



Report from CERN International Relations

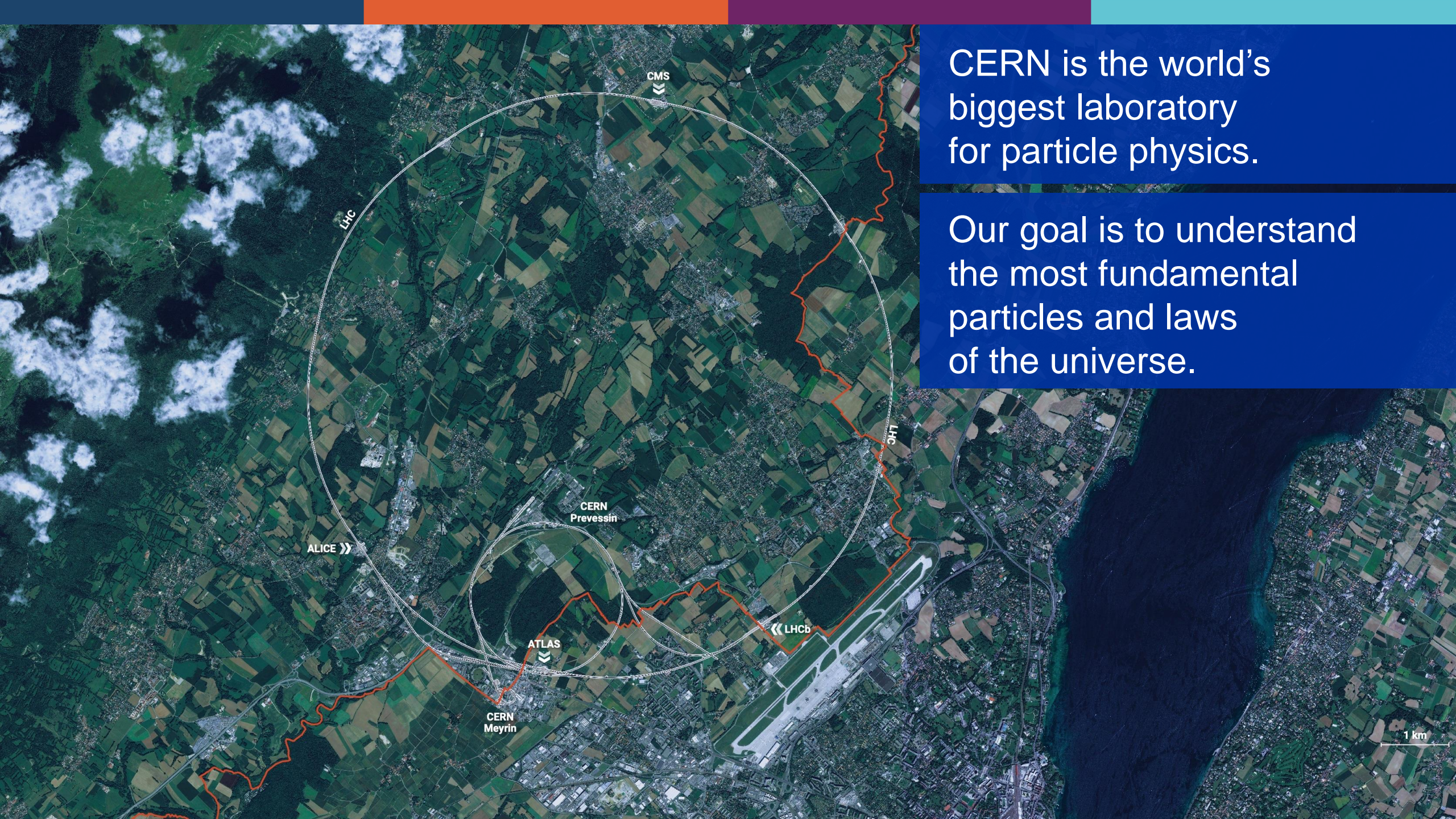
Emmanuel Tsesmelis

Principal Physicist and Head of Associate Member & Non-Member State Relations, CERN

Joint CERN-KEK Committee

KEK Tsukuba

7 December 2023



CERN is the world's biggest laboratory for particle physics.

Our goal is to understand the most fundamental particles and laws of the universe.

1 km

Four pillars underpin CERN's mission



Science for peace

CERN was founded in 1954 with 12 European Member States



23 Member States

Austria – Belgium – Bulgaria – Czech Republic
Denmark – Finland – France – Germany – Greece
Hungary – Israel – Italy – Netherlands – Norway
Poland – Portugal – Romania – Serbia – Slovakia
Spain – Sweden – Switzerland – United Kingdom

3 Associate Member States in the pre-stage to membership

Cyprus – Estonia – Slovenia

7 Associate Member States

Croatia – India – Latvia – Lithuania – Pakistan
Türkiye – Ukraine

6 Observers

Japan – Russia (suspended) – USA
European Union – JINR (suspended) – UNESCO

CERN's annual budget
is 1200 MCHF (equivalent
to a medium-sized European
university)

As of 31 December 2022
Employees:
2658 staff, **900** fellows

Associates:
11 860 users, **1516** others

Around 50 Cooperation Agreements with non-Member States and Territories

Albania – Algeria – Argentina – Armenia – Australia – Azerbaijan – Bangladesh – Belarus – Bolivia
Bosnia and Herzegovina – Brazil – Canada – Chile – Colombia – Costa Rica – Ecuador – Egypt – Georgia – Honduras
Iceland – Iran – Jordan – Kazakhstan – Lebanon – Malta – Mexico – Mongolia – Montenegro – Morocco – Nepal
New Zealand – North Macedonia – Palestine – Paraguay – People's Republic of China – Peru – Philippines – Qatar
Republic of Korea – Saudi Arabia – Sri Lanka – South Africa – Thailand – Tunisia – United Arab Emirates – Vietnam

A laboratory for people around the world

Distribution of all CERN Users by the country of their home institutes as of 31 December 2022



Geographical & cultural diversity
Users of 110 nationalities
22.5% women

Member States 7147

Austria 85 – Belgium 129 – Bulgaria 43 – Czech Republic 244
Denmark 49 – Finland 90 – France 844 – Germany 1225
Greece 119 – Hungary 73 – Israel 64 – Italy 1527
Netherlands 169 – Norway 79 – Poland 305 – Portugal 100
Romania 109 – Serbia 33 – Slovakia 70 – Spain 383
Sweden 103 – Switzerland 406 – United Kingdom 898

Associate Member States

in the pre-stage to membership 69

Cyprus 15 – Estonia 30 – Slovenia 24

Associate Member States 382

Croatia 38 – India 132 – Latvia 16 – Lithuania 14 – Pakistan 35
Türkiye 122 – Ukraine 25

Brazil, Chile and Ireland are candidate Associate Member States

Observers 2991

Japan 216 – Russia (suspended) 873 – United States of America 1902



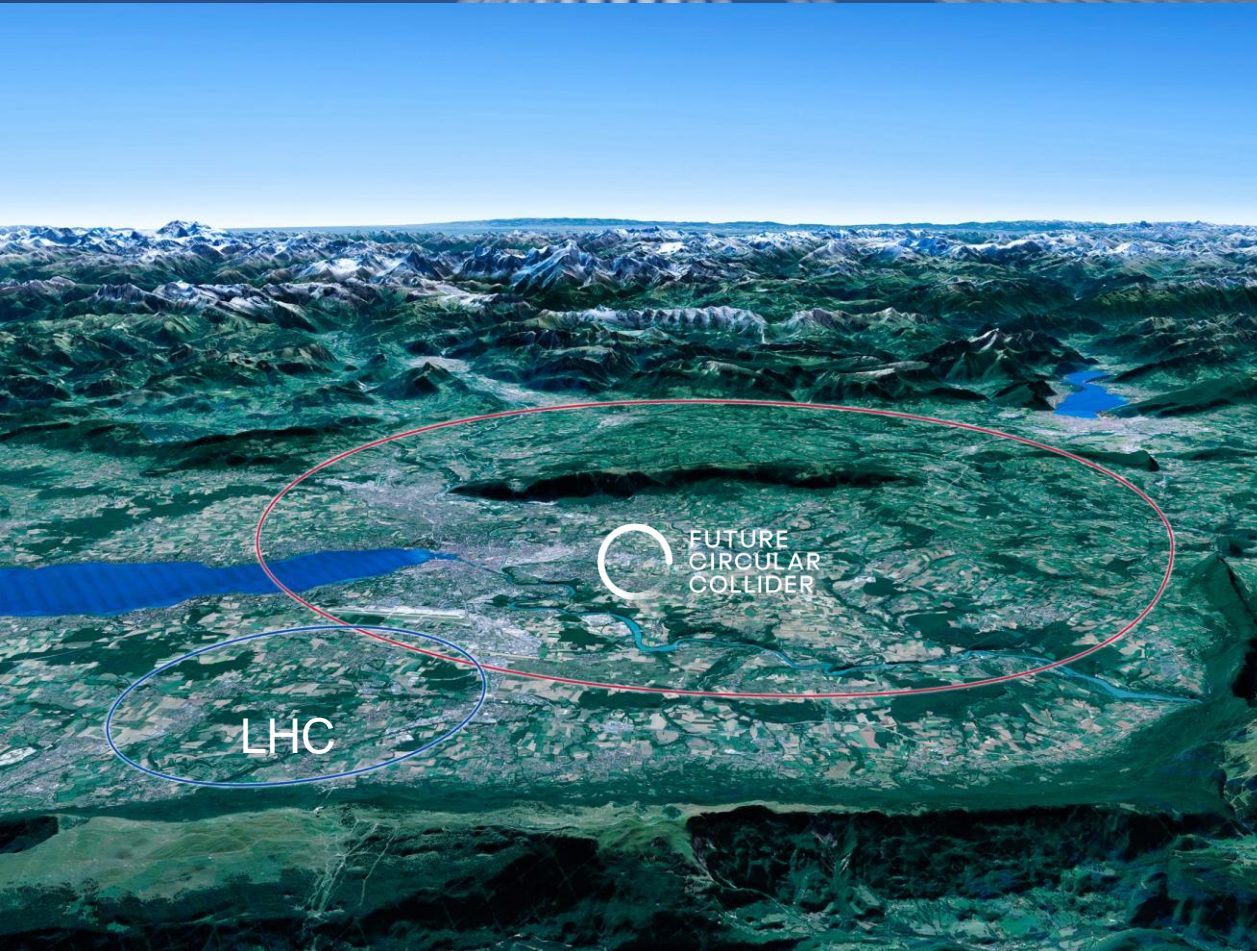
Non-Member States and Territories 1271

Algeria 2 – Argentina 13 – Armenia 8 – Australia 21 – Azerbaijan 2 – Bahrain 4 – Belarus 18 – Brazil 122
Canada 199 – Chile 34 – Colombia 21 – Costa Rica 2 – Cuba 3 – Ecuador 4 – Egypt 20 – Georgia 32
Hong Kong 15 – Iceland 3 – Indonesia 5 – Iran 11 – Ireland 5 – Jordan 5 – Kuwait 4 – Lebanon 13 – Madagascar 1
Malaysia 4 – Malta 1 – Mexico 49 – Montenegro 4 – Morocco 19 – New Zealand 5 – Nigeria 1 – Oman 1
Palestine 1 – People's Republic of China 333 – Peru 2 – Philippines 1 – Republic of Korea 147 – Singapore 2
South Africa 52 – Sri Lanka 10 – Taiwan 45 – Thailand 17 – Tunisia 2 – United Arab Emirates 7 – Viet Nam 1

Scientific priorities for the future

Implementation of the recommendations
of the **2020 Update of the European Strategy
for Particle Physics:**

- Fully exploit the HL-LHC
- Build a Higgs factory to further understand this unique particle
- Investigate the technical and financial feasibility of a future energy-frontier 100 km collider at CERN
- Ramp up relevant R&D
- Continue supporting other projects around the world

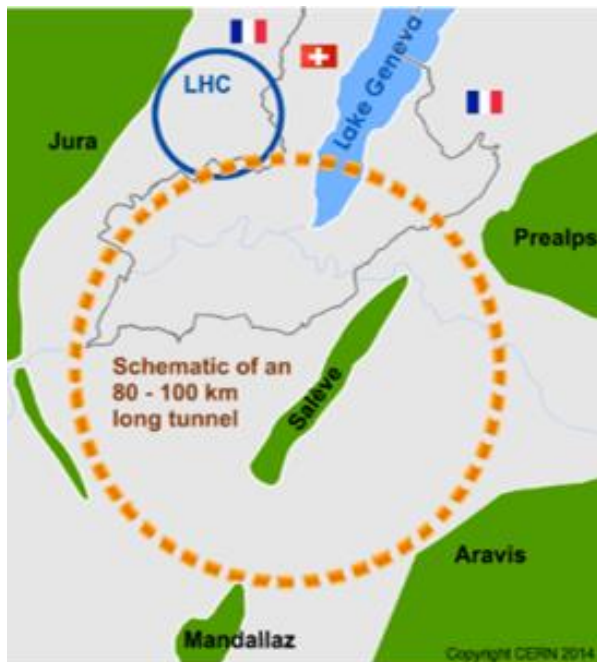


The FCC Integrated Programme

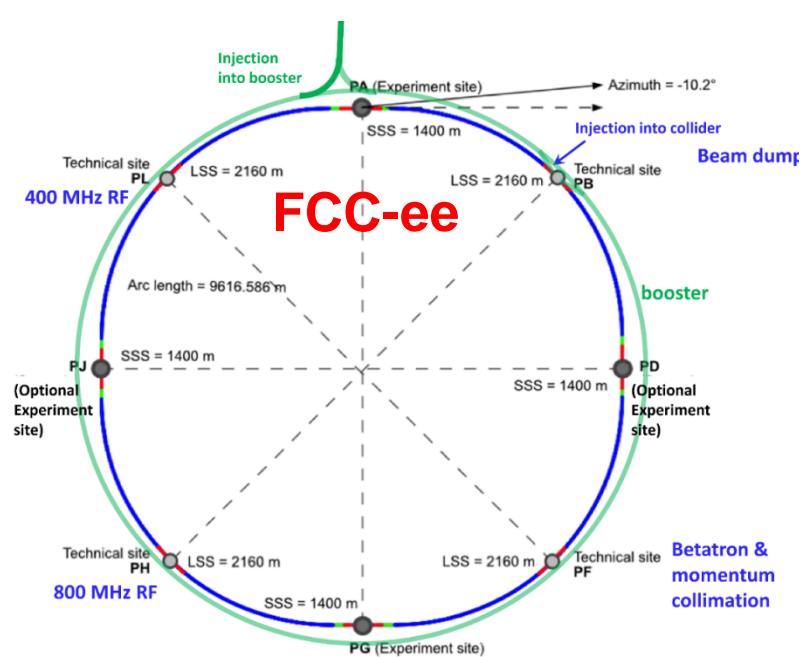
Inspired by Successful LEP – LHC Programmes at CERN

Comprehensive long-term programme maximising physics opportunities

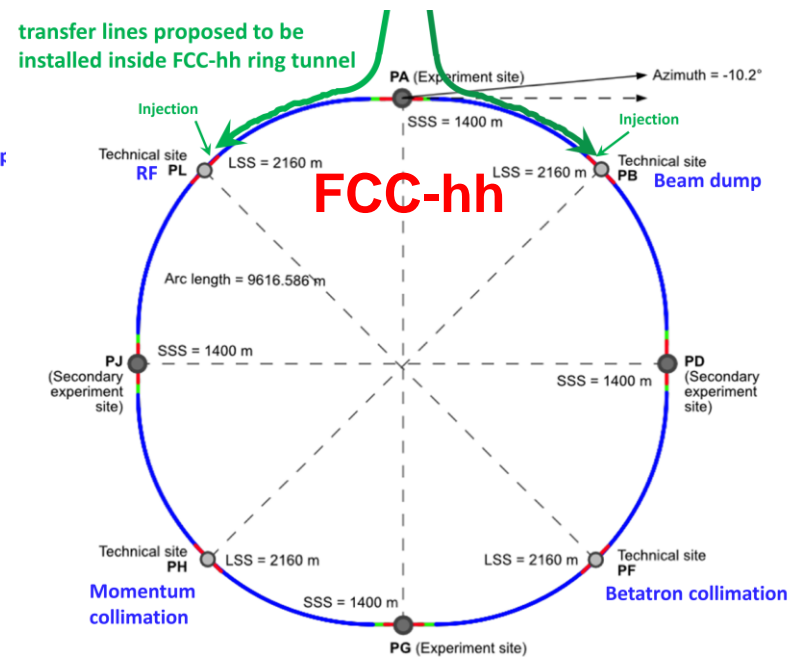
- Stage 1: FCC-ee (Z, W, H, $t\bar{t}$) as Higgs factory, electroweak & top factory at highest luminosities
- Stage 2: FCC-hh (~100 TeV) as natural continuation at energy frontier, with ion and eh options
- Highly synergistic and complementary physics.
- Common civil engineering and technical infrastructures,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



2020 - 2040



2045 - 2063



2070 - 2095

FCC Feasibility Study

FCC Feasibility Study

FCC Feasibility Study (FS) will address a recommendation of the 2020 update of the European Strategy for Particle Physics (ESPP):

- “Europe, together with its international partners, should investigate the technical and financial feasibility of a future hadron collider at CERN with a centre-of-mass energy of at least 100 TeV and with an electron-positron Higgs and electroweak factory as a possible first stage.
- Such a feasibility study of the colliders and related infrastructure should be established as a global endeavour and be completed on the timescale of the next Strategy update.”

FCC FS is organised as an **international collaboration**.

The FCC FS and a possible future project will profit from CERN’s decades-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**.



The FCC Collaboration



150 INSTITUTES **32 COMPANIES** **34 COUNTRIES**

- Increasing international collaboration is a prerequisite for success
- Aim of the FCC Feasibility Study is to increase further the collaboration on all aspects, particularly on Accelerator and Particle/Experiments/Detectors (PED)

FCC and Japan

- KEK, Ibaraki

- Memorandum of Understanding signed on 02 September 2014
- Addendum signed on 09 September 2014
 - The scope of this collaboration is to perform electron-cloud studies for FCC-hh and FCC-ee as well as to perform beam-beam simulations for FCC-hh and FCC-ee. In addition, the institute will investigate high-field and fast-cycling SC magnet options, produce a complex FCC-ee injector design based on SuperKEB injector, perform vacuum-system studies and perform SRF developments for FCC-ee and FCC-hh.
- Appendix signed on 21 September 2016

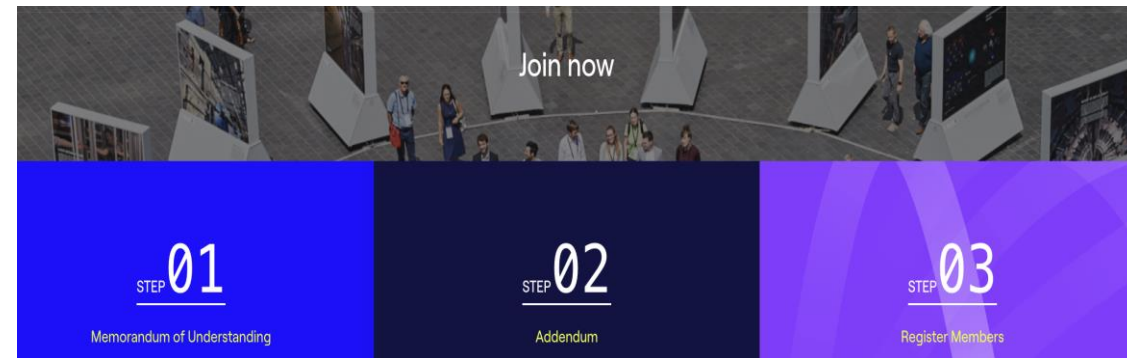
- UTOKYO, Tokyo

- Memorandum of Understanding signed on 22 November 2017
- Addendum signed on 22 November 2017
 - The scope of this collaboration is to establish a report on sensitivity studies of the SUSY and HH production in FCC-hh as well as a report on the conceptual design of the muon detector and performance studies at high energy regions.

Building the FCC Collaboration

- **FCC Global Collaboration Working Group (FGC)**
 - **Work with national laboratories, institutes and universities as well as industry to :**
 - Encourage an expanded membership.
 - **Explore opportunities for future prospective participants, in particular on the Accelerator side**
 - Support new participants in application process.
 - Assist the new participants in **defining areas of collaboration** and conclude relevant agreements.
 - Facilitate the integration process.
 - **Facilitate interest in CERN non-core areas –e.g. geology, geodesy, logistics, materials science.**
 - Prepare the foundations for research and contributions by industry.
 - Liaise with National Contact persons

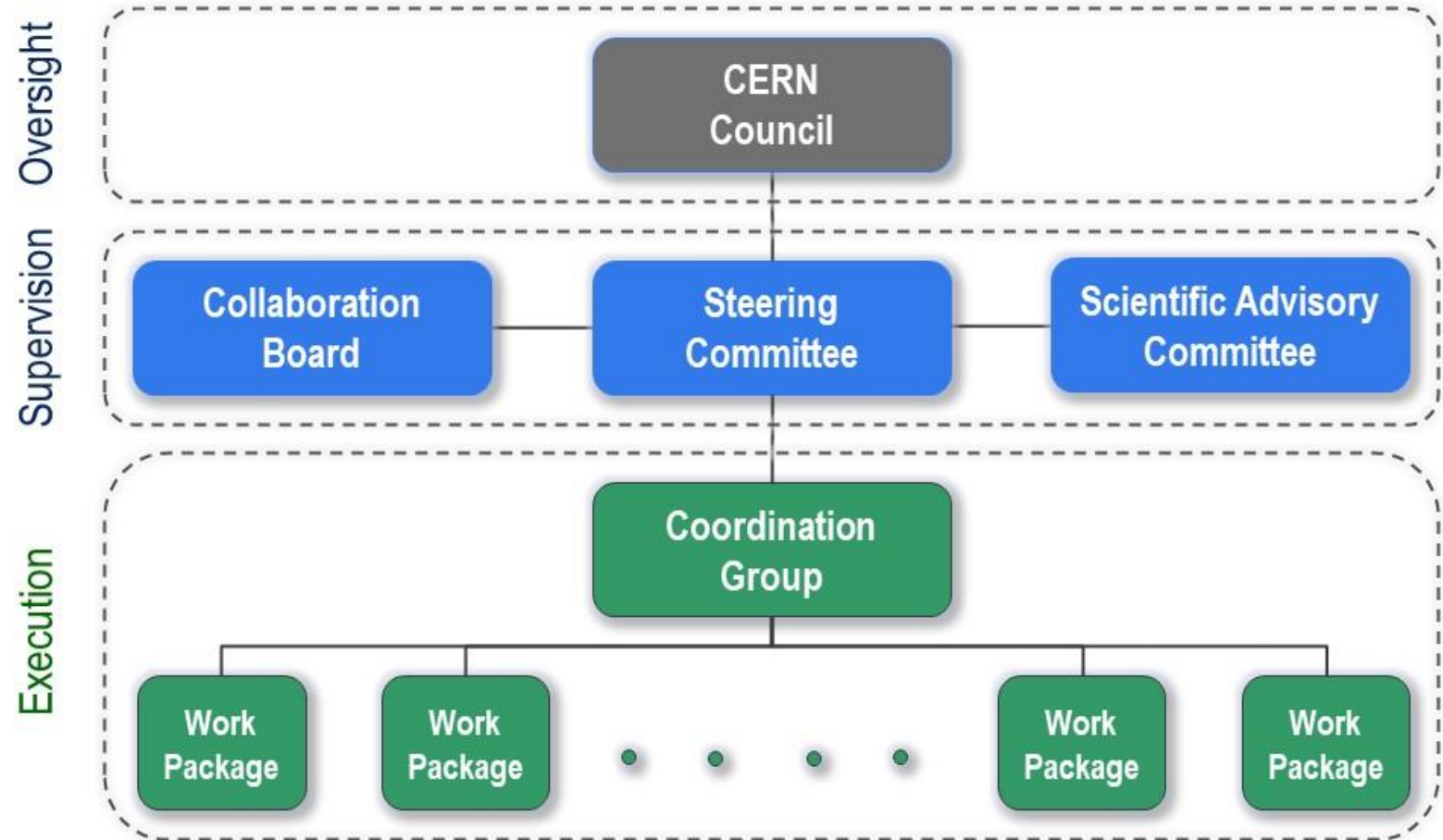
<https://fcc.web.cern.ch/collaboration>



**Many possible synergies between
FCC and Japan accelerator/PED studies**

Convened by Emmanuel Tsesmelis (CERN international relations)

- **Ownership** of the Feasibility Study by the Council.
- Effective and timely **supervision**.
- Integration of scientific and technical **advice**.
- **Participation of stakeholders** that can potentially make significant financial and technical contributions to a possible future project.
- **Execution** of Feasibility Study.

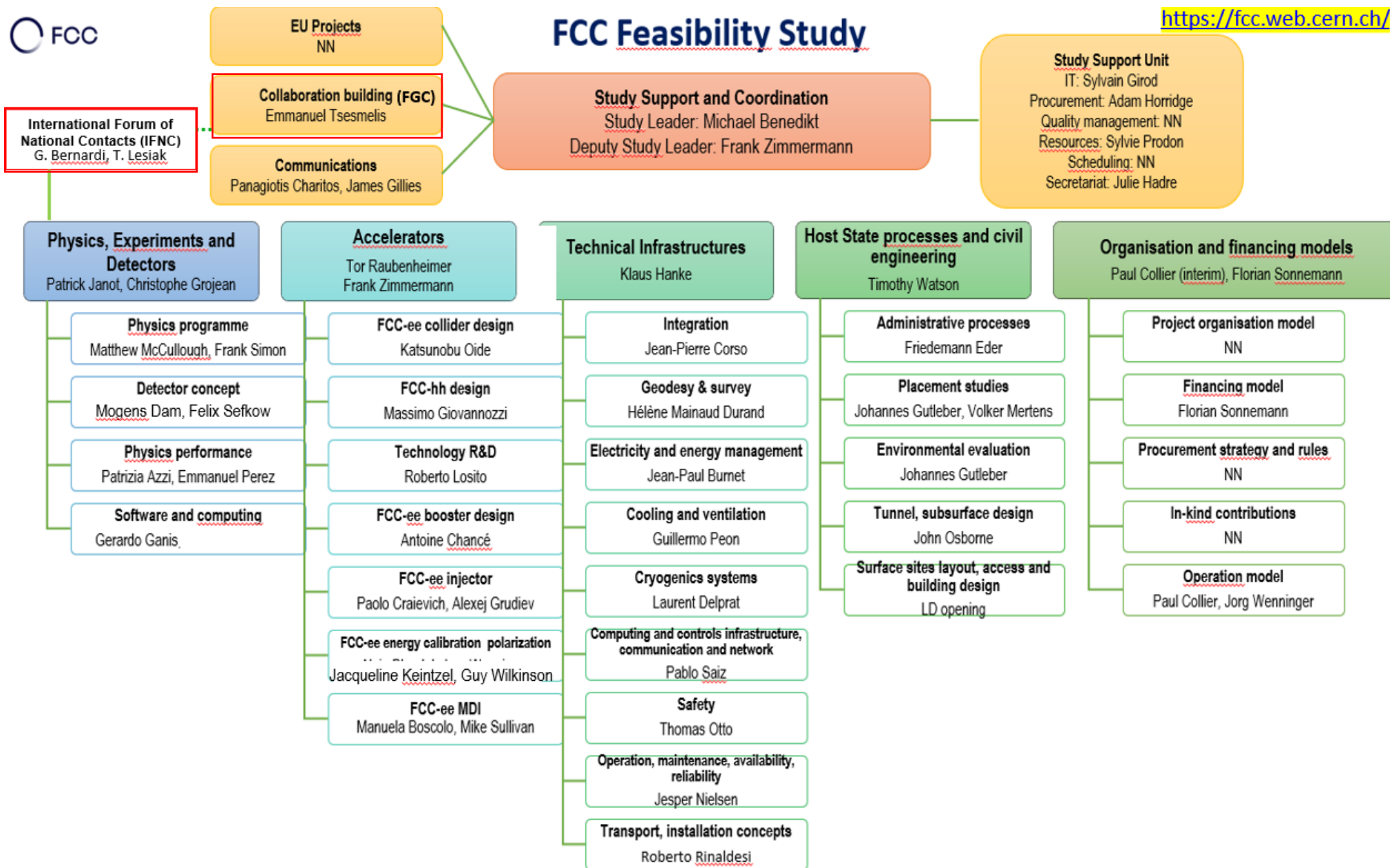


FGC and IFNC



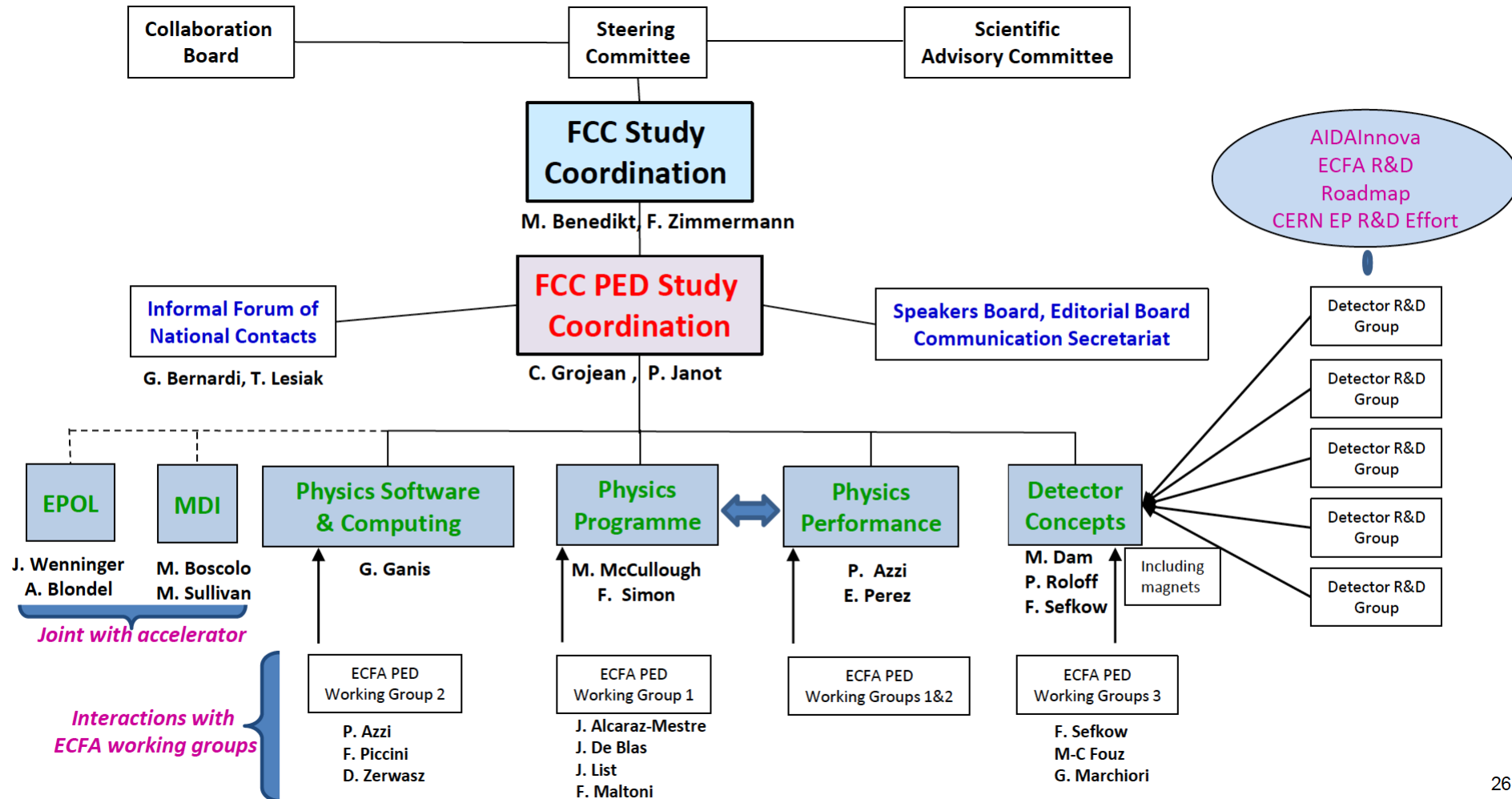
FCC Feasibility Study

<https://fcc.web.cern.ch/>



PED Organisation and Convenors

PED = Physics, Experiments and Detectors



CERN Science Gateway

Date for CERN's 70th
anniversary celebration
1 October 2024

CERN's new education and
outreach centre for all
public aged 5-plus.

Inaugurated
7 October 2023.

Immersive exhibitions,
education labs, events
and shows.

