

Fourth U.S. FCC Week

SLAC

September 8-12, 2026

Introduction

Welcome

- ❖ This is the fourth annual U.S. FCC workshop
 - Following BNL (2023), MIT (2024), ANL/FNAL (2025).
- ❖ A big thank you to our host, SLAC National Laboratory
 - Especially to Caterina Vernieri for spearheading the organization of this workshop.
- ❖ A well-crafted agenda is in place:
 - Plenary sessions including overviews of various activities, plans for FY27
 - Remarks from DOE and our international colleagues
 - Panel discussions: US involvement in FCC R&D and Early Career Scientists engagement
 - Parallel sessions reviewing ongoing R&D and covering a wide range of topics in Accelerator and Physics, Experiments, Detectors.
- ❖ This is the first workshop held following the conclusion of the 2025 European Strategy Process recommending FCC as the next preferred flagship project.

European Strategy Process

- ❖ The 2025 European Strategy Group received its mandate from the CERN Council:
 - *Identify the preferred option for the next collider at CERN and prioritized alternatives to be pursued if the chosen preferred option turns out not to be feasible or competitive*
 - The committee was chaired by Karl Jakobs (Freiburg).
 - Community input was sought by ESG: A total of 256 submissions were received
 - The three-volume FCC feasibility study report was submitted to ESG as an input to their deliberation and for consideration as the next collider at CERN.
 - Volume 1: Physics, Experiments and Detectors ([link](#))
 - Volume 2: Accelerators & Infrastructure ([link](#))
 - Volume 3: Civil Engineering & Sustainability ([link](#))
 - Significant U.S. engagement in the preparation of the Feasibility Study report.

Considerations for the next collider

The primary considerations by the European Strategy Group for identifying the next CERN flagship project:

1. Physics reach and discovery potential
 - Maximizing precision measurements while expanding direct mass reach for BSM discovery.
2. Project readiness
 - Technical feasibility, required R&D, risks, timeline, cost, and human resources
3. Long-term prospects
 - What are the long-term prospects of reaching the 10++ TeV pCM scale
4. Input from national communities
 - What do the different countries, especially the CERN member states, want?

Overall Comparative Summary

Machine	Precision Physics	BSM physics	Physics vs CEPC	Technical readiness	Constr. cost (BCHF)	Time scale	Path to ≥ 10 TeV
FCC-ee	22	23			15.3	2046-2060	
Descoped FCC-ee	15	17			12.9	2046-2055	
LCF550	15	17			14.8	2045-2065	
CLIC1500	14	18			14.6	2045-2066	
LCF250	10	16			9.4	2045-2053	
CLIC380	10	16			7.5	2045-2054	
LEP3	15	17			4.1	2047-2062	
LHeC	8	7			2.1	2044-2051	

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Detailed report of the European Strategy Group can be found [here](#).

Physics: from WG2b: sum of precision/BSM physics
Phys vs CEPC: competitiveness, assuming CEPC is running in parallel

Tech readiness: from WG2a

Construction cost: from proponents + exp. (CERN part)

Recommendations of the ESG

❖ The next flagship collider project:

- The electron-positron Future Collider (FCC-ee) is recommended as the preferred option for the next flagship collider at CERN,
- A descoped FCC-ee is the preferred alternative option for the next flagship collider at CERN

❖ Additional comments were provided in the ESG document:

- Other alternatives do not present a concrete and visionary plan, by failing one or more of the requirements for the next flagship collider at CERN.
- At this stage, without knowing the reasons for which FCC-ee would not be feasible, other alternative options were not ranked.

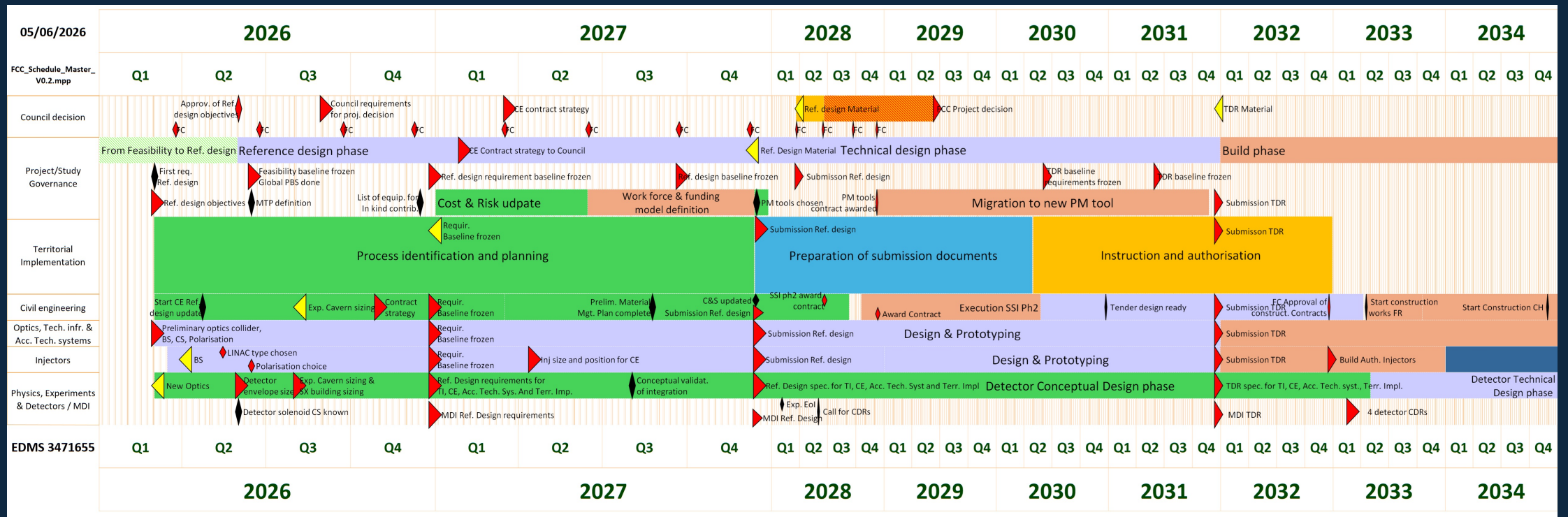
❖ On May 22, 2026, in Budapest, the CERN Council updated the European Strategy for Particle Physics.

Alignment with the CERN strategy

- ❖ The update to the European Strategy is aligned with and underpins the CERN strategy as outlined by the current CERN management:
 - Top Priority: full exploitation of the LHC and HL-LHC
 - Highest long-term priority: FCC-ee as CERN's next flagship collider
 - Non-collider physics
- ❖ At the FCC week in Helsinki, the CERN Director General noted:
 - FCC-ee is CERN's sole vision for the next flagship collider project
 - CERN aims to be ready for a decision on FCC-ee in 2028 by the CERN Council
 - Seeking a go/no-go decision, noting that this is not a choice between options
 - Noting FCC-ee provides a potential future pathway to a very high-energy hadron collider.
 - **Taking FCC-ee to a decision point is CERN's highest long-term priority.**
 - CERN has also initiated an "options analysis" to support the decision-making process in some member states. This entails preparation of documentation for LEP3 and LCF380 on the scientific and strategic reasons on why these are **not** identified as CERN's future flagship project.

Timeline

- ❖ **2028: CERN Council official approval / go-no-go decision.**
- ❖ **Call for Expression of Interests for experiments following CERN approval which leads to defining 4 experiments and subsequent collaboration forming.**



The next two years are crucial

- ❖ Following the completion of the European Strategy Process, we have entered the *Reference Design Phase* (current phase leading to the CERN Council decision).
- ❖ An FCC Project Office, led by Michael Benedikt and reporting to CERN DG, has been established to steer the process of developing the reference design and the necessary documentation for the CERN Council decision.
- ❖ The CERN management has stressed that CERN and the international community must work together on the delivery/partnership model for FCC-ee.
- ❖ The U.S. remains a significant partner in this process
 - Engagement of U.S. is crucial and essential to the success of the project,
 - Engagement of U.S. in the reference design phase will assure U.S. leadership in FCC-ee and its ability to influence and lead the next-generation technological and scientific developments.

Objectives of the Reference Design Phase

- ❖ Increase maturity of the technical design (incl. addressing recommendations from feasibility study reviews).
- ❖ Overall project integration and requirements on civil engineering sufficiently detailed to enable launch of civil engineering tender design in case of project approval.
- ❖ Reducing project risks via:
 - Integrated planning across all domains and interface management
 - Prototyping of critical elements
 - Build up cost/performance contingency by design optimization
 - Civil engineering refinement
 - Close coordination with host states on territorial implementation aspect
 - Reinforcing collaboration as basis for global support for the project.
- ❖ Reference Design Documentation (by Q1 2028) to enable decision includes:
 - Integrated technical baseline, Resource loaded project master schedule, Updated cost estimate with uncertainty, project-wide risk register and a procurement strategy (incl. in-kind contribution opportunities).

Objectives of Accelerator

- ❖ Complete studies for the new LCC optics
 - Top-up injection, collimation, tolerances and stability, and finalize main ring layout
 - Understand challenges in the MDI
- ❖ Complete electron-cloud and collective instability simulations
 - Update requirements of staggered fill pattern (electron-cloud) on Booster and Injector
- ❖ Finalize Booster design and layout and finalize injector design and layout
 - Develop designs for damping ring and positron polarization ring
 - Develop design for polarized electron source and verify e^+/e^- polarization preservation to Main rings.
- ❖ Finalize the RF frequency choice and establish paths for RF source and SRF cavity prototypes
- ❖ Develop prototypes of magnets, supports, and vacuum systems
- ❖ Perform realistic studies of systematic uncertainties for precision measurements, e.g. luminosity, polarization, energy, and optical errors and further develop MDI design
- ❖ Engage the early career researchers and next generation scientists.

Objectives of Physics, Experiments, Detectors

- ❖ Continue developing the international high-energy physics community
- ❖ Consolidation of the interaction region layout, detector integration and beam-background mitigation.
- ❖ Optimized procedures for $\sqrt{s}$ calibration & possible monochromatic (125) operation.
- ❖ Finalizing common software/analysis framework and developing common computing architecture.
- ❖ Further studies of exp. systematic uncertainties for some EW precision measurements & consolidation of pertaining requirements on colliders, detectors and theory.
- ❖ Engagement of theory community to address theory challenges
- ❖ Proposal for staging implementation and improvements of the staged/descoped FCC-ee
- ❖ Prepare to answer call for (at least 4) documented EoI's for FCC-ee experiments end 2028.
- ❖ Engaging the early career researchers and the next-generation scientists.

Conclusion

- ❖ The next two years are a critical and challenging phase to assure the approval of FCC-ee by the CERN Council in 2028.
- ❖ Approval by the CERN Council in 2028 will launch the next phase of the FCC-ee project:
 - Launch of civil engineering tendering process to be ready for civil construction in 2032
 - Plan is to complete civil construction by 2040, to enable installation of services, infrastructure and accelerator and detector components and be operationally ready by 2045.
 - Launch of Expression of Interests for potential FCC-ee experiments
 - Launch of the Accelerator Technical Design Phase
- ❖ Continued U.S. engagement in all phases of the project is vital for the success of the FCC-ee project.
- ❖ We hope this workshop helps to make that case and to opens the door for the next generation of scientists to further engage in these developments.