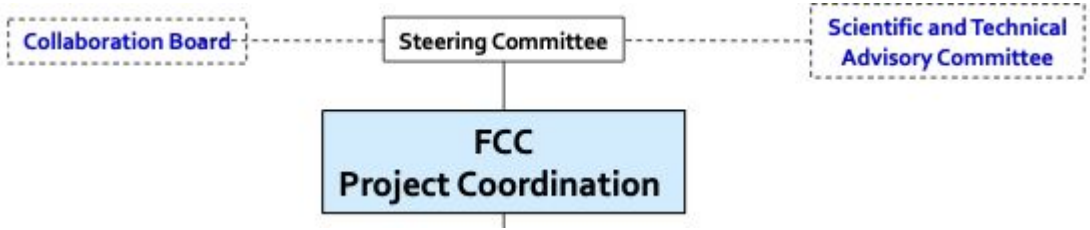
PED News

PED general meeting, 25 November 2026

Outline

- International Collaboration Board
- ECFA ECR prize
- New Detector WP coordinators and MDI WG conveners
- Documentation for RDP
- FCC New Optics
- Updated RF frequency
- ECFA news
- ICFA news
- Recommendation of the SCAC in the US
- Recent workshops
- Forthcoming events of interest
- 2027 FCC week & PED workshop
- ECOI and CERN open days

FCC ICB



- The Collaboration Board brings together representatives of the institutes involved in the Feasibility Study, which are currently mainly focusing on R&D and design study activities. They represent the worldwide FCC community and form the core of the Feasibility Study, providing human and other resources for the execution of the Study.
- The Collaboration Board is composed of one representative per institute contributing to the Feasibility Study, having signed the FCC MoU and whose participation has been approved by the Collaboration Board and a representative of CERN as one of the participants in the Feasibility Study
- The Collaboration Board typically meets once a year (during the FCC week)
- Chair: Philippe Chomaz → **Fabiola Gianotti**

ECFA ECF Prize

ECFA ECR awards

- The awards are presented annually in order to recognise outstanding contributions to future accelerator-based experimental projects, in the following three sub-fields:
  - Physics prospect studies and analysis tools, including the development of novel analysis methods, simulation and/or reconstruction methods and software, identification of distinctive experimental signatures, and novel discrimination techniques;
  - Detector/instrumentation development;
  - Accelerator physics at large, including concept development, beam dynamics and research on technologies for accelerators.
- The ECFA ECR Awards recognise significant achievements by individuals at an early stage in their careers. The corresponding work must demonstrate clear promise or have contributed meaningfully to advances in particle physics at future experimental facilities. Early career refers to the first 10 years following the award of a PhD or other last degree, with appropriate extensions for eligible career interruptions. Nominees should have carried out the majority of the work recognised by the award in an ECFA country.

Award winners in 2026

1. For outstanding contributions in the field of detector and instrumentation development:

Dennis Sperlich,

in recognition of his outstanding contributions to the upgrade of the ATLAS Inner Tracker (ITk) detector for the High-Luminosity LHC.

2. For outstanding contributions in the field of physics performance studies and analysis tools for future colliders:

Dolores Garcia,

in recognition of her research on reconstruction algorithms based on machine learning for the FCC.

3. For outstanding contributions in the field of accelerator physics:

Livio Verra,

in recognition of his research on beam-driven plasma wakefield acceleration.



Congratulations, Dolores!

Detector Concepts Studies WP has 3 new Coordinators

- Mandate for Detector Concept Studies finalised on June 2026: link
- Call for nomination in July 2026: link. 24 nominations received.
- Three new coordinators have been appointed to second Marc-André Pleier (BNL) and Mogens Dam (NBI):
  - Didier **Contardo** (Lyon)
  - Gaia **Lanfranchi** (Frascati)
  - Frank **Simon** (KIT)
- Important task ahead of them: enable credible detector EoI's by Q1 2029







MDI has 5 WGs (2 directly connected to PED)

(NB: MDI is not a PED WP. It is a coordination interface and its WGs are the equivalent of our PED WPs.)

FCC 13/07/2026 FCC-ee MDI meeting #80 Manuela Boscolo

New MDI organisation for the RDP

To align with the overall FCC Reference Design Phase organisation, the MDI activities are **thematically grouped into five Working Groups**. This new organisation will facilitate broader international participation, optimise CERN's contribution, and ensure the timely delivery of the highest-priority Reference Design Phase objectives by the end of 2027:

- Consolidation of the project baselines
- Demonstration of design compliance with the project performance requirements
- Increase of the maturity level for the various designs from feasibility study and reduction of the technical and financial risks
- Potential impact on civil engineering for underground caverns and surface sites.

The work of the five thematic Working Groups will be coordinated by dedicated conveners (to be nominated), under the guidance of the MDI WP Coordinators. The WP Coordinators will ensure the overall coherence of the programme, foster harmonisation across the transversal MDI activity, and minimise duplication of effort.

FCC 13/07/2026 FCC-ee MDI meeting #80 Manuela Boscolo

MDI working groups

WG1 - IR Optics and Beam Dynamics
- Definition of the final-focus quadrupole systems
- Define baseline detector-field compensation scheme
- Optimisation of the shielding solenoid field shape
- Specify the optics correction elements,
- Definition of permissible field errors, alignment tolerances and stability requirements to ensure achievement of design luminosity
- Develop a beam-based alignment procedure for the IR quadrupoles
- Specification and integration of fast beam feedback systems,
- Optimise the IR optics for the minimisation of the synchrotron radiation levels in the interaction region and detector environment
- Evaluate the various sources of IR heat loads

WG2 – Detectors and beam induced background
- Inner Detectors
  - integration concepts for inner detectors and vacuum chamber
  - R&D plan
- Beam-Induced Backgrounds and Shielding
  - Accelerator-to-detector simulation workflow
  - Consolidate realistic MDI geometry models
  - Single beam losses and synchrotron radiation, and transport into detector systems
  - Beam-beam backgrounds and transport into detector systems
  - Optimise shielding, masking, and vacuum chamber radius
  - Following detector background estimates of collision debris, determine shielding requirements for IR magnets.
  - Evaluate TID and fluence for detectors and accelerator systems

PED

WG3 – Accelerator technical systems
- Design of final focus superconducting magnets
- Design of the cryogenic systems
- Design of the beam vacuum systems
- Design of the beam instrumentation
- Beamstrahlung monitor
- Radiation studies
- R&D plan

WG4 – Metrology, alignment and adjustment strategy
- Alignment strategy
- Characterization of the various sources of instability
- Structural analysis methodology
- Support structures, positioning systems
- Design compliance
- R&D plan

WG5 – Global integration studies for MDI, Detectors and Experimental cavern including infrastructure
- MDI systems static and dynamic envelopes
- Global experimental cavern integration
- MDI and detector assembly/disassembly scenario
- Assessment of removal/installation of cavern vacuum chambers
- Proof of concepts of MDI Far End vacuum supporting structures

PED

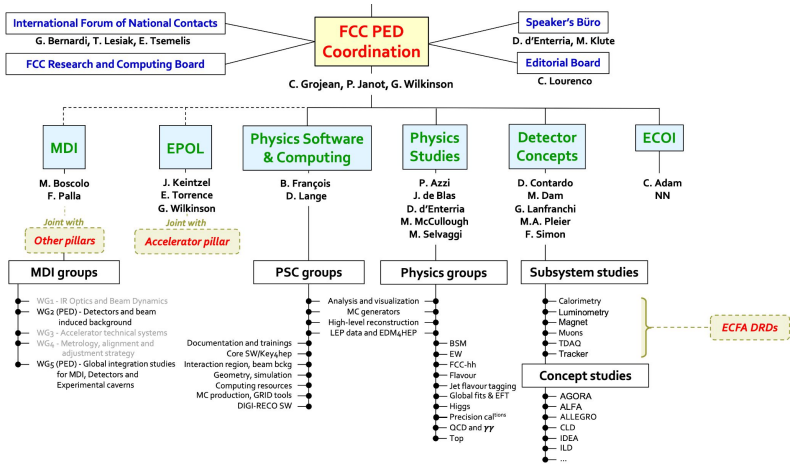
FCC 13/07/2026 FCC-ee MDI meeting #80 Manuela Boscolo

New MDI organisational structure

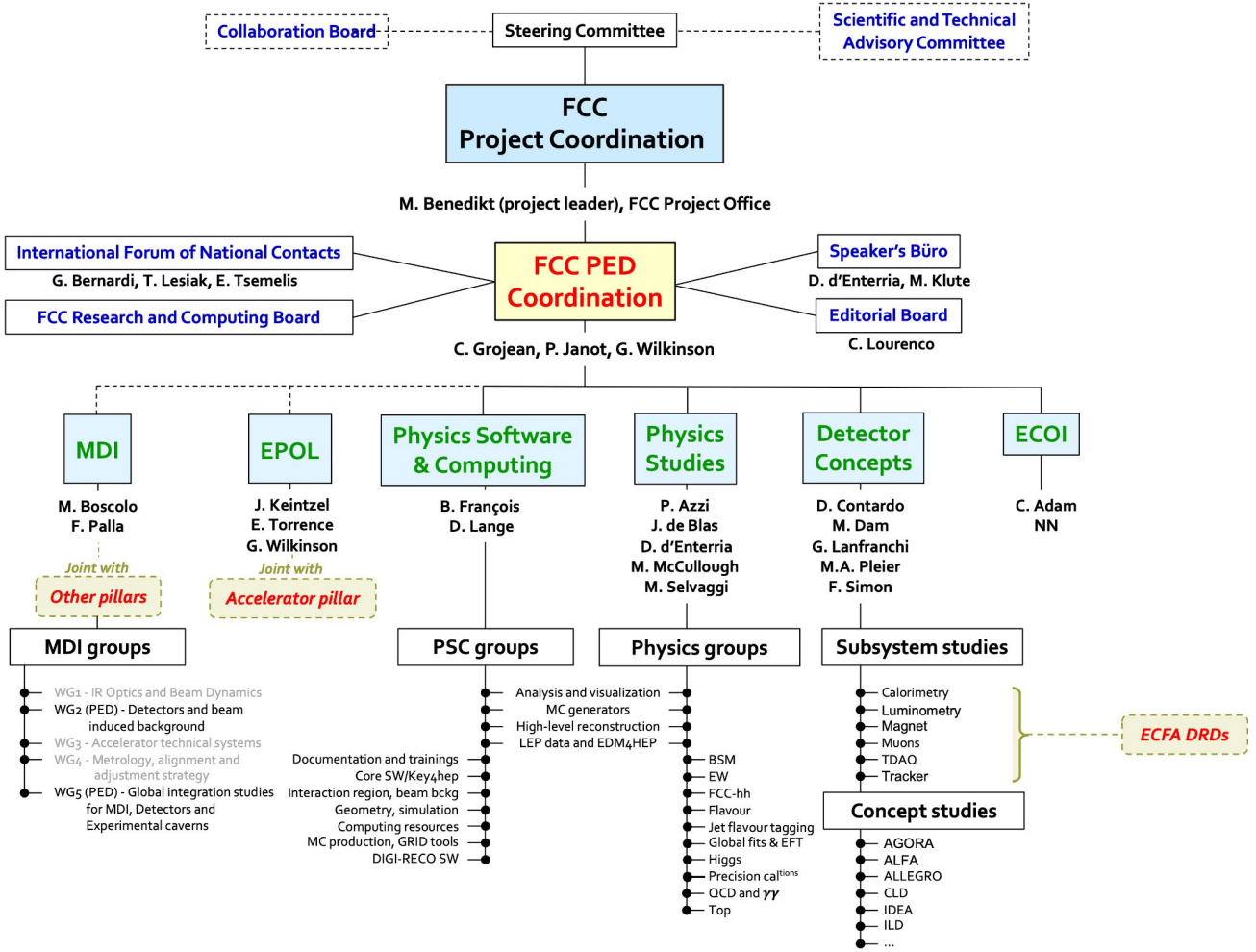
MDI WP
Manuela Boscolo, Fabrizio Palla, and a technical coordinator from CERN

Will interface with, and report progress also to

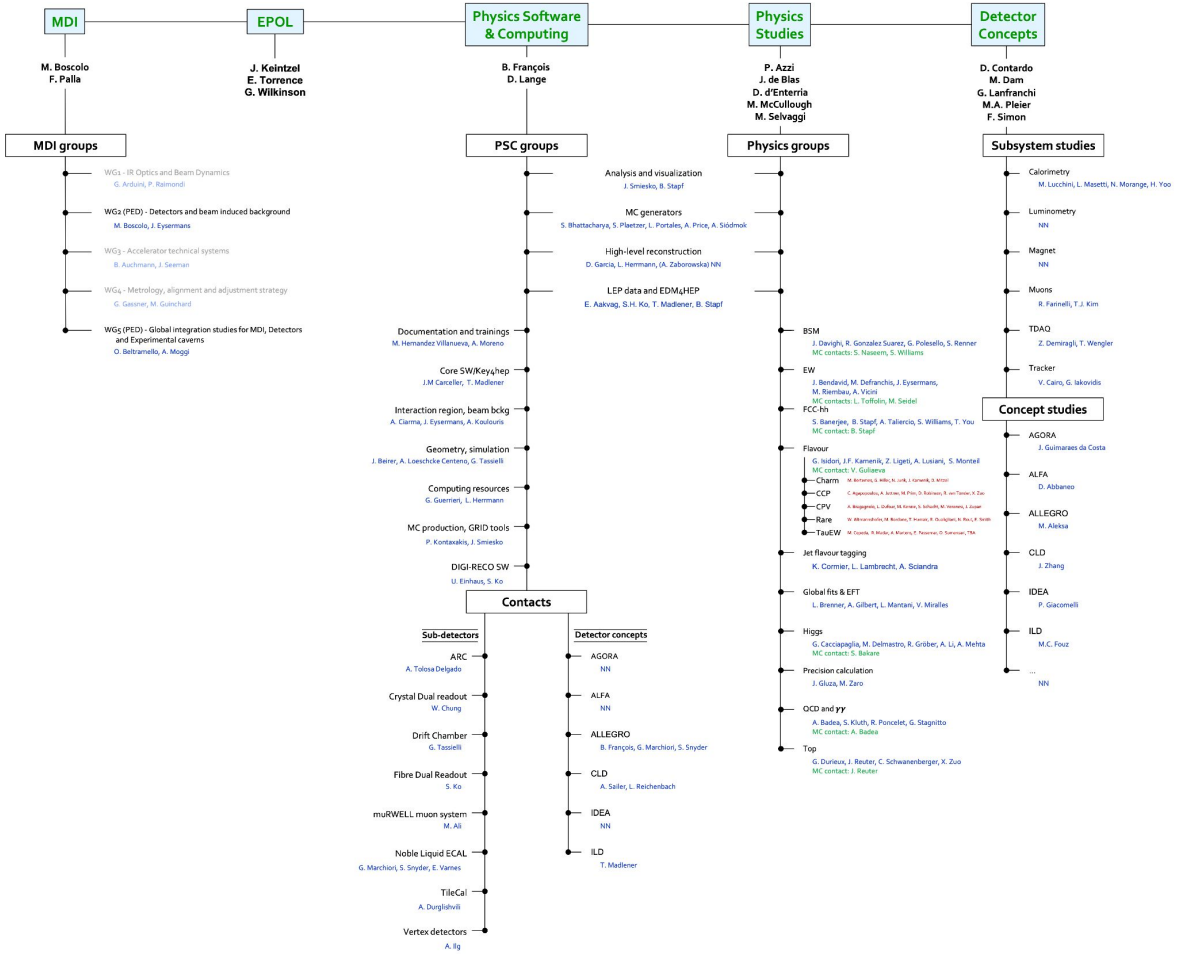
WG 1 IR optics and Beam dynamics	G. Arduini, P. Raimondi	Accelerator and booster design pillar
WG 2 Detectors and beam induced backgrounds	M. Boscolo, J. Eysermans	PED & Accelerator and booster design pillars
WG 3 Accelerator technical systems	B. Auchmann, J. Seeman	Technical systems pillar
WG 4 Metrology, Alignment and adjustment strategy	G. Gassner, M. Guinchard	Accelerator and Technical systems & System Engineering Project Integration pillars
WG 5 Global integration studies for MDI, Detectors and Experimental caverns	O. Beltramello, A. Moggi	System Engineering Project Integration & Technical Infrastructure pillars



PED Organogramme



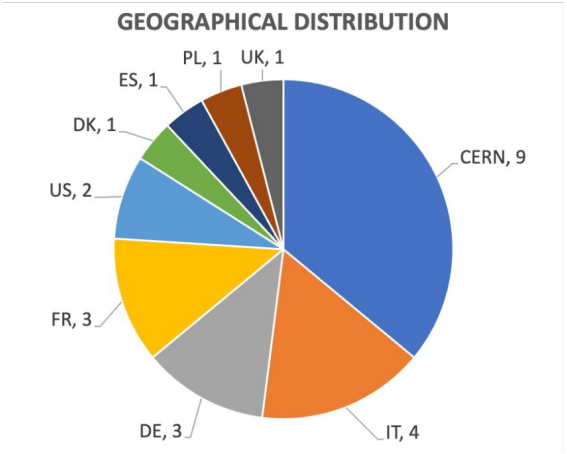
PED Organogramme



PED Organogramme

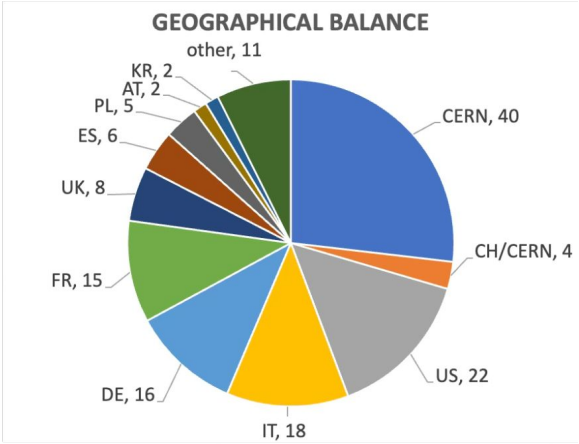
A truly international effort, connecting physics programme requirements to viable detector concepts

Overall coordination & WP coordinators

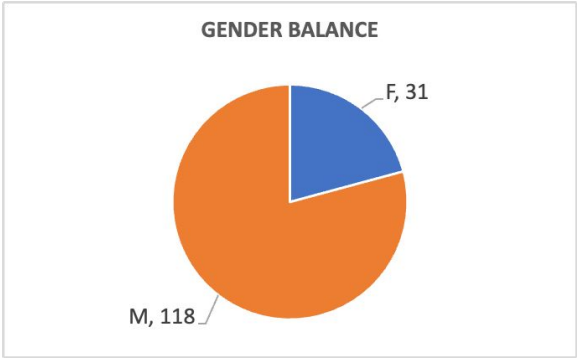


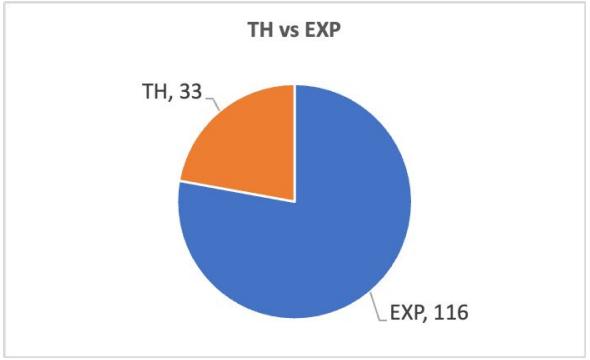
total: 25

All coordinators & WG conveners



other: BE, CN, CO, DK, GE, IN, JP, LV, NL, SI, UAE (1 each)
total: 149



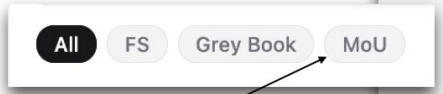


PED Organogramme

A truly international effort, connecting physics programme requirements to viable detector concepts

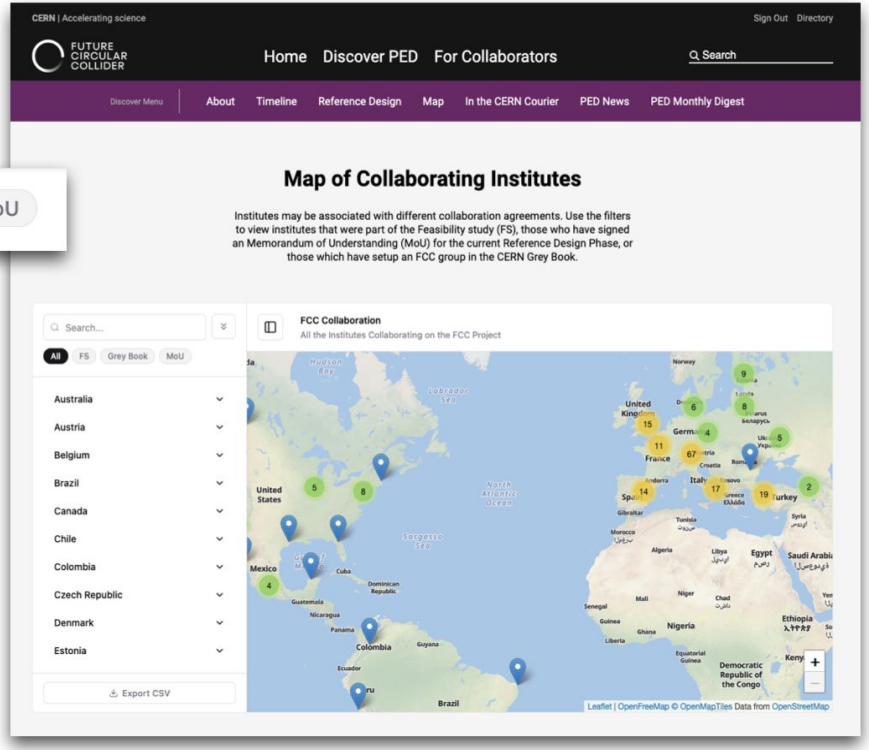
Our collaboration map is alive!

Nice tool developed by Claire Adam and her ECOI team



New RDP MoU list provided by PO, will update on Wednesdays until Dec council week.

Few open questions on how/ when “umbrella MoU” should be treated

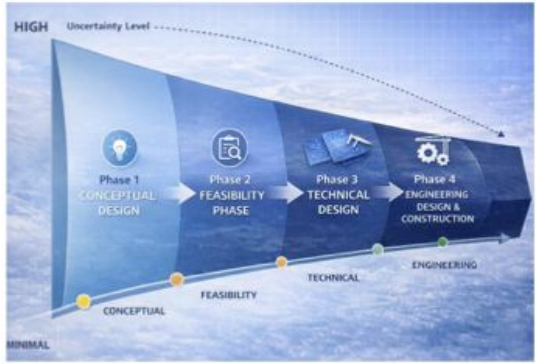


For all: https://fcc-ped.web.cern.ch/collaboration-map/

Behind sso: https://fcc-global-collaboration-workgroup.web.cern.ch/

Reference Design Phase (RDP) Documentation

M. Benedikt @ pECFA Nov. 2026



- **2026-2028 Reference Design Phase**
- **2029-2032 Technical Design Phase cont'd**

Prepare and deliver documentation end Q1 2028 as basis for Council review and decision process on FCC.

- **Integrated technical baseline**
- **Resource-loaded project master schedule**
- **Updated cost estimate and project-wide risk register**
- **Procurement strategy & in-kind contribution opportunities)**

- No clear request yet (either a decision level document of O(150) pages and a full length O(1000) page report)
- But for sure a document (addressed to CERN Council and member state funding agencies) that summarises
  - the FCC selling arguments,
  - the socio-economic impact of the project in industry and EU.
- Timeline: Q4 2027- Q1 2028
- PED ultimate deliverable: detector EoIs, not expected before Q4 2028/Q1 2029

Update of FCC optics

M. Benedikt @ pECFA Nov. 2026

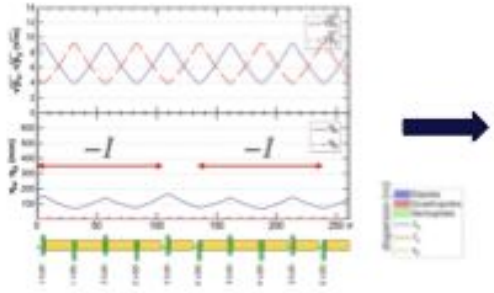
Collider lattice change, January 2026

Global Hybrid Chromaticity
from Katsunobu Oide, baseline 2015 to 2026

Backbone for past FCC-ee studies
high-level of maturity, building on KEKB/SuperKEKB experience

Phase advance in GHC lattice (K Oide) fixed by −I condition for chromaticity correction

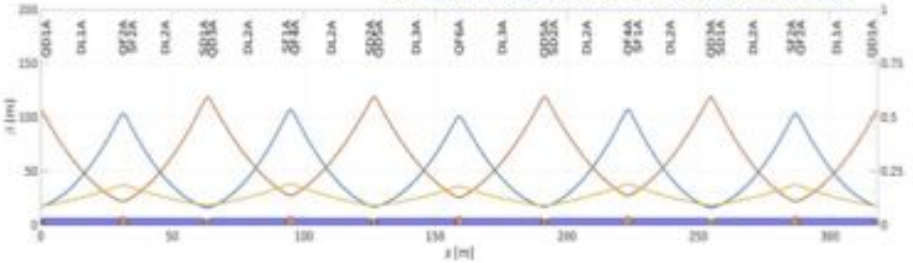
Phys. Rev. Accel. Beams 19, 111005 (2016)



Local Chromatic Correction
from Pantaleo Raimondi new optics for Reference Design

LCC lattice with hybrid focusing / defocusing structure for optimised non-linear dynamics and chromatic properties with high flexibility on phase advance

Phys. Rev. Accel. Beams 28, 021002 (2025)



LCC optics:

- **larger dynamic aperture / momentum acceptance and additional tuning flexibility → possibility of higher RF frequency**
- **higher dipole filling factor → 10% reduction of SR power (i.e. 45 MW)** for same beam current and luminosity
- significantly **reduced number of main sextupole circuits** (availability and cost)
- **reduced quadrupole focusing strength** and power consumption
- **modular design of technical insertions** (transparency conditions) enables straight sections with individual optics optimizations

FCC RF system

- One important outcome of the Feasbility Study report: operation flexibility from the Z run to ZH run.
- RF external review took place in October:
  - Pros and cons of different frequencies are discussed
    - 400 MHz (so far used for the Z, WW, and ZH runs), Nb/Cu technology
    - 800 MHz (so far used for the top runs), bulk Nb technology
    - 600 MHz (not used so far, but closer to frequencies used elsewhere in the world)
  - The latter seems to gather a number of advantages
    - It can be used throughout the whole FCC-ee programme, from the Z to the top
    - At the expense of more instabilities at the Z pole, which may require the total current to be reduced (resulting in a 12% smaller instantaneous luminosity)
    - Mitigation methods – including adding one year of running at the Z pole – are envisioned

FCC RF system

M. Benedikt @ pECFA Nov. 2026

FCC-ee collider RF frequency choice revisited

- Configurations studied: **400 + 800 MHz (reference)**, **600 + 800 MHz**, **full 600 MHz**, **full 800 MHz**

- **Criteria:**
  - Beam performance
  - Integration / installation
  - cryogenics requirements
  - Phase 1-to-Phase 2 upgrade effort
  - Cost
  - Impact on the R&D program



- **The full 600 MHz option (+1.3 GHz booster RF for $t\bar{t}$) emerged as most competitive solution**
  - Significantly reduces technology development effort and risks by avoiding 400 MHz Nb/Cu technology
  - Reduction of RF footprint and cost, simplified integration and staging to $t\bar{t}$, single cryo system
  - Largest margin for beam dynamics and performance
  - Confirmed by international expert review mid October 2026

FCC RF system

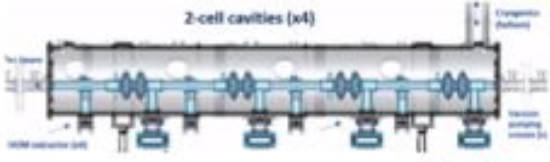
M. Benedikt @ pECFA Nov. 2026

2-cell 600 MHz RF – collider Z, W, ZH

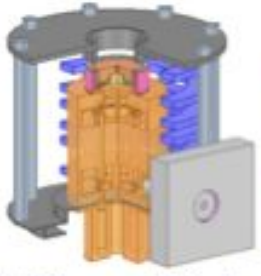


X 288

R&D in collaboration with FNAL, IJCLAB, CEA, DESY, HZB, ESS, further partners tbc



X 72



X 288 + X 112 + X 80 (ttbar)

SC elliptical cavity
- 600 MHz, 2-cell,1.5 m long
- Bulk Nb
- 13.9 MV/m

Cryomodule
- Segmented design, 4 cavities, 2 K
- Vertical FPC, HOM damping & extr.
- Frequency tuning system
- Thermal and magnetic shielding

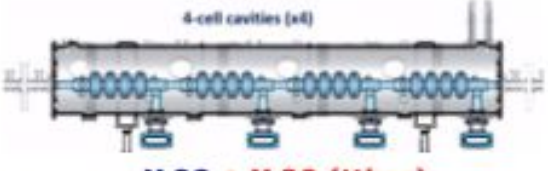
Multibeam Tristron
- **600 MHz**
- 370 / 210 CW
- ~ 90% efficiency

4-cell 600 MHz RF– for booster Z, W, ZH & for collider at ttbar



X 400

R&D in collaboration with FNAL, IJCLAB, CEA, DESY, HZB, ESS, further partners tbc



X 28 + X 20 (ttbar)



X 486 (ttbar)

SC elliptical cavity
- 500 MHz, 4-cell
- 20.8 MV/m

Cryomodule
- Segmented design, 4 cavities, 2 K

Solid State Amplifier (SSA)
- 1.3 GHz
- 20-50 kW pulsed

booster at ttbar:
- 1.3 GHz
- 9-cell cav
- 54 CMs
- 486 SSAs

Objective: cryomodule demonstrators by 2032

FCC @ ECFA

Recall the comprehensive presentation on PED matters by Patrick Janot in the pECFA meeting in Amsterdam, 9th July [link].

We are now promised a regular slot at pECFA meetings. The last one occured at CERN last Friday (20/11), and has be given by Guy Wilkinson [link].

PED and ECFA should join efforts to
> Propose a roadmap for the detector concepts:
- Preparation for submission of detector Expressions of Interest
- Letters of Intent from four experiment collaborations

> Call for more proactive interactions with the DRD collaborations: alignment of DRD activities with FCC detector development needs
> Set the stage for a possible staged FCC-ee implementation scenarios

R. Tenchini @ pECFA Nov. 2026

ECFA study activities (in two phases)

Before CERN Council decision on FCC

- **Promote theory studies:** the physics potential of the FCC is enormous, but significant progress in theoretical calculations and event generators is essential. Bring the theory community together around FCC.
- **Strengthen detector studies and R&D (DRD !):** focus on realistic detector concepts and technologies, final aim: minimise systematic uncertainties.
- **Broaden the community and build networks:** encourage wider participation and foster new collaborations.
- **Organise open workshops:** start engaging the community already at this early stage.

After CERN Council decision on FCC (if positive)

- Encourage and review **detector Expression of Interest (EoI's)**
- Then **converge on four experiments (LoI's)**

A note on the first phase: the last collider at the e^+e^- energy frontier was dismantled at CERN 25 years ago, we need to train a new generation of physicists on practical reasearch work with a complex machine, very different from LHC !

Very welcome support from ECFA!

R. Tenchini @ pECFA Nov. 2026

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These proposed workshops could maybe be merged with / replace our annual PED physics workshops while we would continue independently our topical workshops.

Very welcome support from ECFA!

News from Toyoma (ICFA Seminar)

- ICFA (International Committee for Future Accelerators) organises a meeting every 3 years. After Hamburg in 2023, the 2026 meeting took place in Toyama (Japan)
- Indico link
- In the past 2-3 decades, ICFA has been strongly supporting (I)LC(F)
- Chair is elected for a 3-year term:
  - 2024-2026: Pierluigi Campana (INFN) - scientific secretary Thomas Schörner (DESY)
  - 2027-2029: Tsuyoshi Nakaya (Kyoto) - scientific secretary Mingshui Chen (IHEP)

News from Toyoma (ICFA Seminar)

FCC was a major topic of the update of the ESPP

Some key points:

- European Strategy update identified FCC-ee as the clear preferred option for CERN's next flagship collider.
  - consensus within CERN's Member States and beyond
- A descoped version of FCC-ee was identified as the lower cost alternative option
- In CERN's strategy FCC-ee is identified as the *highest long-term priority*
- We are progressing the design and the supporting documentation to a point where the CERN Council could take a decision from September 2028 onwards
  - further details in M. Benedikt's presentation tomorrow
- **Following the European Strategy Update, at this time, the FCC-ee is the only option being considered for CERN's next flagship collider project**
- CERN Council will be asked for a decision on FCC-ee and not a choice between options

FCC Reference Design Phase Timeline

Planned FCC Phases:

- 2026-2028: Reference Design Phase (RDP, previously referred to as pre-TDR Phase)
- 2029-2033: Technical Design Phase
- 2033- : Project Implementation

Selection of the proposed "Council-level" steps/milestones

- Mar 2026: discussion of Reference Design Phase scope and deliverables ✓
- **Jun 2026: Council approval of the FCC-ee Reference Design Phase** ✓
- Sep 2026: Council approval of Reference Design Phase governance ✓
- Dec 2026: Council discussion on the main features of the funding model
- Mar 2027: Council feedback on FCC-ee governance model
- Dec 2027: Establishment of the FCC-ee review process
- Jul 2028: SPC/FC review of the FCC-ee RDP
- Sep 2028: Council review of FCC-ee RDP

24 months

From Mark Thomson

FCC-ee Comments

The next two years will be critical to our success

- **FCC-ee** is the clear best option for the future of CERN **and for global particle physics**
  - **the outcome of the European Strategy Update is crystal clear**
- At CERN, we will do everything possible to ensure the realisation of FCC-ee
- and we have a clear plan of work
  - details of the recent impressive progress in tomorrow's presentation

At this time, it is important that the whole community gets behind the collective goal to secure FCC-ee as the next flagship collider

Concluding remarks

Our mission and our collective challenge

- **The coming years will be a critical period for particle physics at CERN**
  - The **HL-LHC** machine and detector construction are moving at pace, **both of which are at the scale not seen at CERN for the last 20 years**
  - In parallel, we are aiming to progress **FCC-ee**, as CERN's next flagship project after HL-LHC, **which would be the largest collider project ever undertaken**
  - At CERN, we are focusing resources on the top priorities for the future of CERN and the future of collider-based high-energy physics: **HL-LHC** and **FCC-ee**

FCC-ee is a remarkable scientific opportunity

- **Potentially a once-in-a-generation opportunity to secure a bold vision for the future of particle physics**
- **It is important that the whole community gets behind this vision**

ESPP

News from the US

Report of US D.O.E. SCAC Facilities Subcommittee

chaired by Persis Drell, 12 November 2026
(SCAC: Office of Science Advisory Committee)

Decadal Priority Near Term: *Projects that have important science and/or broad impact that we should move on now.*

- **Second Target Station (STS)**
- **US Contribution to Future Circular Collider (FCC)**
- **LEGEND-1000 Double Beta Decay**
- **Low Emittance Injector (LEI) for LCLS**
- **Bio-Data Nexus**
- **Complex Biosystem Transformation Capability (PTC)**

It creates excellent opportunities to move with targeted R&D for FCC

Recent Events

- Reconstruction Workshop, CERN, 26-29 Ocotber 2026 [Link]
- Polarised Physics Beams Workshop, CERN, 2-3 November 2026 [Link]
- Tracking and PID workshop, CERN, 16-20 November 2026 [Link]

We'll hear detailed summaries of these workshop next in this PED general meeting

Coming PED events and workshops of interest

- 6th FCC France Workshop, Marseille, 25-27 November 2026, register here
- German FCC workshop, DESY, 3-4 December 2026, register here
- Key4Hep developer workshop, 7-9 Dec 2026, register here
- FCCAnalyses Software hackathon, 9–11 Dec 2026, register here
- Flavour workshop, part III, CERN, 19-22 January 2027, register here
- Higgs, EWK and Top workshop, CERN, 27-29 January 2027, register here
- Many facets of precision, part II, CERN, 8-12 February 2027, register here
- AI4FCC Workshop, CERN, 22-25 February 2027, register here

Joint 2027 FCC week and PED workshop

https://fccweek2027.web.cern.ch/



FCC ECOI



DAY 3
Master Classes



The IPPOG Collaboration board voted YES yesterday afternoon

This secures our visibility in the outreach community and fits with the DG introductory wish.

3

FCC is joining IPPOG

CERN Open Days
(25-26 Sept. 2027)

Project Leader: Matteo Solfaroli

1) 2 booths in the vicinity of the Mock-up: one for games (including fun 3D printed stuff) and one for more serious and fragile elements. Motivation: "entertain" or at least speak to people queuing, as there will for sure be a long line if robots demos are on the program.

2) For P8, do something "as close as possible from the last LEP detector to be seen, DELPHI".

Thank you for your attention.