection/extraction system (Jinhui Chen)

A.22.1 Comments

The committee commends the progress in the design and development of the injection and extraction systems.

The CEPC injection and extraction system integrates four circular accelerators linked by ten injection and extraction subsystems with fourteen transport lines. Its hardware includes various kickers — slotted-pipe, stripline, delay-line, and lumped ferrite-core types — designed for precise beam deflection and fast pulse operation. Layout and survey designs focus on on-axis swap-out injection for Higgs mode, with detailed EDR updates for kickers and septa. Lambertson septa are engineered with in-air or half-in-vacuum configurations to minimize leakage fields while accommodating beam clearance. Mechanical and magnetic designs ensure field uniformity, appropriate deflection, and manageable installation and alignment tolerances.

Overall, the EDR phase progresses towards reliable, flexible, and high-precision injection/extraction technologies for CEPC operations.

To mitigate vacuum deterioration at the collider ring injection point, caused by the septum magnet excitation, in-situ baking of the septum magnets is deemed necessary. This area is highly congested, requiring thorough countermeasures against vacuum chamber deformation caused by the baking.

Solid-state switches for pulsed power supplies would be preferable over thyratrons as the technology advances, since they enable reliable operation.

The pulse shapes of the various injection and extraction devices should be recorded to ensure clarity in beam performance evaluations. The mechanical resonant frequencies should be examined to avoid synchronization with possible beam-repetition patterns.

Although the spaces around the injection and extraction devices are especially tight and the aperture shapes differ, an adequate number of BPMs should be arranged around these devices to properly evaluate the beam-optics functions.

A.22.2 Recommendations

1. Consider countermeasures against vacuum chamber deformation caused by the in-situ baking around the septum magnets;

2. Prefer solid-state switches over thyratrons for pulsed power supplies to ensure reliable operation and sustainable maintenance;

3. Record pulse shapes of injection and extraction devices to ensure clarity in performance evaluations;

4. Examine mechanical resonant frequencies to avoid synchronization with possible beam-repetition patterns;

5. Arrange an adequate number of BPMs around injection and extraction devices, despite limited space and varying aperture shapes, to properly evaluate beam-optics functions.

A.23 CEPC linac injector (Jingyu Zhang)

A.23.1 Comments

The committee commends the significant progress in design and development since the 2024 meeting.

The CEPC linac injector team has been advancing the S-band and C-band sources, RF systems, and high-power components over the past year. A normal-temperature C-band test bench is under design, while cryogenic copper accelerating structures are being developed to achieve higher gradients. Optimizations in iris shape, pulse compressors, and hybrid power dividers improve efficiency and reduce surface fields. Phase stability and LLRF systems meet strict beam requirements, and BPM layouts have been validated through simulations. High-power tests for C-band structures are ongoing, targeting 80 MV/m gradients, with beam tests planned in 2026. Overall, the linac design meets energy, availability, and upgrade requirements while responding to previous IARC recommendations.

In the reference line of linac, phase-stabilized coaxial cables in the temperature controlled duct are proposed to reduce the cost from optical fiber-based system. Without a phase-lock system, the distributed phase might drift even with high quality cables under stable temperature conditions. It is suggested to prepare a phase-lock loop system between the reference cable stations. It may be possible to employ the reflection from the end of the same cable.

The allocation of 15 months for injector commissioning, without overlap with ring commissioning, is excellent. The experience gained during this injector commissioning, planned with reference to the HEPS injector commissioning, will be valuable. However, because of the higher energy of 30 GeV and additional positron generation, the large number of components may easily consume valuable commissioning time. A detailed task list arranged in an optimised order would therefore be needed.

During equipment commissioning before beam availability, the design specifications and measurement accuracies — especially of the microwave components, such as phase and amplitude — will provide important references for the construction. These values should be explicitly shared between the hardware and design groups.

The stability of pulsed devices such as magnets and microwave generators may affect beam performance. These should be carefully evaluated with different pulse timing patterns at factories, during acceptance tests, and on the beam-lines.

The use of 80 MW C-band klystrons, instead of the baseline 50 MW units, would be preferable for cost efficiency and higher reliability. However, microwave components such as waveguides, pulse compressors, and their supports as well as their mass-fabrication schedule will need to be modified accordingly. Sufficient preparation time will be required to accommodate these changes.

A.23.2 Recommendations

1. Consider to add a phase-lock loop system between the stations to enable enough phase stabilization to the coaxial-cable reference lines;
2. Elaborate a detailed task list for injector commissioning within the limited 15 months, in an optimised order;
3. Explicitly share the design specifications and measurement accuracies as base reference between hardware and design groups, especially microwave phase and amplitude;
4. Carefully evaluate the stability of pulsed devices (magnets, microwave generators) with different pulse timing patterns at factories, during acceptance, and on the beam-lines;
5. Prepare sufficient time and planning for introducing 80 MW C-band klystrons, including modifications to microwave components, supports, and the mass-fabrication schedule.

A.24 CEPC plasma injector (Dazhang Li)

A.24.1 Comments

The committee noted that the design for the 30 GeV plasma injector has been essentially frozen over the past year in favour of developing the new plasma test facility, so there are no particular comments or recommendations in this area. The committee noted that ideas for a more ambitious plasma injector to reach full collider energy are being pursued. International collaboration on similar projects was discussed, in particular with the DESY team working on the proposed plasma injector for PETRA-IV.

The committee was impressed by the progress in refurbishing the hall in which the test facility is being constructed and the progress in installing the beam lines. A tour of the facility took place and once more the committee was impressed. The committee noted the small delay in installation but appreciated the great progress that has been made. It would like to emphasise that aspects of the new facility will be unique in the world, in particular the positron acceleration capability. The proposed experimental programme looks exciting and ambitious. The committee looks forward to seeing first results of the commissioning and possible experiments at its next meeting.

A.24.2 Recommendations

1. Continue injector design both for 30 GeV and up to collider energies;
2. Complete installation and commission plasma test facility and begin experimental programme;
3. Explore further international collaboration.

A.25 Civil engineering design (Jianfeng Liu)

A.25.1 Comments

The civil engineering studies are now focusing on a specific site at Xinmi 2, located 40 km south-west of Zhengzhou in Henan Province. This site was selected as the primary option based on geological investigations, the availability of local infrastructure, and broader local political support.

The machine layout, including shafts, access tunnels, and surface buildings, has been defined. Geological investigations, such as borehole drilling and seismic studies, have shown that the tunnel must be constructed at a greater depth than initially foreseen, around 300 m. The geology is complex, and mining activity in the area imposes additional constraints on the precise placement of the tunnel.

The ring has been tilted to account for the local topography. Construction will be carried out using drill-and-blast methods, with the excavated spoil to be sold off. The civil engineering cost estimate has been updated to reflect this specific layout, resulting in an increase of about 20% for civil works (around 6% overall).

The committee recognizes many significant advantages of developing a site-specific design. This benefits not only the civil-engineering aspects but also key technical systems such as electrical distribution, cooling and ventilation, transport and access, installation planning, survey networks, and safety systems.

A.25.2 Recommendations

1. The committee encourages the CEPC team to move forward with the site specific civil engineering, and particular studies to reduce the risks related to the new deeper tunnel layout;
2. As the civil engineering work now concentrates on a specific site, exploit the new opportunities to make fast progress on the many systems that are closely connected to the CE and need site-specific guidelines and parameters, e.g. EL, CV, transport, safety, survey;
3. To maintain the ambitious CEPC schedule, fully design and carefully evaluate all systems before large-scale civil engineering work begins at full scale.

A.26 SppC high-field magnet (HFM) dipole development (Qingjin Xu)

A.26.1 Comments

The committee congratulates significant progress in the SppC high-field dipole magnet development program, in hybrid coil configuration with a LTS (Nb3Sn) outer coil assembled with a HTS (ReBCO) Inner coil.

The committee supports the primary concept for the development for SppC with the common coil approach by likely using a hybrid coil configuration: LTS (Nb3Sn) common coils with HTS coil inserts.

The HTS superconductor development, in particular for iron-based superconductor (IBS), is strongly encouraged with strong domestic collaboration in China. The current-density improvement with an order of magnitude in the past 10 years is remarkable and further improvement is expected.

Superconducting magnet collaboration with CERN on HL-LHC project is becoming a very important step for further contributions to the HFM development at a global level and for further steps towards a 20-T-class accelerator magnets in the long-term future.

A.26.2 Recommendations

1. Pursue the HTS superconductor development in particular for IBS and the HFM development to reach 16 T and higher in hybrid configuration, for realising accelerator quality magnets;
2. Develop the method and the diagnostics for pin-pointing quench locations and identifying their origin in the superconducting coil, contributing to the improvement of magnet performance.

B Program

The following presentations were delivered:

	Beijing time	Talk time	Speaker	Title
Sep 16th 2025	09:00	15'	IARC preparation meeting (closed)	
Tuesday	09:05	5'	Yifang Wang	Welcome
	09:10	15'	Xinchou Lou	CEPC general status and news
	09:25	30'+5'	Jie Gao	CEPC Accelerator EDR Status and beyond
	10:00	30'	Coffee break	
	10:30	25'+5'	RuiGe/Mei Li	Summary of cryogenic system mini review
	11:00	25'+5'	Xiaolong Wang	Summary of alignment mini review
	11:30	25'+5'	Sha Bai/Haoyu Shi	Summary of MDI mini review
	12:00	25'+5'	Dou Wang	Summary of booster dipole magnet+sextupole mini review
	12:30	90'	Lunch	
	14:00	25'+5'	Guangyi Tang	Summary of vacuum chamber mini review
	14:30	25'+5'	Haijing Wang	CEPC survey and hardward design status
	15:00	25'+5'	Xiaolong Wang	Installation procedures of the Booster magnets beam pipe
	15:30	30'	Coffee break	
	16:00	25'+5'	Yiwei Wang	Solenoid compensation scheme and alternative schemes
	16:30	25'+5'	Daheng Ji	Simulation of injection at commissioning and orbit correction
	17:00	25'+5'	Yiwei Wang/Bin Wang	Studies of the tolerance to machine errors at all energies
	17:30	30'	IARC members	Closed session
Sep 17th 2025	09:00	25'+5'	Jinshu Huang	Conventional facility and control methods for the tunnel temperature
Wednesday	09:30	25'+5'	Wen Kang	CEPC booster magnet production line
	10:00	25'+5'	Yongsheng Ma	CEPC vacuum chamber production line
	10:30	30'	Coffee break	
	11:00	25'+5'	Dapeng Jin	Control system
	11:30	25'+5'	Xiaohao Cui	Collimators in the collider rings
	12:00	25'+5'	Song Jin/Lei Ye	DeepC electronic documentation system
	12:30	90'	Lunch	
	14:00	25'+5'	Zusheng Zhou	CEPC high efficiency klystron development
	14:30	25'+5'	Na Wang/Yudong Liu	CEPC collective effects
	15:00	25'+5'	Zhe Duan	CEPC polarization studies
	15:30	30'	Coffee break	
	16:00	30'	IARC discussion and Q/A with CEPC accelerator speakers (partly closed if needed)	
	17:00	60'	IARC members	Closed session
Sep 18th 2025	09:00	25'+5'	Jinhui Chen	Injection/extraction system
Thursday	09:30	25'+5'	Jingyu Zhang	CEPC linac injector
	10:00	25'+5'	Dazhang Li	CEPC plasma injector
	10:30	30'	Coffee break	
	11:00	25'+5'	Daheng Ji	HEPS and BEPCII-U commissioning experiences
	11:30	25'+5'	Jianfeng Liu	Civil engineering design
	12:00	25'+5'	Qingjin Xu	SppC high field magnet dipole development
	12:30	90'	Lunch	
	14:00	90'	IARC discussion and Q/A with CEPC accelerator speakers (partly closed if needed)	
	15:30	30'	Coffee break	
	16:00	120'	IARC members	Closed session
	18:30	180'	Banquet	
Sep 19th 2025	09:00	150'	IARC members	Closed session for document editing and final reading
Friday	11:30	30'	Coffee break	
	12:00	60'	ALL	Report presentation to CEPC Team
	13:00	90'	Lunch	
	14:30			Adjourn

These presentations are available at: `https://indico.ihep.ac.cn/event/26917//`

C Second IARC EDR Review Committee Members

Philip Bambade	IJCLab (Absent)
Maria Enrica Biagini	INFN Frascati, Chair
Anton Bogomyagkov	BINP (Remotely)
Brian Foster	DESY & U. Oxford
Kazuro Furukawa	KEK
Eugene Levichev	BINP (Remotely)
Xiaoye He	USTC (Remotely)
Roberto Kersevan	CERN
Michael Koratzinos	CERN
Gero Kube	DESY
(Absent) Hélène Mainaud Durand	CERN
Mauro Migliorati	U. La Sapienza, Rome
Hiroyuki Nakayama	KEK
Norihito Ohuchi	KEK
Carlo Pagani	INFN Milano
Paolo Pierini	ESS
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Steinar Stapnes	CERN (Remotely)
Makoto Tobiyama	KEK
Akira Yamamoto	KEK
Zhentang Zhao	SINAP (Remotely)