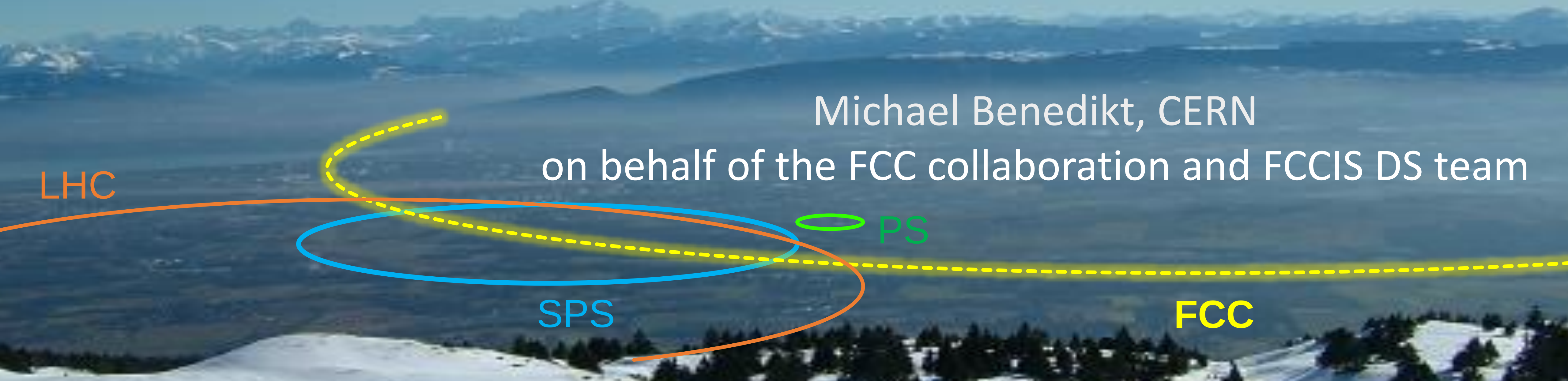
FCC Feasibility Study Status

FCCIS workshop and FCC SAC meeting
5 December 2022

Michael Benedikt, CERN
on behalf of the FCC collaboration and FCCIS DS team



http://cern.ch/fcc

*Work supported by the **European Commission** under the **HORIZON 2020 projects EuroCirCol**, grant agreement 654305; **EASITrain,** grant agreement no. 764879; **ARIES**, grant agreement 730871, **FCCIS**, grant agreement 951754, and **E-JADE,** contract no. 645479*

European Commission
Horizon 2020 European Union funding for Research & Innovation

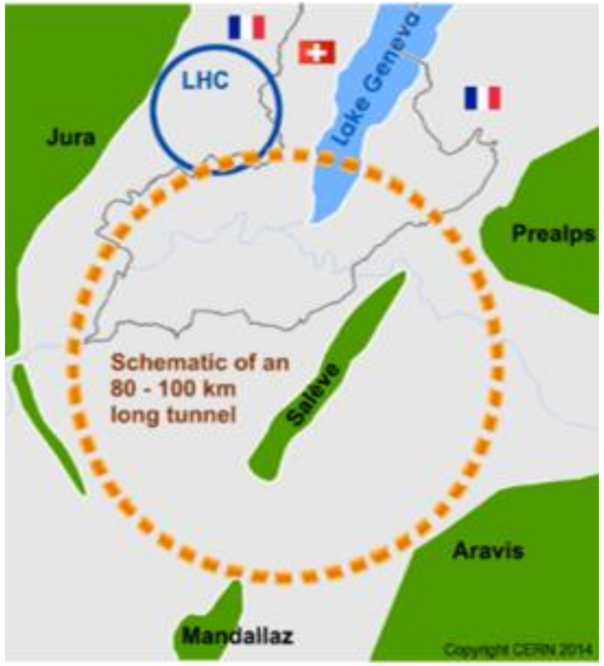
photo: J. Wenninger

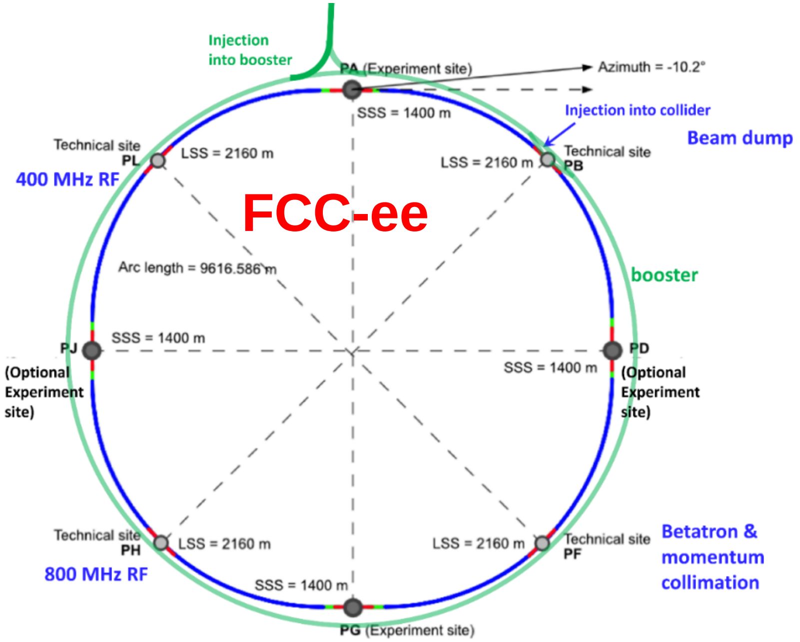
The FCC integrated program inspired by successful LEP – LHC programs at CERN

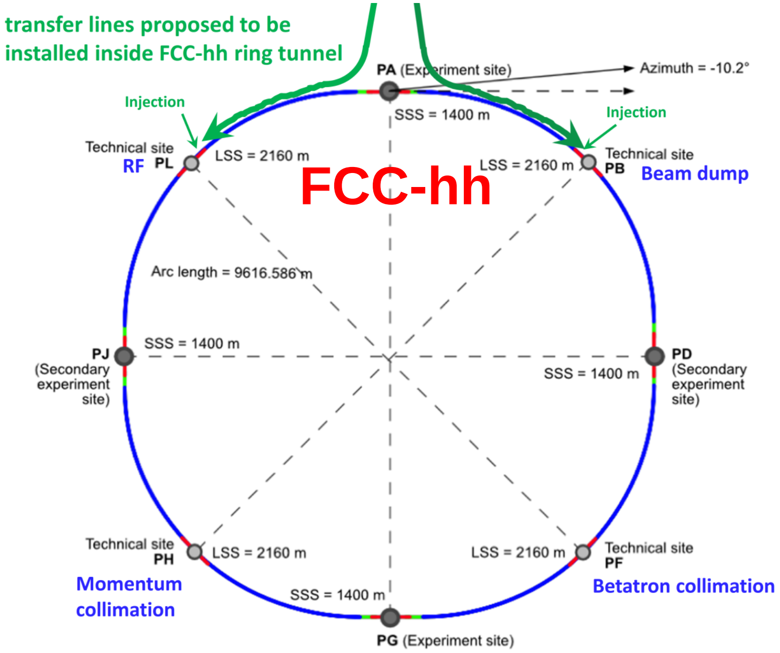
FUTURE CIRCULAR COLLIDER

comprehensive long-term program maximizing physics opportunities

- **stage 1: FCC-ee (Z, W, H, $t\bar{t}$) as Higgs factory, electroweak & top factory at highest luminosities**
- **stage 2: FCC-hh (~100 TeV) as natural continuation at energy frontier, with ion and eh options**
- complementary physics
- common civil engineering and technical infrastructures, building on and reusing CERN's existing infrastructure
- FCC integrated project allows seamless continuation of HEP after completion of the HL-LHC program



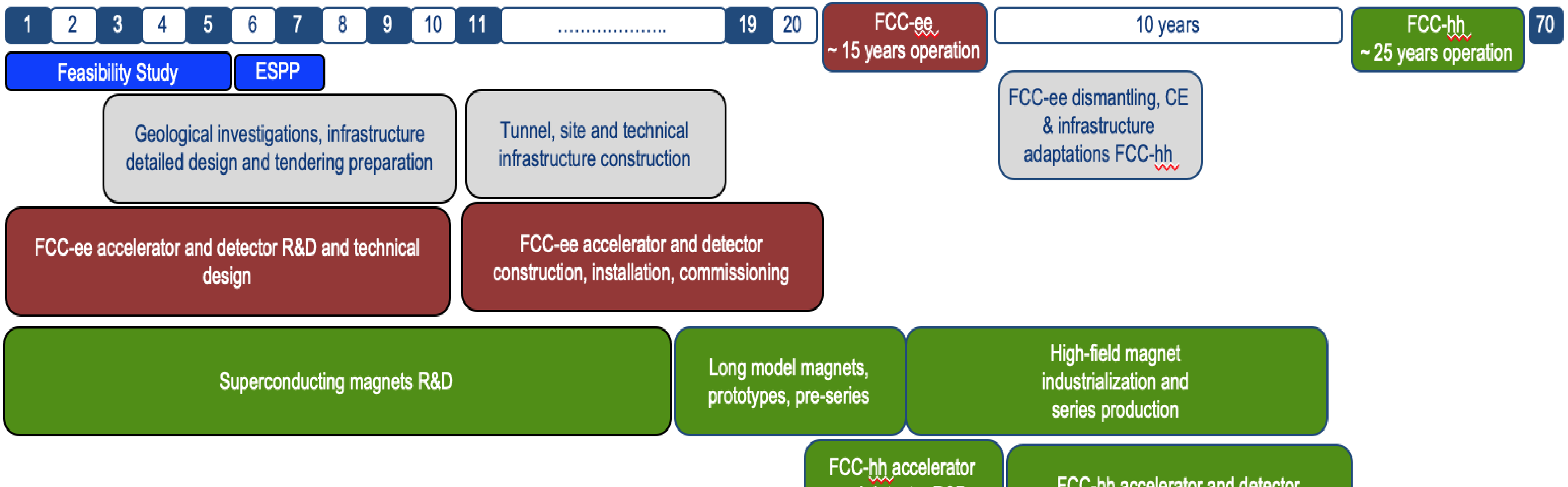




2020 - 2040 | **2045 - 2060** | **2065 - 2090**

a similar two-stage project CEPC/SPPC is under study in China

technical timeline of FCC integrated programme



- Feasibility Study: 2021-2025
- If project approved before end of decade → construction can start beginning 2030s
- FCC-ee operation ~2045-2060
- FCC-hh operation 2070-2090++

F. Gianotti

The FCC integrated program
inspired by successful LEP – LHC programs at CERN

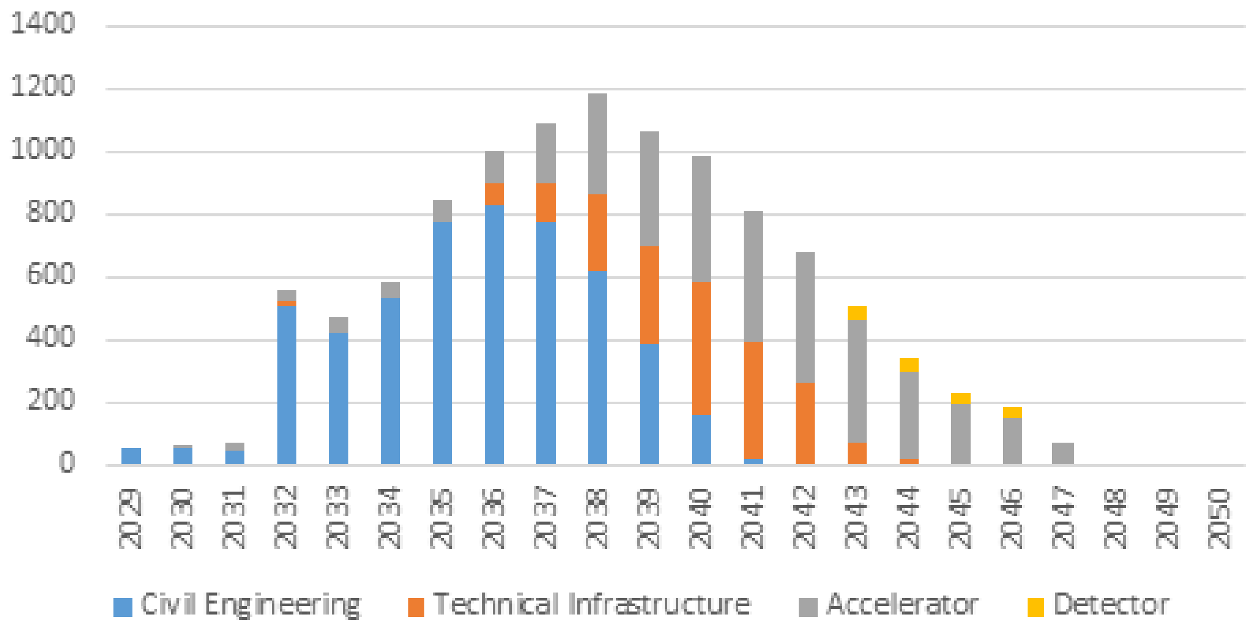
Construction cost estimate for FCC-ee

- Machine configurations for Z, W, H working points included
- Baseline configuration with 2 detectors
- CERN contribution to 2 experiments incl.

cost category	[MCHF]	%
civil engineering	5.400	50
technical infrastructure	2.000	18
accelerator	3.300	30
detector	200	2
total cost (2018 prices)	10.900	100

Spending profile for FCC-ee

- CE construction 2032 - 2040
- Technical infrastructure 2037 - 2043
- Accelerator and experiment 2032 – 2045
- Commissioning and operation start 2045 -2048.



FCC Feasibility Study

FUTURE CIRCULAR COLLIDER

2013 ESPPU requested FCC Conceptual Design four-volume report → 4 volumes delivered in 2018/19, describing the physics cases, the design of the lepton and hadron colliders, and the underpinning technologies and infrastructures. Fol-

2020 ESPPU→ 2021 Launch of FCC Feasibility Study (FCC FS) by CERN Council

- Feasibility Study Report (FSR) expected by the end of 2025 , not only the technical design, but also numerous other key feasibility aspects, including tunnel construction, financing, and environment
- FSR will be an important input to the next ESPPU expected in 2026/27.

FCC FS is organized as an international collaboration.

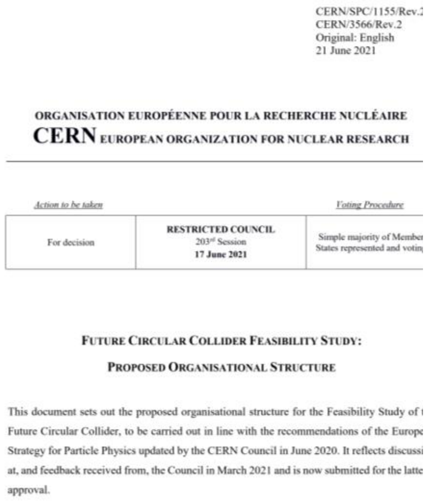
The FCC FS and a possible future project will profit from CERN's decade-long experience with successful large international accelerator projects, e.g., the LHC and HL-LHC, and the associated global experiments, such as ATLAS and CMS.

Organisational Structure of the FCC Feasibility Study

http://cds.cern.ch/record/2774006/files/English.pdf

Main Deliverables and Timeline of the FCC Feasibility Study

http://cds.cern.ch/record/2774007/files/English.pdf



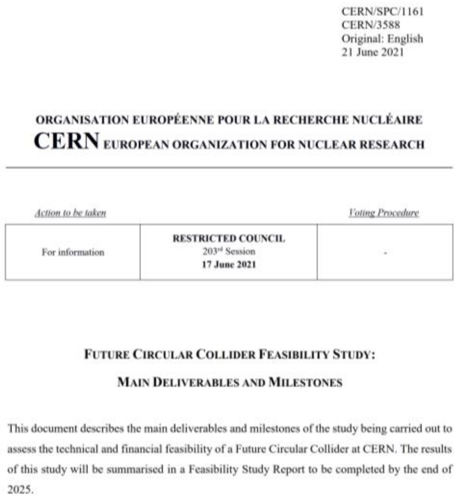
CERN/SPC/1155/Rev.2
CERN/3566/Rev.2
Original: English
21 June 2021

ORGANISATION EUROPÉENNE POUR LA RECHERCHE NUCLÉAIRE
CERN EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

Action to be taken		Voting Procedure
For decision	RESTRICTED COUNCIL 203rd Session 17 June 2021	Simple majority of Member States represented and voting

FUTURE CIRCULAR COLLIDER FEASIBILITY STUDY:
PROPOSED ORGANISATIONAL STRUCTURE

This document sets out the proposed organisational structure for the Feasibility Study of the Future Circular Collider, to be carried out in line with the recommendations of the European Strategy for Particle Physics updated by the CERN Council in June 2020. It reflects discussions at, and feedback received from, the Council in March 2021 and is now submitted for the latter's approval.



CERN/SPC/1161
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FUTURE CIRCULAR COLLIDER FEASIBILITY STUDY:
MAIN DELIVERABLES AND MILESTONES

This document describes the main deliverables and milestones of the study being carried out to assess the technical and financial feasibility of a Future Circular Collider at CERN. The results of this study will be summarised in a Feasibility Study Report to be completed by the end of 2025.

FCC Feasibility Study (2021-205): high-level objectives

- demonstration of the geological, technical, environmental and administrative feasibility of the tunnel and surface areas and optimisation of placement and layout of the ring and related infrastructure;
- pursuit, together with the Host States, of the preparatory administrative processes required for a potential project approval to identify and remove any showstopper;
- optimisation of the design of the colliders and their injector chains, supported by R&D to develop the needed key technologies;
- elaboration of a sustainable operational model for the colliders and experiments in terms of human and financial resource needs, as well as environmental aspects and energy efficiency;
- development of a consolidated cost estimate, as well as the funding and organisational models needed to enable the project's technical design completion, implementation and operation;
- identification of substantial resources from outside CERN's budget for the implementation of the first stage of a possible future project (tunnel and FCC-ee);
- consolidation of the physics case and detector concepts for both colliders.

Results will be summarised in a Feasibility Study Report to be released at end 2025

F. Gianotti

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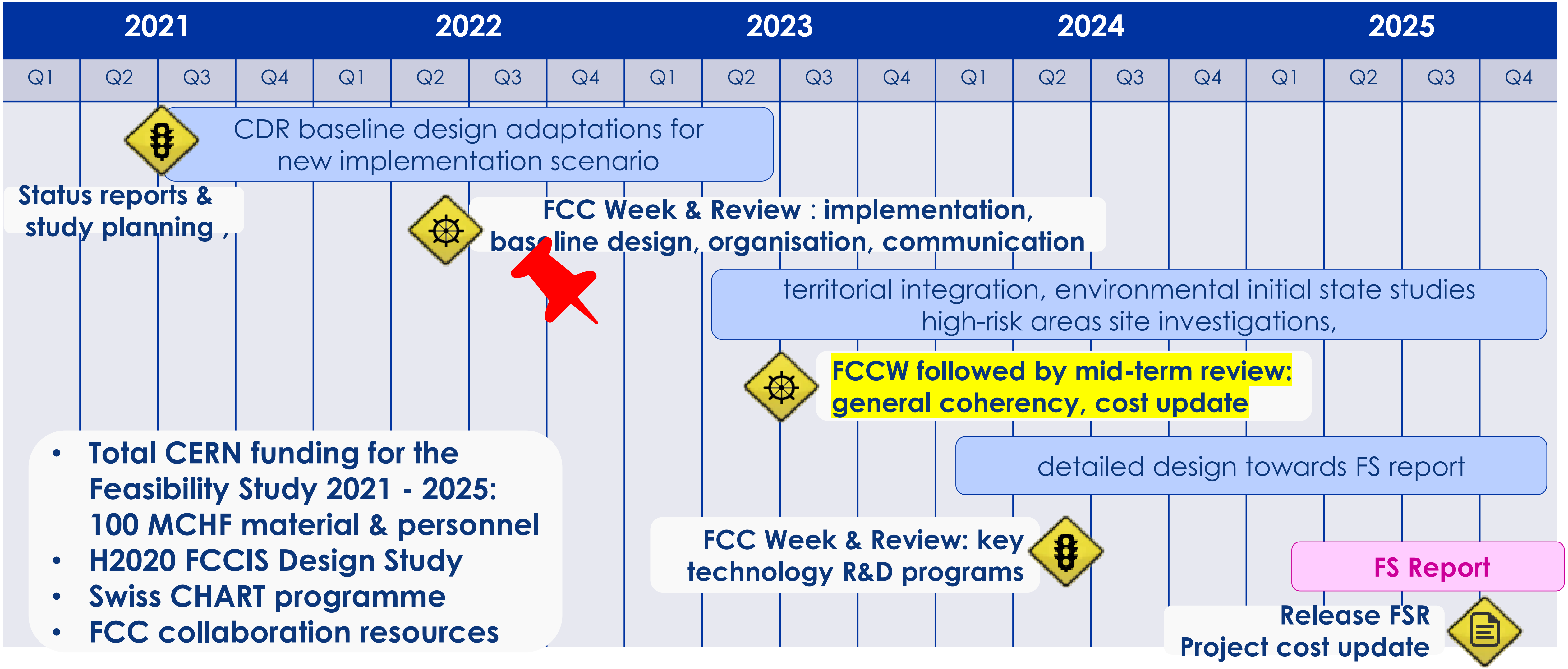
FCC Feasibility Study timeline



- **Total CERN funding for the Feasibility Study 2021 - 2025: 100 MCHF material & personnel**
- **H2020 FCCIS Design Study**
- **Swiss CHART programme**
- **FCC collaboration resources**

Mid-Term Review & Cost Review, autumn '23

Mid-term review report, supported by additional documentation on each deliverable, will be submitted to review committees and to Council and its subordinate bodies, as input for the review.

Results of both general mid-term review and the cost review should indicate the main directions and areas of attention for the second part of the Feasibility Study

Infrastructure & placement

- Preferred placement and progress with host states (territorial matters, initial states, dialogue, etc.)
- Updated civil engineering design (layout, cost, excavation)
- Preparations for site investigations

Technical Infrastructure

- Requirements on large technical infrastructure systems
- System designs, layouts, resource needs, cost estimates

Accelerator design FCC-ee and FCC-hh

- FCC-ee overall layout with injector
- Impact of operation sequence: Z, W, ZH, $t\bar{t}$ vs start at ZH
- Comparison of the SPS as pre-booster with a 10-20 GeV linac
- Key technologies and status of technology R&D program
- FCC-hh overall layout & injection lines from LHC and SC-SPS

Physics, experiments, detectors:

- Documentation of FCC-ee and FCC-hh physics cases
- Plans for improved theoretical calculations to reduce theoretical uncertainties towards matching FCC-ee statistical precision for the most important measurements.
- First documentation of main detector requirements to fully exploit the FCC-ee physics opportunities

Organisation and financing:

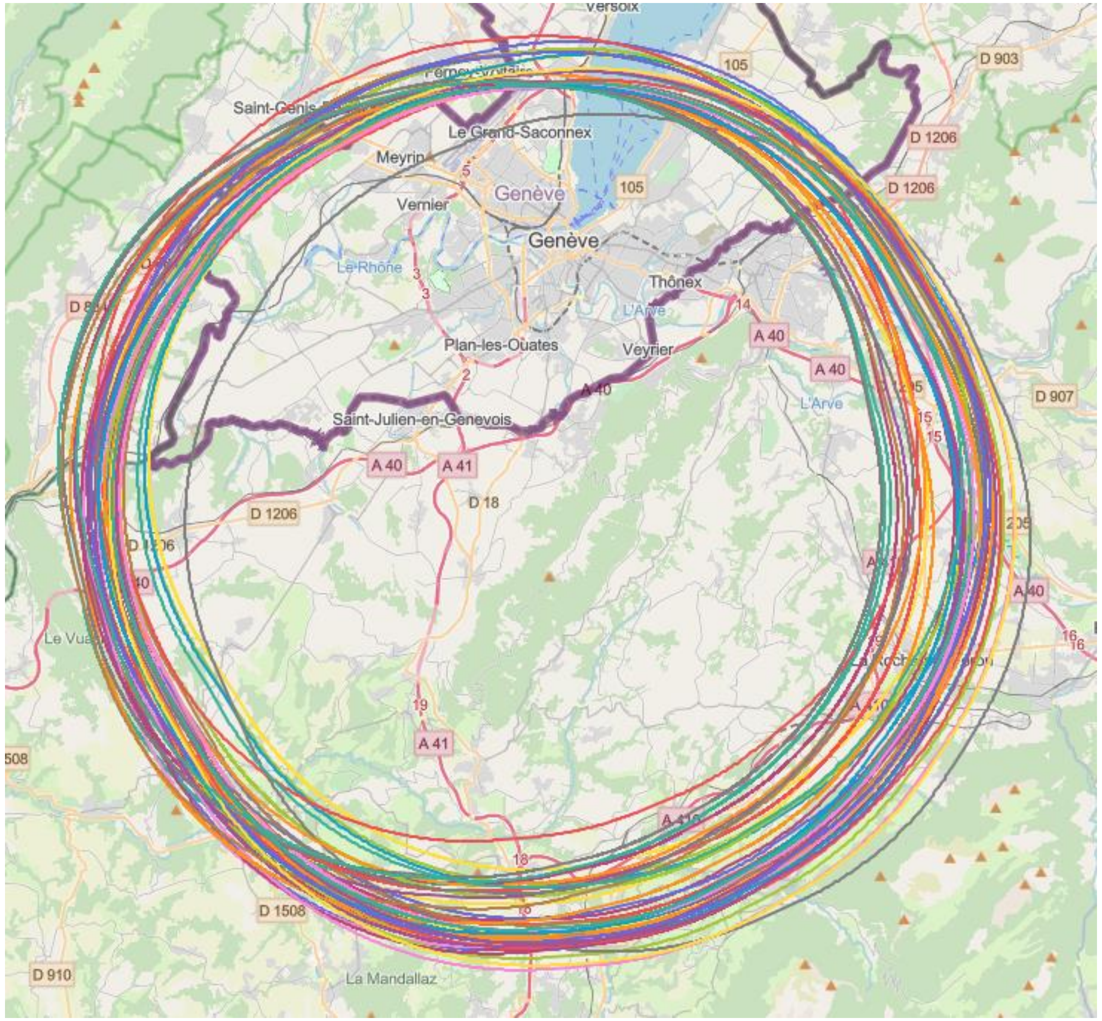
- Overall cost estimate & spending profile for stage 1 project

Environmental impact, socio-economic impact:

- Initial state analysis, carbon footprint, management of excavated materials, etc.
- Socio-economic impact and sustainability studies

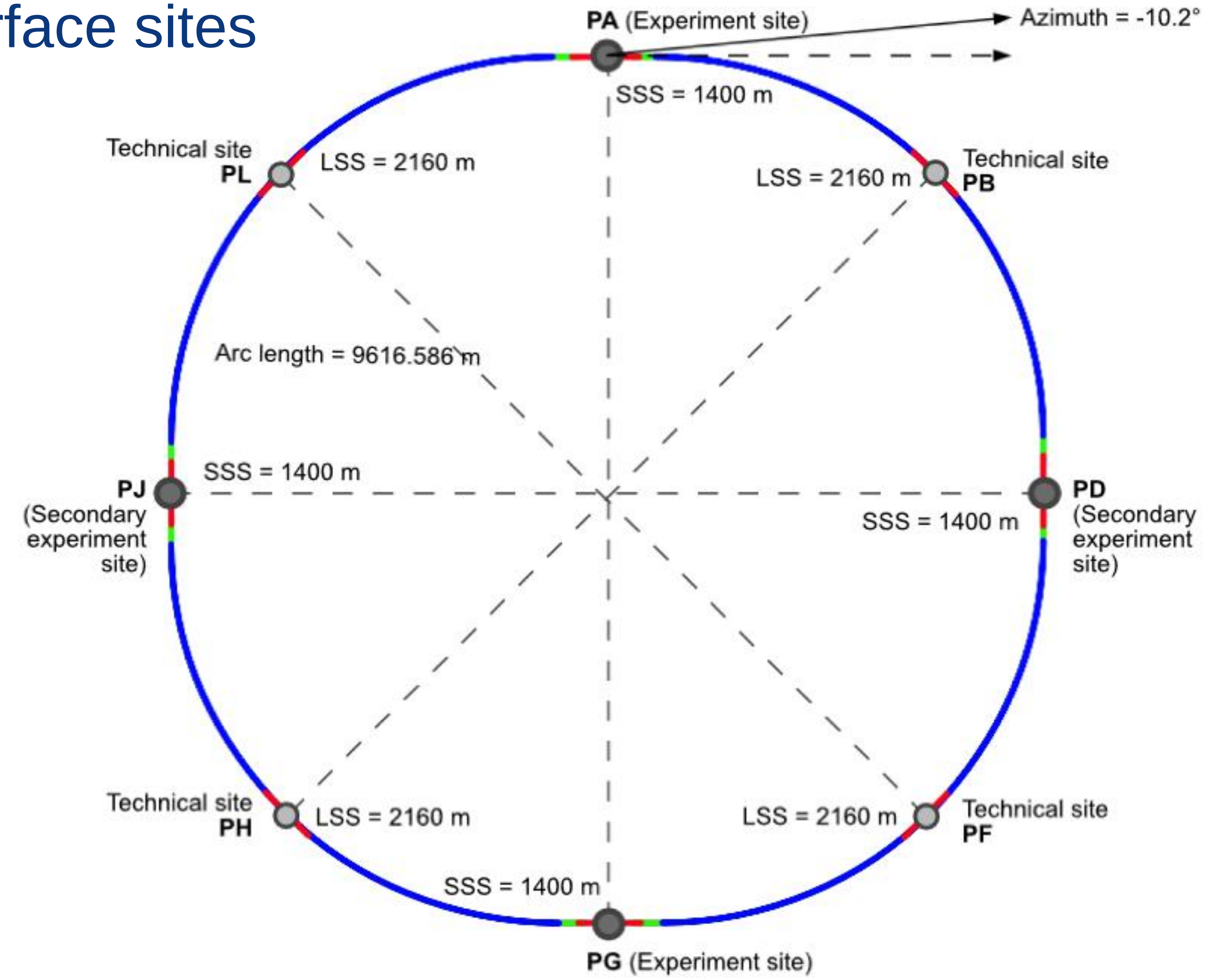
Implementation studies with host states

- layout & placement optimisation across both host states, Switzerland and France;
- following "avoid-reduce-compensate" directive of European & French regulatory frameworks;
- diverse requirements and constraints:
  - **technical feasibility of civil engineering** and subsurface geological constraints
  - **territorial constraints on surface** and subsurface
  - **nature, accessibility**, technical infrastructure, resource needs & constraints
  - **optimum machine performance and efficiency**
  - economic factors including benefits for, and synergies, with the **regional developments**
  - ...
- collaborative effort: FCC technical experts, consulting companies, government-notified bodies



new “lowest risk” placement/optics allows 4 exp’s

8 surface sites



4-fold symmetry
and
4-fold superperiodicity

FCC-ee 2 or 4 Ips
FCC-hh 4 IPs

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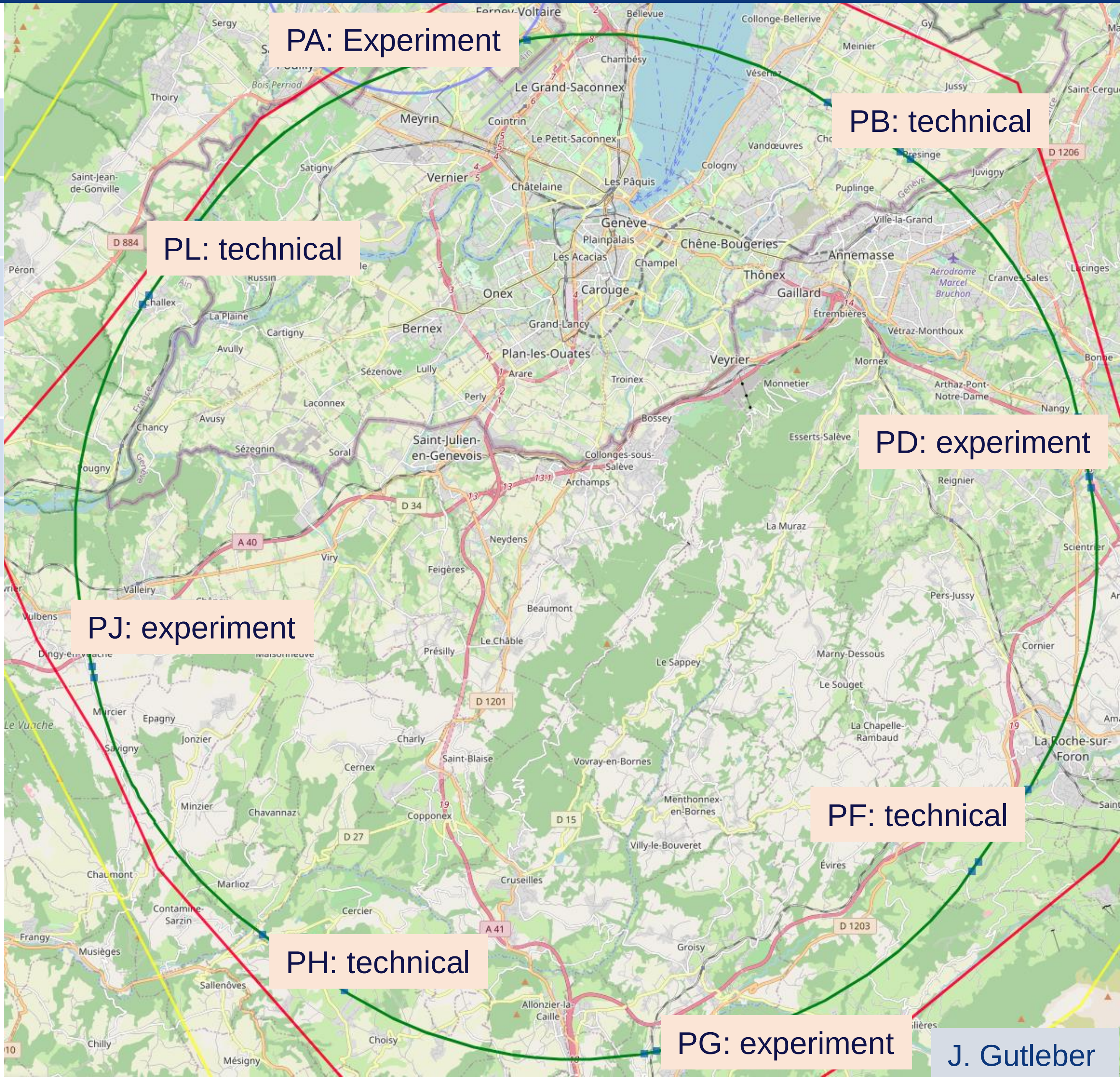
optimized placement and layout

8-site baseline “PA31”

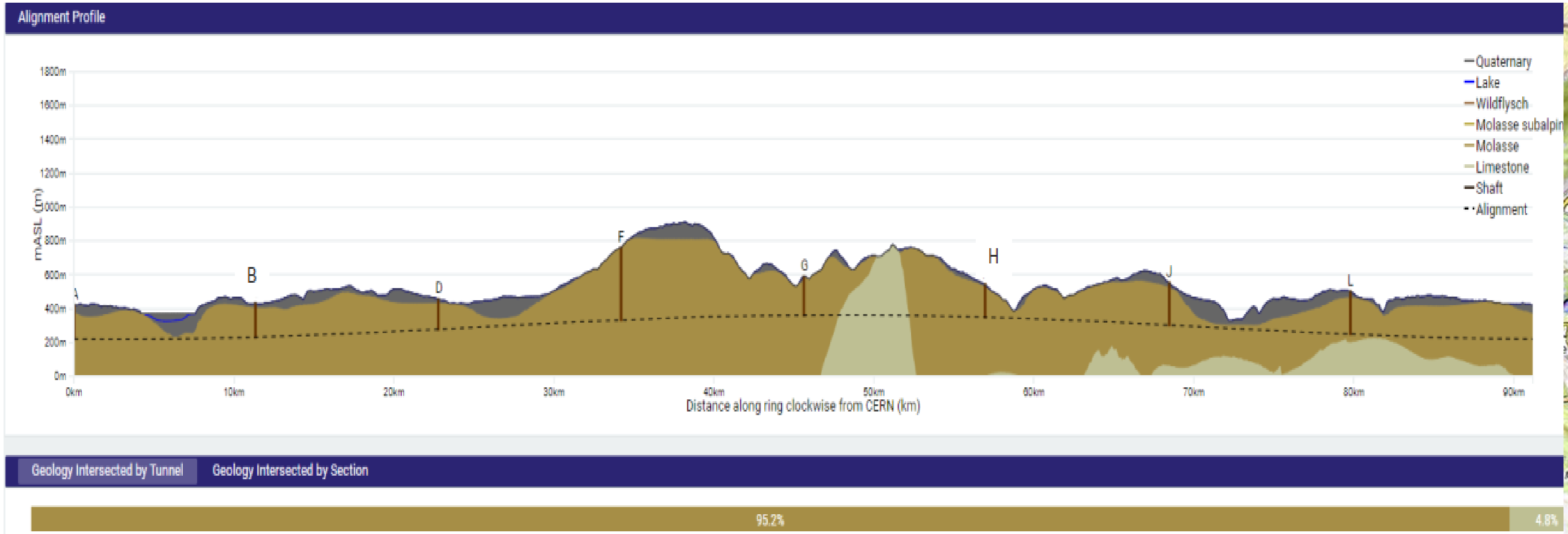
Number of surface sites	8
LSS@IP (PA, PD, PG, PJ)	1400 m
LSS@TECH (PB, PF, PH, PL)	2143 m
Arc length	9.6 km
Sum of arc lengths	76.9 m
Total length	**91.1 km**

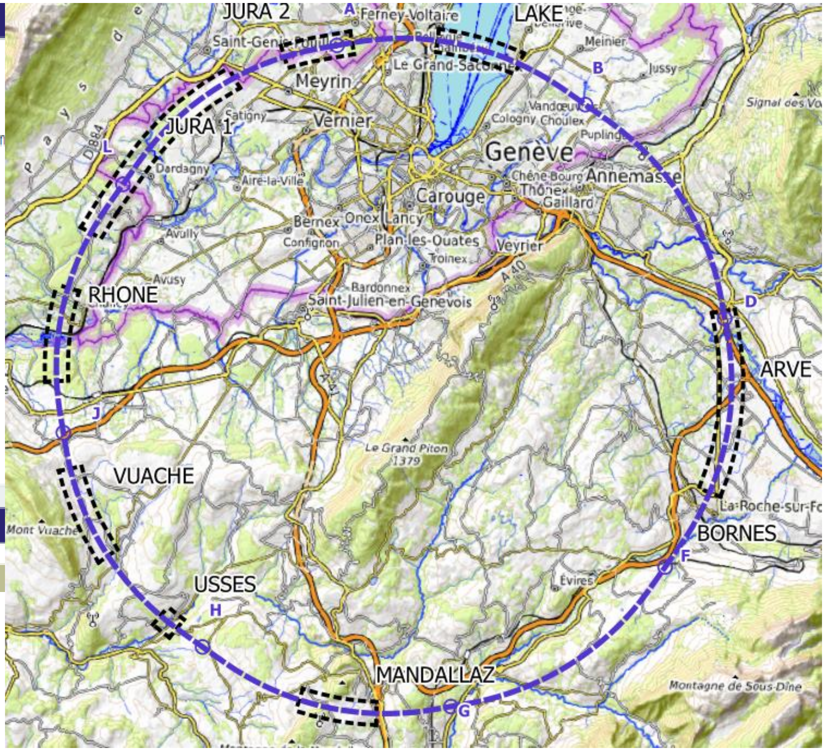
- 8 sites – less use of land, <40 ha instead 62 ha
- Possibility for 4 experiment sites in FCC-ee
- All sites close to road infrastructures (< 5 km of new road constructions for all sites)
- Vicinity of several sites to 400 kV grid lines
- Good road connection of PD, PF, PG, PH suggest operation pole around Annecy/LAPP
- **Exchanges with ~40 local communes ongoing**



J. Gutleber

FCC implementation - footprint baseline





Present baseline implementation

- 91.2 km circumference
- 95% in molasse geology for minimising tunnel construction risks
- 8 surface sites with ~5 ha area each.

Site investigations planned for 2024 and 2025 in areas with uncertain geological conditions:

- Limestone-molasse border, karstification, water pressure, moraine properties, water bearing layers, etc.
- ~40-50 drillings, 100 km of seismic lines

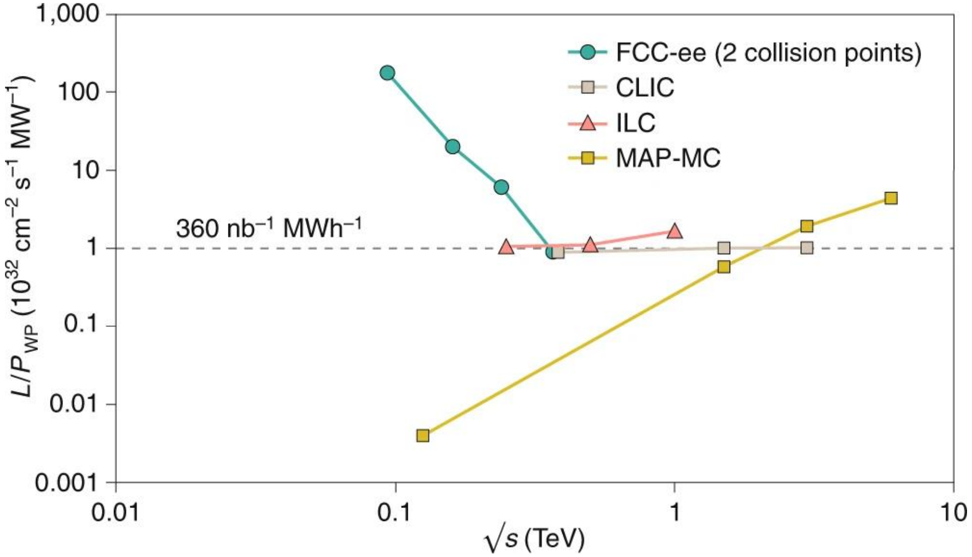
Progress with regional activities

- CERN visits of Elus from Departments Haute Savoie, Ain and Canton Geneva
- Information meetings and exchanges with presidents and prefets of Ain and Haute Savoie to prepare regional activities
- All communes concerned by FCC trace were approached directly via information letters co-signed by Prefet de la region ARA and CERN DG for France and Conseiller d’Etat de Geneve and CERN DG for Switzerland.
- Consultations with individual communes presently ongoing, first contact with all 42 completed before end of year.
- Technical discussions on territorial implementation, water use, excavation material reuse, etc. started with department 74 Haute Savoie.

Sustainability aspects and studies

highly sustainable Higgs factory

luminosity vs. electricity consumption



Thanks to twin-aperture magnets, thin-film SRF, efficient RF power sources, top-up injection

optimum usage of excavation material

int'l competition "mining the future®"

https://indico.cern.ch/event/1001465/

FCC-ee annual energy consumption ~ LHC/HL-LHC

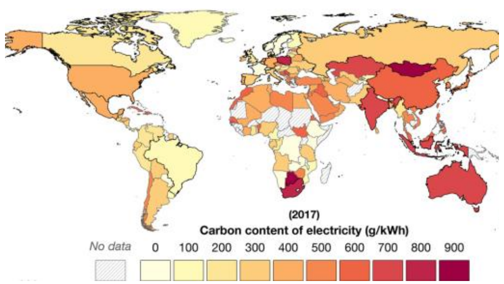
120 GeV	Days	Hours	Power OP	Power Com	Power MD	Power TS	Power Shutdown		
Beam operation	143	3432	293					1005644	MWh
Downtime operation	42	1008	109					110266	MWh
Hardware, Beam commissioning	30	720		139				100079	MWh
MD	20	480			177			85196	MWh
technical stop	10	240				87		20985	MWh
Shutdown	120	2880					69	199872	MWh
Energy consumption / year	365	8760						1.52	TWh
Average power								174	MW

J.-P. Burnet, FCC Week 2022

CERN Meyrin, SPS, FCC	Z	W	H	TT
Beam energy (GeV)	45.6	80	120	182.5
Energy consumption (TWh/y)	1.82	1.92	2.09	2.54

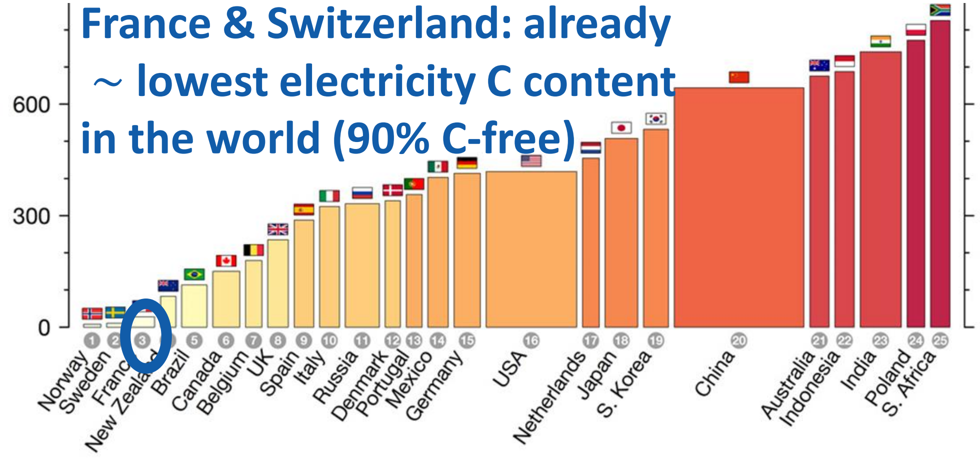
incl. CERN site & SPS

powered by mix of renewable & other C-free sources



https://www.carbonbrief.org/

France & Switzerland: already ~ lowest electricity C content in the world (90% C-free)

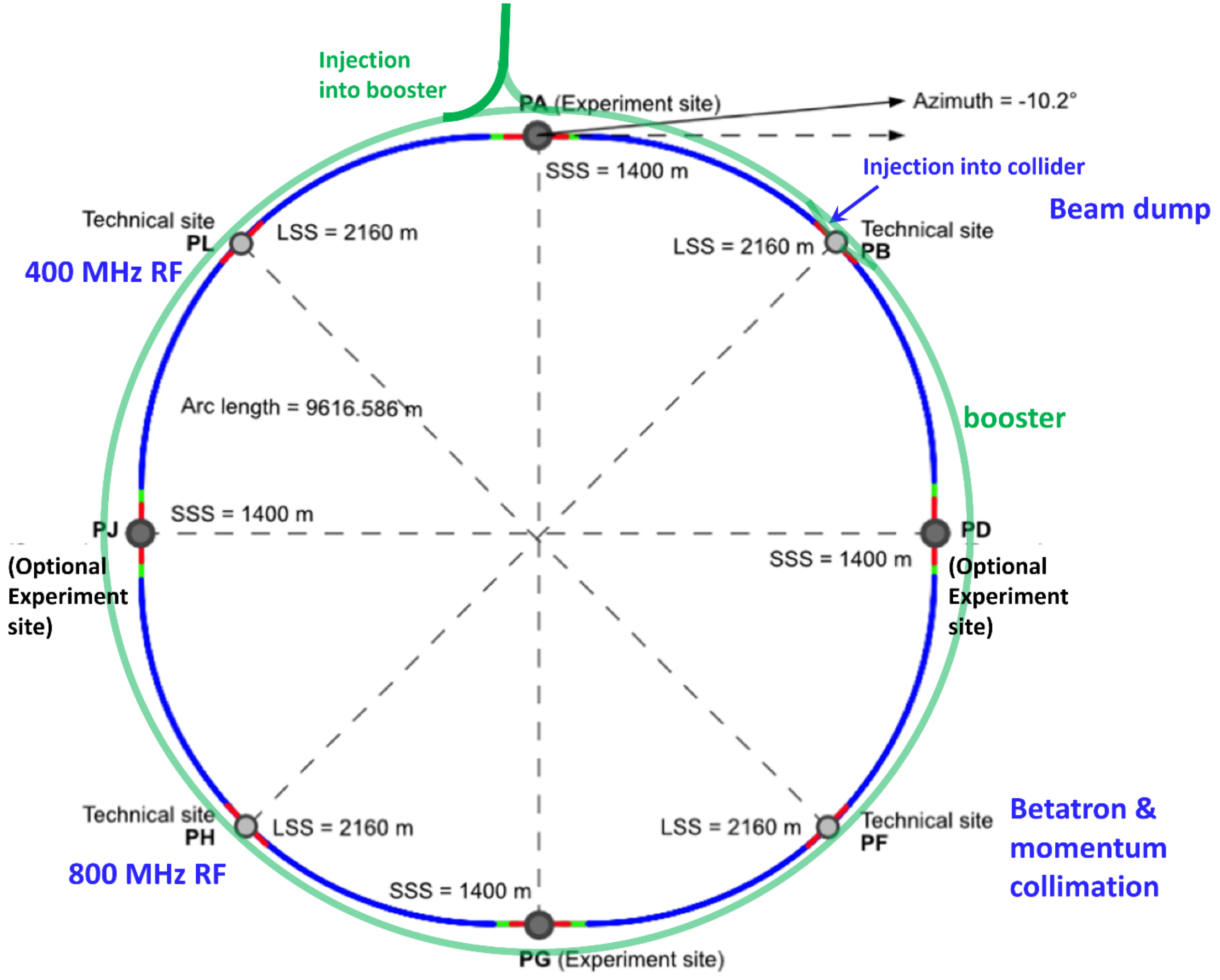


new layouts & preliminary assignments of straight sections

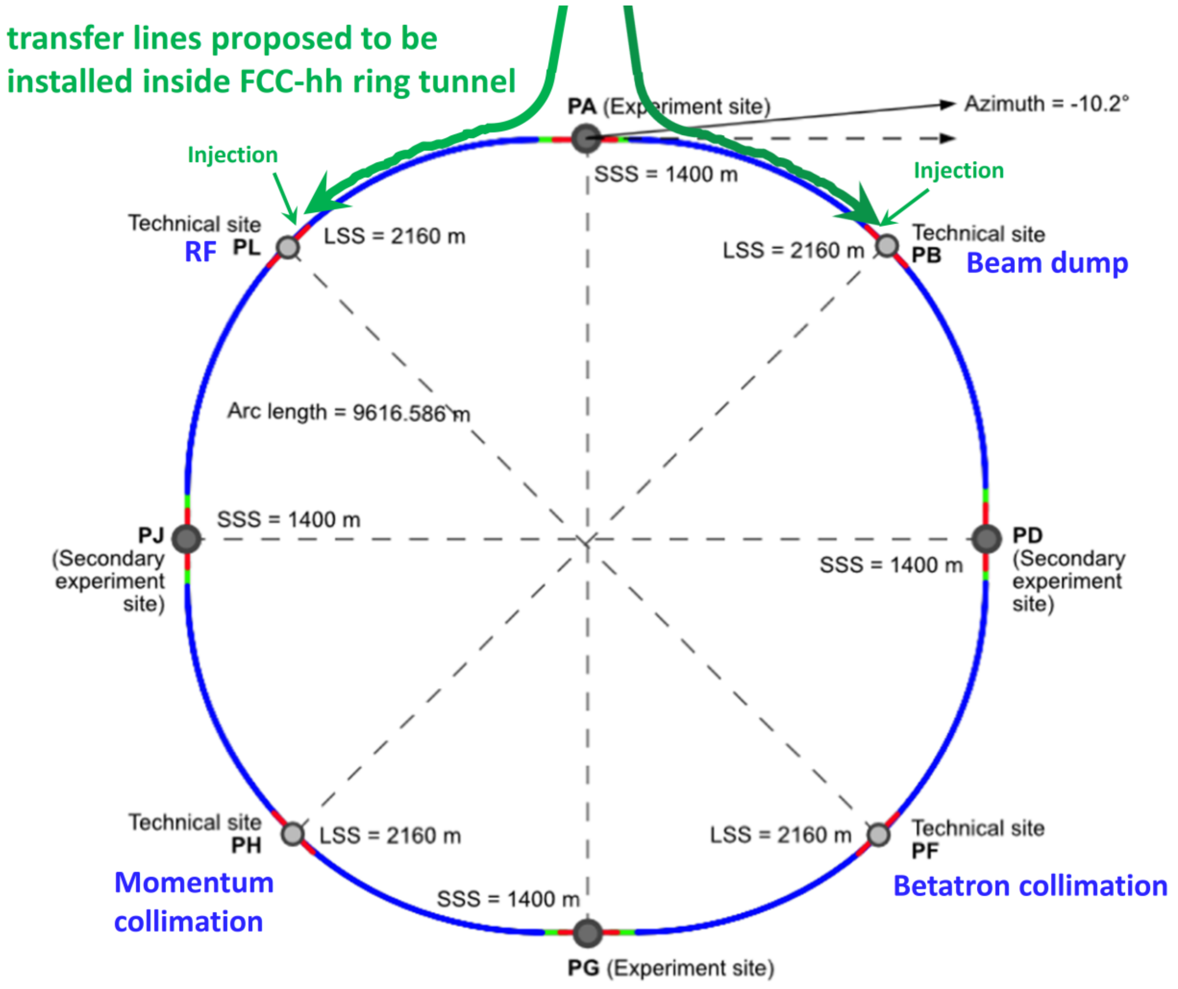
injection-tunnel near PA; 4 exp. caverns for both

4-fold periodicity, synergies ee & hh

FCC-ee



FCC-hh



FCC-ee in a nutshell

- **High luminosity precision study of Z, W, H, and $t\bar{t}$** 2×10^{36} cm^{-2}s^{-1}/IP at Z (or total ~10^{37} cm^{-2}s^{-1} with 4 IPs), 7×10^{34} cm^{-2}s^{-1} at ZH, 1.3×10^{34} cm^{-2}s^{-1} at $t\bar{t}$, unprecedented energy resolution at Z (<100 keV) and W (<300 keV)
- **Low-risk technical solution** based on 60 years of e^+e^- circular colliders and particle detectors ; R&D on components for improved performance, but no need for "demonstration" facilities; LEP2, VEPP-4M, PEP-II, KEKB, DAΦNE, or SuperKEKB already used many of the key ingredients in routine operation
- Infrastructure will support a **century of physics**
  - FCC-ee → FCC-hh → FCC-eh and/or several other options (FCC-μμ, Gamma Factory ..)
- **Utility requirements** similar to CERN existing use
- **Strong support** from CERN, partners, and 2020 ESPPU

Stage 1: updated parameters

K. Oide, D. Shatilov,

Parameter [4 IPs, 91.2 km, T_{rev}=0.3 ms]	Z	WW	H (ZH)	ttbar
beam energy [GeV]	45	80	120	182.5
beam current [mA]	1280	135	26.7	5.0
number bunches/beam	10000	880	248	36
bunch intensity [10^{11}]	2.43	2.91	2.04	2.64
SR energy loss / turn [GeV]	0.0391	0.37	1.869	10.0
total RF voltage 400/800 MHz [GV]	0.120/0	1.0/0	2.08/0	4.0/7.25
long. damping time [turns]	1170	216	64.5	18.5
horizontal beta* [m]	0.1	0.2	0.3	1
vertical beta* [mm]	0.8	1	1	1.6
horizontal geometric emittance [nm]	0.71	2.17	0.64	1.49
vertical geom. emittance [pm]	1.42	4.34	1.29	2.98
horizontal rms IP spot size [μm]	8	21	14	39
vertical rms IP spot size [nm]	34	66	36	69
beam-beam parameter ξ_x / ξ_y	0.004/ .159	0.011/0.111	0.0187/0.129	0.096/0.138
rms bunch length with SR / BS [mm]	4.38 / 14.5	3.55 / 8.01	3.34 / 6.0	2.02 / 2.95
luminosity per IP [10^{34} cm^{-2}s^{-1}]	182	19.4	7.3	1.33
total integrated luminosity / year [ab^{-1}/yr]	87	9.3	3.5	0.65
beam lifetime (rad Bhabha + BS+lattice)	8	18	6	10

FCC-ee Pre-Injector - Swiss CHART 2 program

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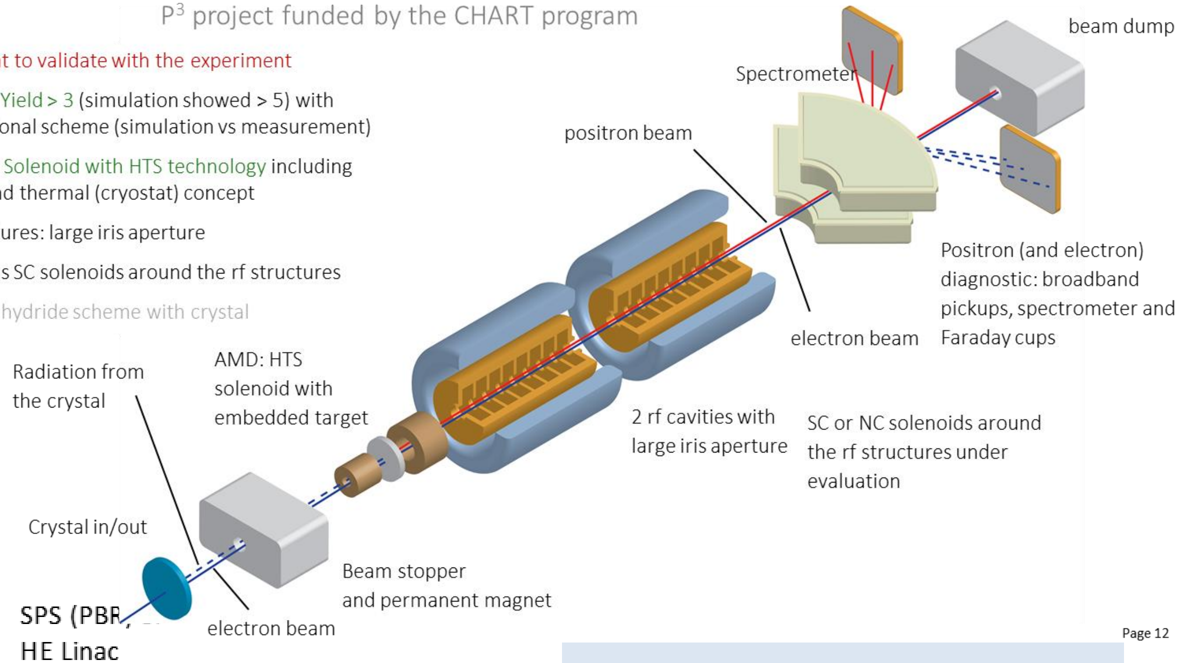
Collaboration between PSI and CERN with external partners: CNRS-IJCLab (Orsay), INFN-LNF (Frascati), KEK/SuperKEKB as observer, INFN-Ferrara – radiation from crystal

P^3: PSI e^+ production experiment with HTS solenoid at SwissFEL planned for 2024/25

P^3 project funded by the CHART program

What we want to validate with the experiment

- ✓ Positron Yield > 3 (simulation showed > 5) with conventional scheme (simulation vs measurement)
- ✓ AMD: SC Solenoid with HTS technology including mech. and thermal (cryostat) concept
- ✓ RF structures: large iris aperture
- ✓ NC versus SC solenoids around the rf structures
- ✓ Phase 2: hydride scheme with crystal



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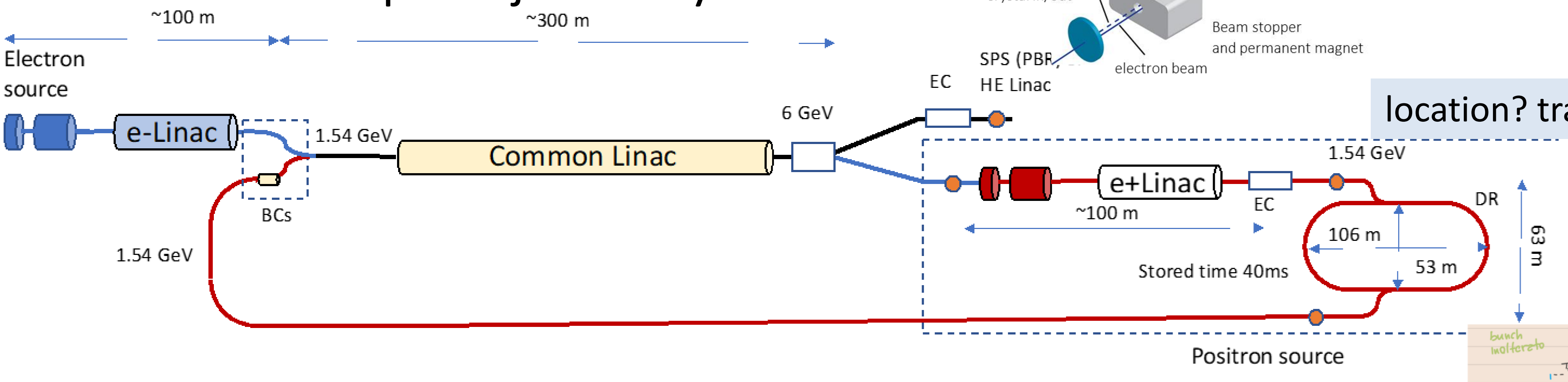
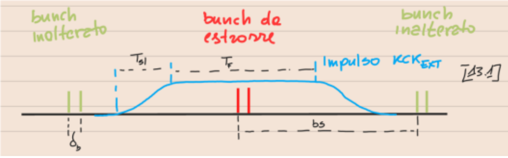
Latest FCC-ee pre-injector layout



location? transfer lines?

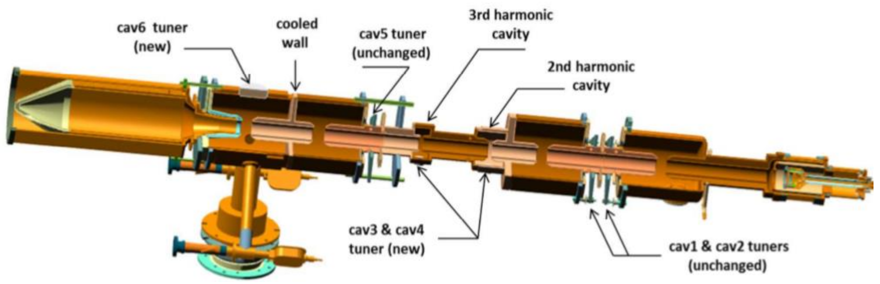


P. Craievich, A. Grudiev, C. Milardi, A. De Santis, et al.

Accelerator R&D examples

efficient RF power sources
(400 & 800 MHz)

I. Syratchev

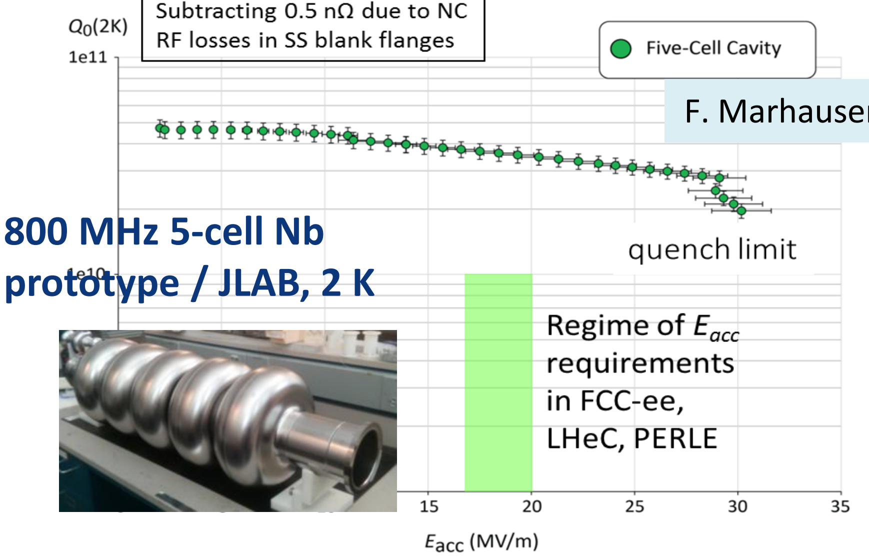


FPC & HOM coupler, cryomodule, thin-film coatings…

efficient SC cavities

Jefferson Lab

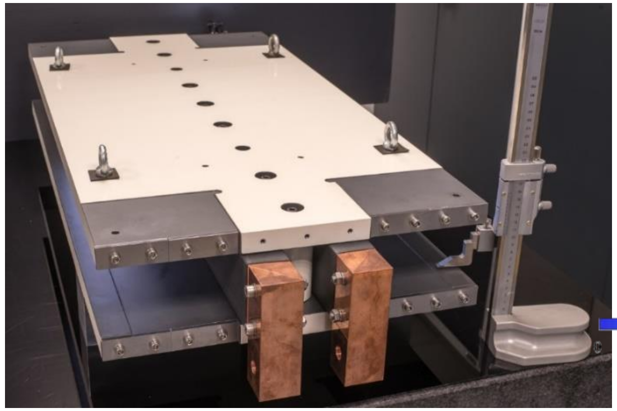
400 MHz 1-,2- & 4-cell Nb/Cu , 4.5 K

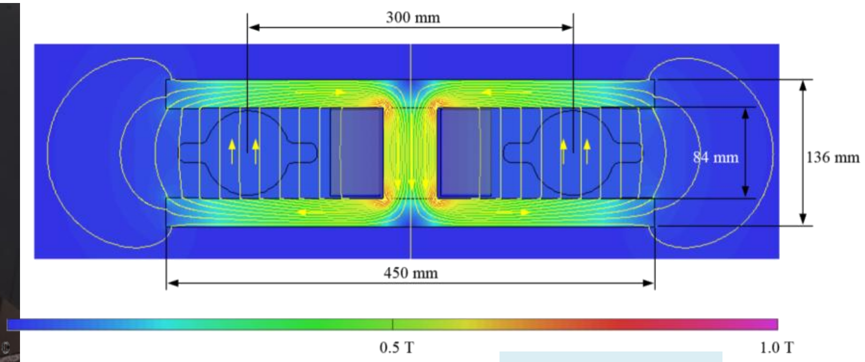


F. Marhauser

800 MHz 5-cell Nb prototype / JLAB, 2 K

energy **efficient** twin aperture **arc dipoles**

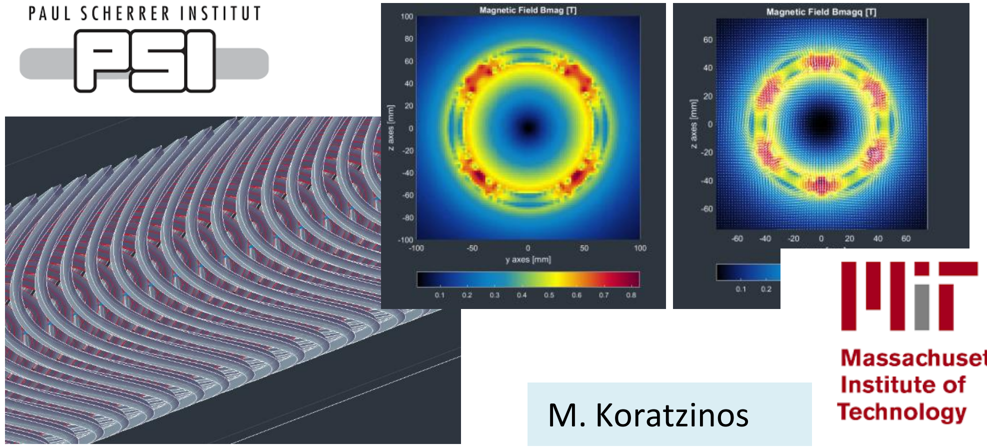




A. Milanese

under study: **CCT HTS quad's & sext's for arcs**

PAUL SCHERRER INSTITUT
PSI



Massachusetts Institute of Technology

M. Koratzinos

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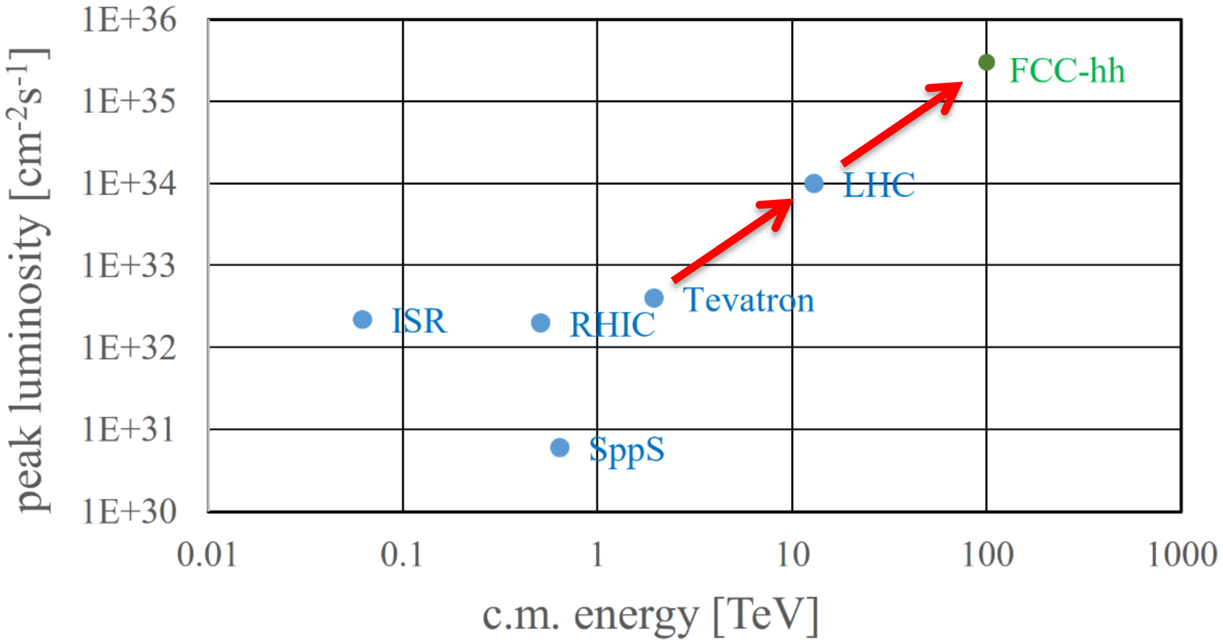
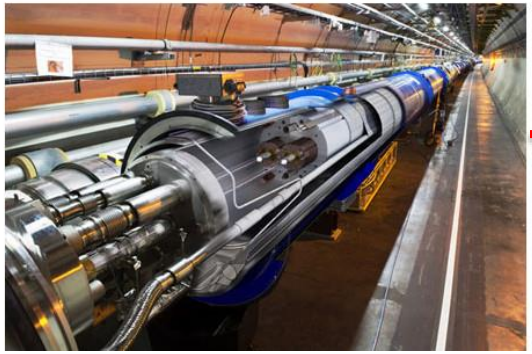
FCC-hh: highest collision energies

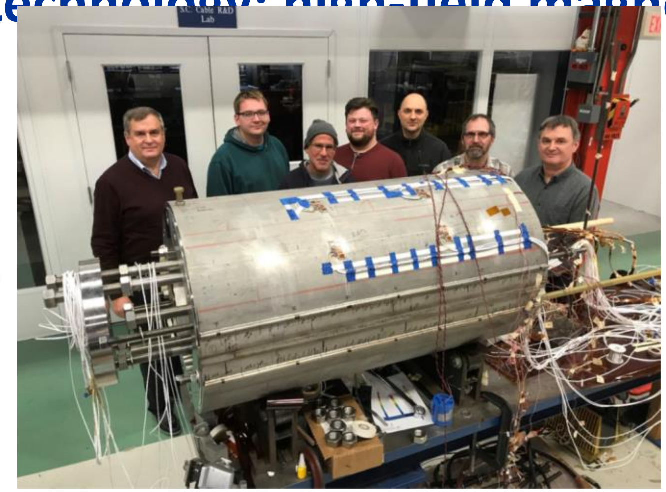


- **order of magnitude performance increase** in both **energy & luminosity**
- **100 TeV cm collision energy** (vs 14 TeV for LHC)
- **20 ab-1 per experiment collected over 25 years** of operation (vs 3 ab^{-1} for LHC)
- similar performance increase as from Tevatron to LHC
- **key technology: high-field magnets**

from
LHC technology
8.3 T NbTi dipole



via
HL-LHC technology
12 T Nb_3Sn quadrupole



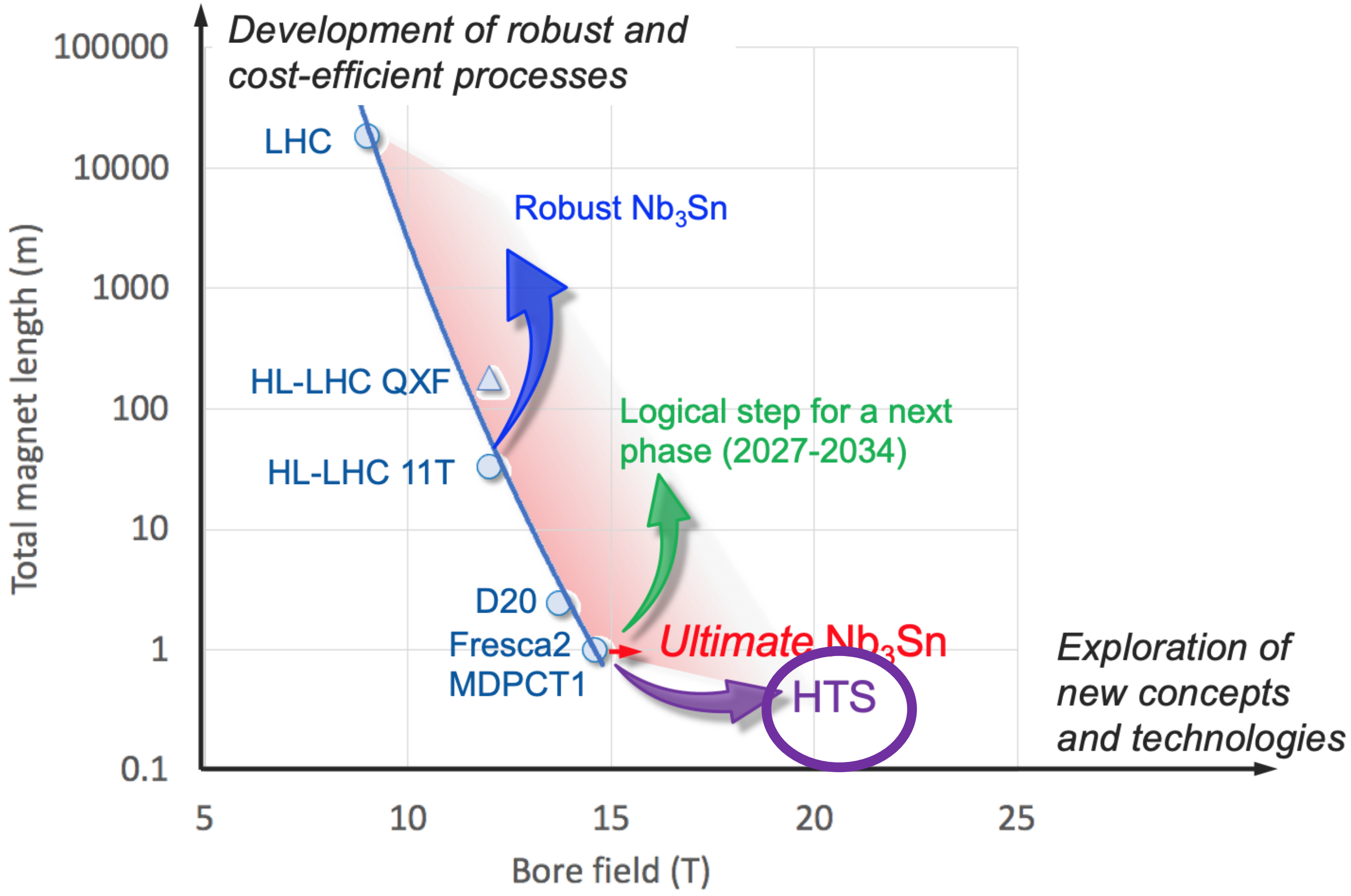
FNAL dipole demonstrator 4-layer cosϑ 14.5 T Nb_3Sn in 2019

Stage 2: FCC-hh (pp) collider parameters

parameter	FCC-hh		HL-LHC	LHC
collision energy cms [TeV]	100		14	14
dipole field [T]	~17 (~16 comb.function)		8.33	8.33
circumference [km]	91.2		26.7	26.7
beam current [A]	0.5		1.1	0.58
bunch intensity [10^{11}]	1	1	2.2	1.15
bunch spacing [ns]	25	25	25	25
synchr. rad. power / ring [kW]	2700		7.3	3.6
SR power / length [W/m/ap.]	32.1		0.33	0.17
long. emit. damping time [h]	0.45		12.9	12.9
beta* [m]	1.1	0.3	0.15 (min.)	0.55
normalized emittance [μm]	2.2		2.5	3.75
peak luminosity [10^{34} cm^{-2}s^{-1}]	5	30	5 (lev.)	1
events/bunch crossing	170	1000	132	27
stored energy/beam [GJ]	7.8		0.7	0.36

HFM: preparing for FCC stage 2 (FCC-hh)

In parallel to FCC studies,
High Field Magnet development program as long-term separate R&D project



CERN budget for high-field magnets doubled in 2020 Medium-Term Plan (~ 200 MCHF over ten years)

Main R&D activities:

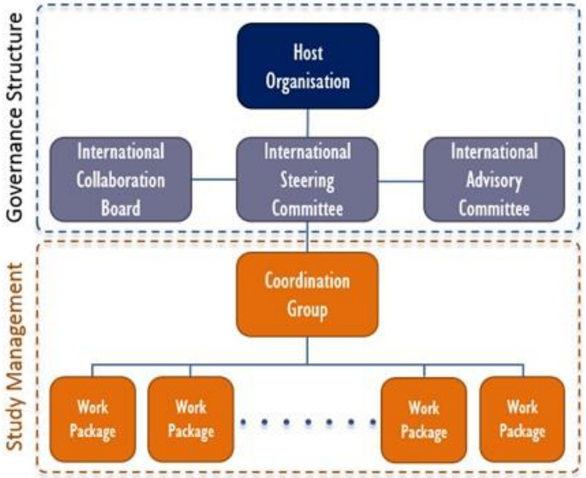
- materials: goal is ~16 T for Nb_3Sn, at least ~20 T for HTS inserts
- magnet technology: engineering, mechanical robustness, insulating materials, field quality
- production of models and prototypes: to demonstrate material, design and engineering choices, industrialisation and costs
- infrastructure and test stations: for tests up to ~ 20 T and 20-50 kA

Detailed deliverables and timescale being defined through Accelerator R&D roadmap under development

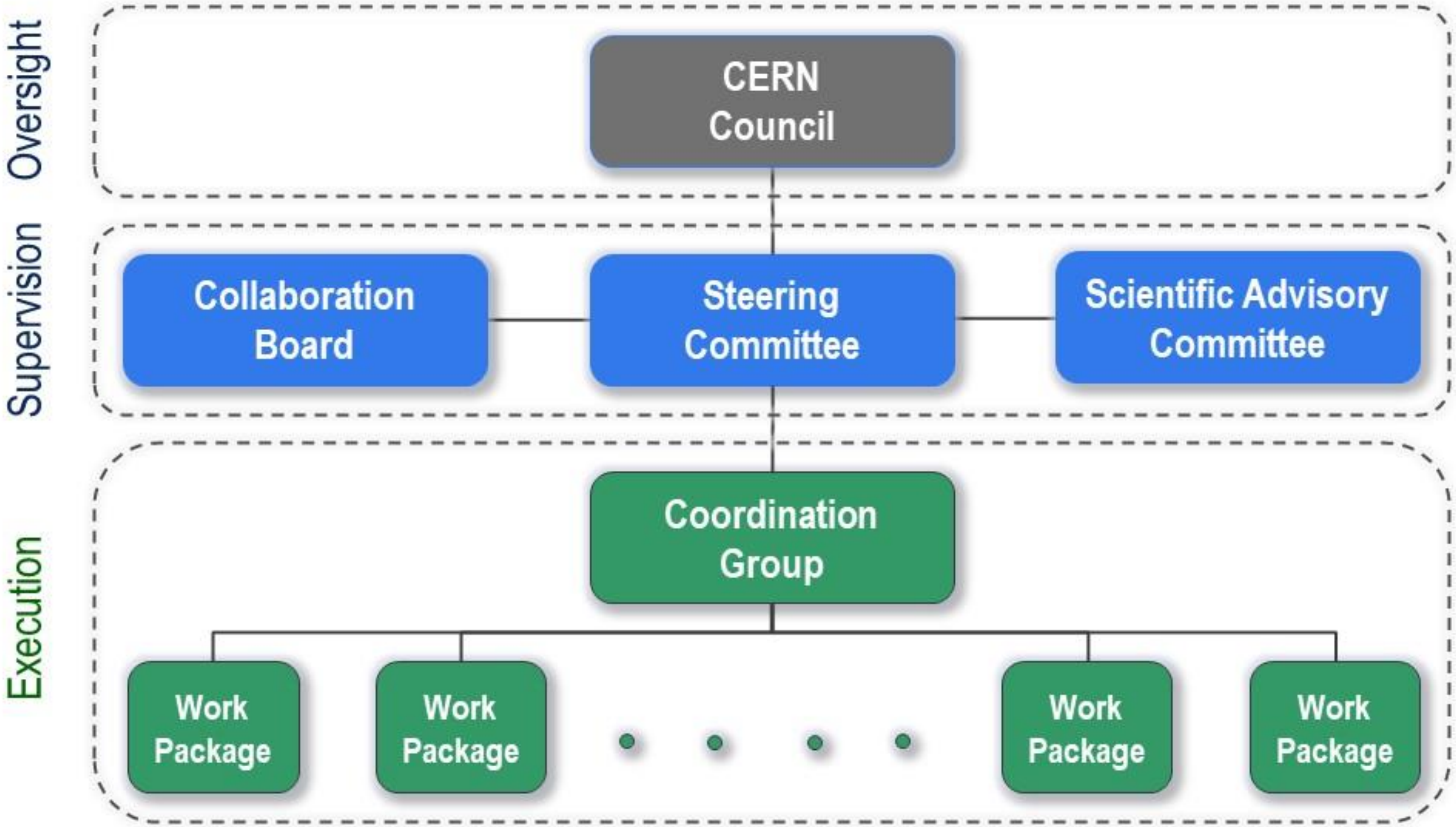
L. Bottura, F. Gianotti, A. Siemko

FCC Feasibility Study - organisational structure

- New structure very similar to the first phase of the FCC Study (2014-2020), leading to the Conceptual Design Report as input to the ESPPU.



- Classical structure common to CERN projects.



FCC Feasibility Study

Study Support and Coordination
Study Leader: Michael Benedikt
Deputy Study Leader: Frank Zimmermann

EU Projects
NN

Collaboration building
Emmanuel Tsesmelis

Communications
Panagiotis Charitos, James Gillies

Study Support Unit
IT: Sylvain Girod
Procurement: Adam Horridge
Quality management: NN
Resources: Sylvie Prodon
Scheduling: NN
Secretariat: Julie Hadre

Physics, Experiments and Detectors
Patrick Janot, Christophe Grojean

- **Physics programme** – Matthew McCullough, Frank Simon
- **Detector concept** – Mogens Dam
- **Physics performance** – Patrizia Azzi, Emmanuel Perez
- **Software and computing** – Gerardo Ganis, Clément Helsens

Accelerators
Tor Raubenheimer
Frank Zimmermann

- **FCC-ee collider design** – Katsunobu Oide
- **FCC-hh design** – Massimo Giovannozzi
- **Technology R&D** – Roberto Losito
- **FCC-ee booster design** – Antoine Chancé
- **FCC-ee injector** – Paolo Craievich, Alexej Grudiev
- **FCC-ee energy calibration polarization** – Alain Blondel, Jorg Wenninger
- **FCC-ee MDI** – Manuela Boscolo, Mike Sullivan

Technical Infrastructures
Klaus Hanke

- **Integration** – Jean-Pierre Corso
- **Geodesy & survey** – Hélène Mainaud Durand
- **Electricity and energy management** – Jean-Paul Burnet
- **Cooling and ventilation** – Guillermo Peon
- **Cryogenics systems** – Laurent Delprat
- **Computing and controls infrastructure, communication and network** – Pablo Saiz
- **Safety** – Thomas Otto
- **Operation, maintenance, availability, reliability** – Jesper Nielsen
- **Transport, installation concepts** – Roberto Rinaldesi

Host State processes and civil engineering
Timothy Watson

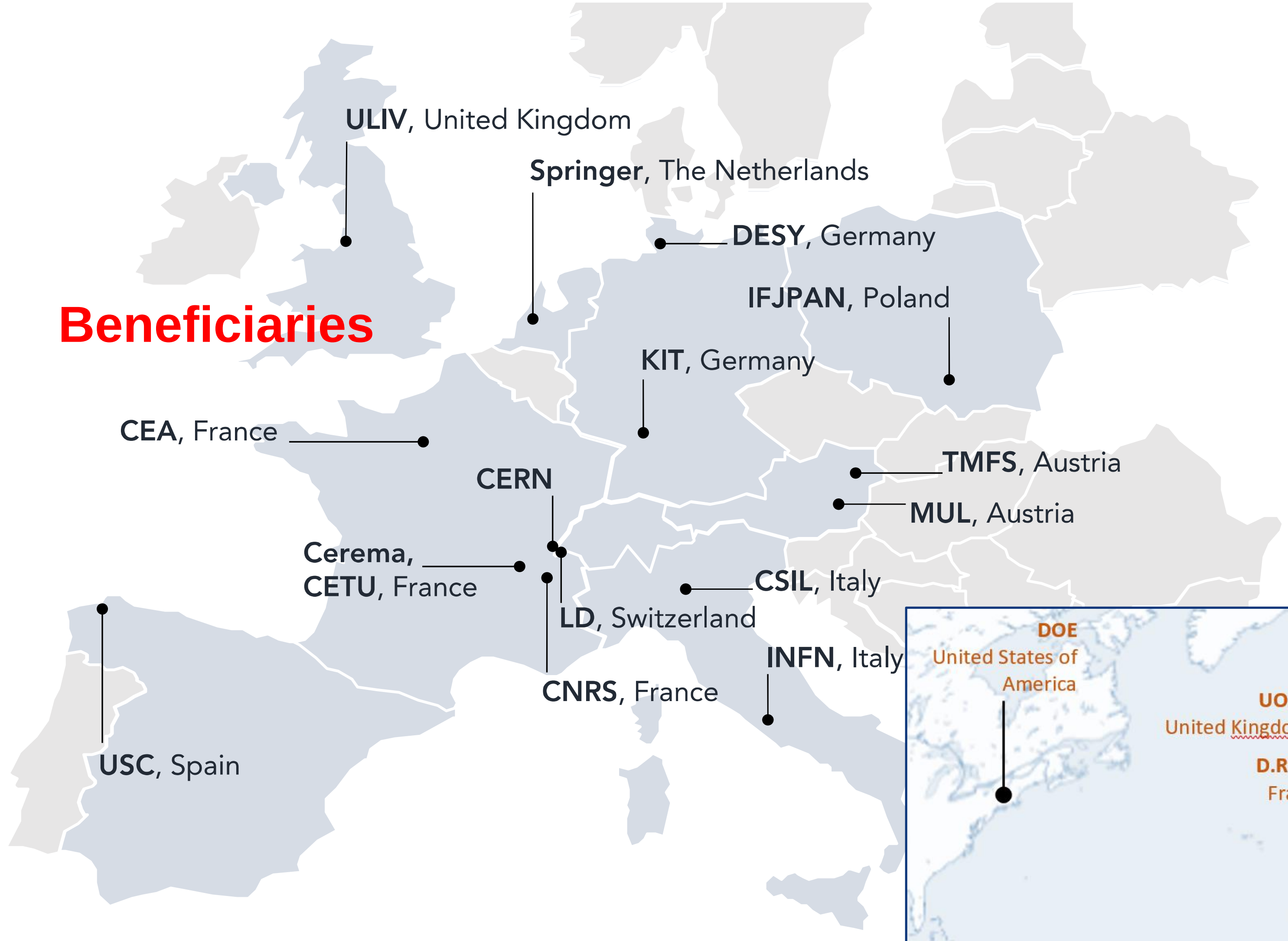
- **Administrative processes** – Friedemann Eder
- **Placement studies** – Johannes Gutleber, Volker Mertens
- **Environmental evaluation** – Johannes Gutleber
- **Tunnel, subsurface design** – John Osborne
- **Surface sites layout, access and building design** – LD opening

Organisation and financing models
Paul Collier (interim), Florian Sonnemann

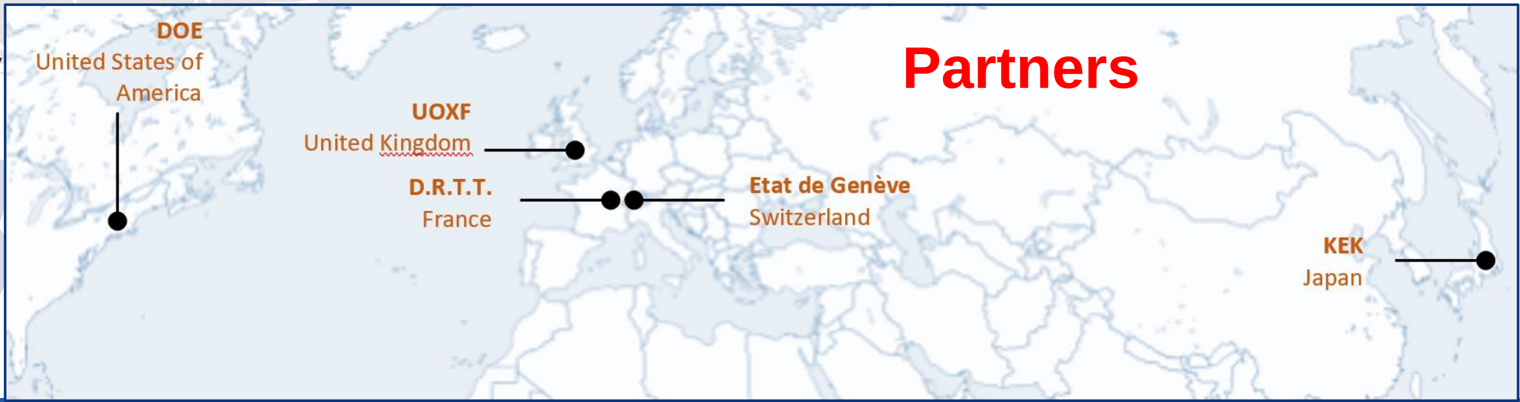
- **Project organisation model** – NN
- **Financing model** – Florian Sonnemann
- **Procurement strategy and rules** – NN
- **In-kind contributions** – NN
- **Operation model** – Paul Collier, Jorg Wenninger

H2020 DS FCC Innovation Study 2020-24

FUTURE CIRCULAR COLLIDER

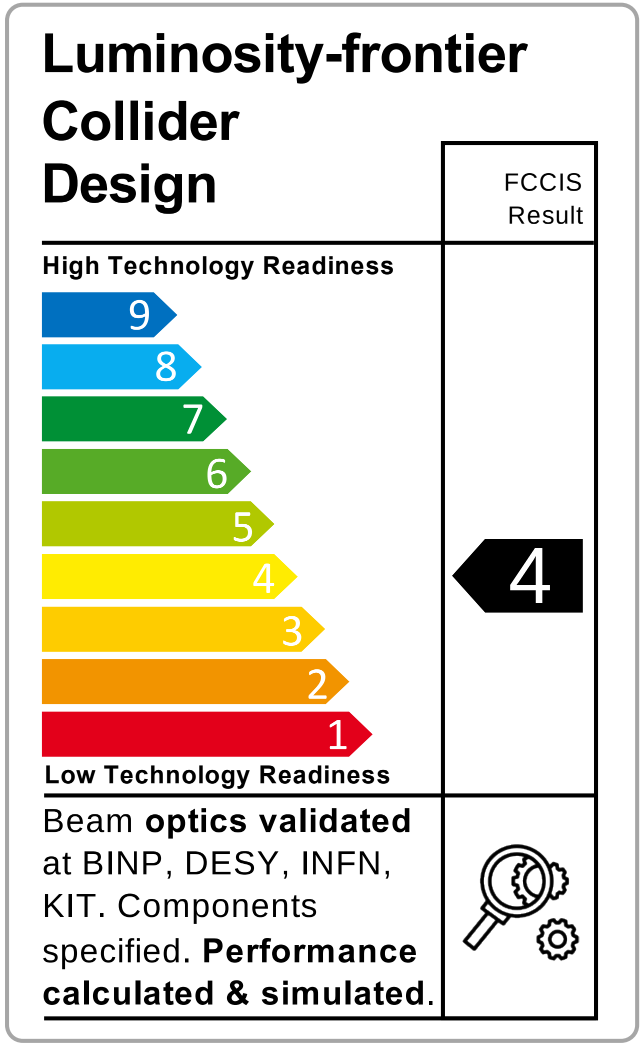


Topic	**INFRADEV-01-2019-2020**
Grant Agreement	FCCIS 951754
Duration	48 months
From-to	2 Nov 2020 – 1 Nov 2024
Project cost	**7 435 865 €**
EU contribution	**2 999 850 €**
Beneficiaries	16
Partners	6



Objectives of FCCIS (Description of Action)

- <u>O1:</u> **Design a circular luminosity frontier particle collider** with a research programme to remain at the forefront of research
- <u>O2:</u> **Demonstrate the technical and organizational feasibility** of a 100 km long, circular particle collider
- <u>O3:</u> **Develop an innovation plan for a long-term sustainable research infrastructure** that is seamlessly integrated in the European research landscape
- <u>O4:</u> **Engage stakeholders** from different sectors of the society
- <u>O5:</u> **Demonstrate the role and impact of the research infrastructure in the innovation chain**, focusing on responsible resource use and managing environmental impacts



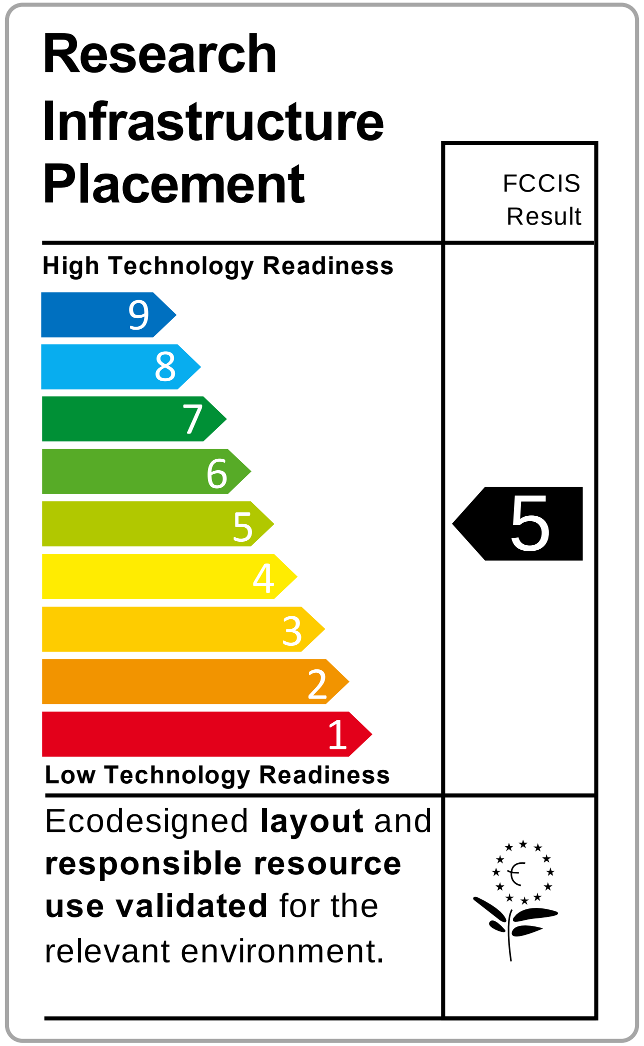
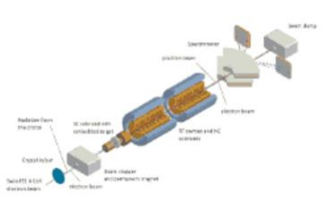
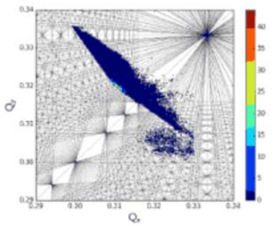


CHART - Switzerland



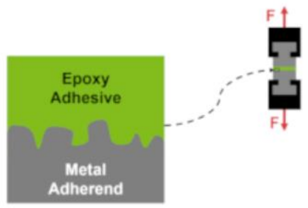
FCCee Injector

Design and positron production test program for FCC-ee Injector



FCChh Stability

Long term coherent stability and diffusion studies for the Future Circular Hadron Colliders



MagAM

Additive Manufacturing for Structural Components in Superconducting Coils

MagDev1

Superconducting Accelerator Magnet R&D

MagNum

Sustainable and Consistent Integrated Modelling of Superconducting Magnets

MagRes

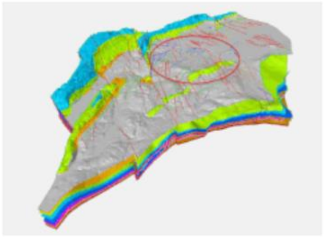
Development of optimized resin systems for SC magnet coil production

FCCee-Beam Dynamics Simulations

Accelerator design and simulation framework for FCC-ee: optics and collective effects

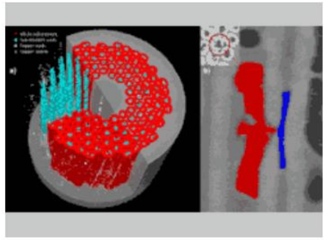
FCC Geodesy

Determination of a high-precision gravity field model for the FCC region and improvement of the Geodetic Reference Frames and the Geodetic Infrastructure



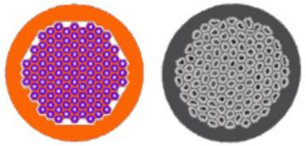
FCC Geology 3D Model

Development of a high-resolution 3D geological model and associated GIS-based subsurface data set for the FCC tunnelling work



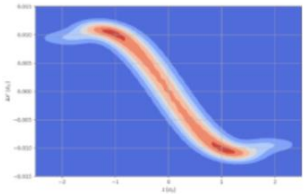
WireChar

Multiphysical characterization of Nb3Sn wires and of REBCO coated conductors



WireDev

Development of recipes and methods for the fabrication of Nb3Sn multifilamentary wires with enhanced current carrying capabilities



FCC / LHC-Lumi

Luminosity Precision Measurements for Hadron Colliders

Founded in 2016 as umbrella organization for accelerator research and technology in Switzerland to support FCC via projects with CERN, PSI, ETHZ, EPFL and U Geneva and further partners.

Status of global FCC collaboration

Increasing international collaboration as a prerequisite for success:

links with science, research & development and **high-tech industry** will be essential to further advance and prepare the implementation of FCC

147 Institutes

30 Companies

34 Countries

EC H2020

FCC Feasibility Study: 58 fully-signed previous members, 17 new members, MoU renewal of remaining CDR participants in progress

FCC workshops in 2nd half of 20

eeFACT'22 – FCC-ee progress; power & performance assessment for future e^+e^- colliders, Frascati (INFN);12-16 Sep'22 – https://agenda.infn.it/event/21199/

FCC-ee energy calibration & polarization, incl. possible exp's at KIT and LNF, CERN; 19-30 Sep'22 – https://indico.cern.ch/event/1181966

ECLOUD'22 – e.g. Vlasov solver for e-cloud driven instabilities; lessons from LHC & SuperKEKB; predictions & countermeasures for FCC-ee/FCC-hh and for EIC, La Biodola (INFN); 25 Sep - 1 Oct'22 - https://agenda.infn.it/event/28336/

FCC-ee MDI workshop – including IR mock-up at LNF; CERN 17-28 Oct'22 https://indico.cern.ch/event/1186798/

FCC-ee beam instrumentation workshop; 21-22 Nov'22 https://indico.cern.ch/event/1209598/

First joint FCC - France&Italy workshop on Higgs, Top, EW, HF and SM physics; Lyon, 21-23 November'22, https://indico.in2p3.fr/event/27968/

FCCIS workshop 2022 including first meeting of FCC FS SAC; 5-9 Dec'22 - https://indico.cern.ch/event/1203316/


FCC WEEK
2023
5 – 9 June
STAY TUNED

FCC FS status summary

Following 2020 European Strategy Update, **organisation structure and major milestones & deliverables for the FCC Feasibility Study (FCC FS) approved by CERN Council in June 2021.** Entire **FCC government structure (**members of **SC, CB, SAC, CG) established by now (summer 2022).**

Main activities: **developing & confirming concrete implementation scenario,** in collaboration **with host state authorities**, including **environmental impact analysis**, and accompanied by **machine optimisation, physics studies and technology R&D** - **via global collaboration,** supported by **EC H2020 Design Study FCCIS and Swiss CHART. Goal: demonstrate feasibility by 2025/26**

Long term goal: **world-leading HEP infrastructure for 21st century** to push particle-physics **precision and energy frontiers** far beyond present limits