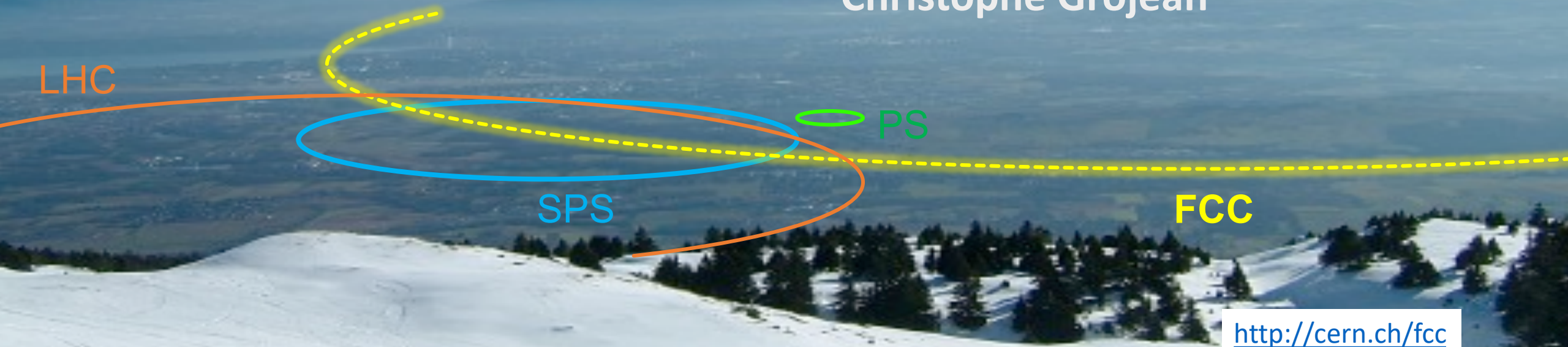


Future Circular Colliders (FCC) Quick Update on Feasibility Study

22nd Future Colliders @ DESY meeting

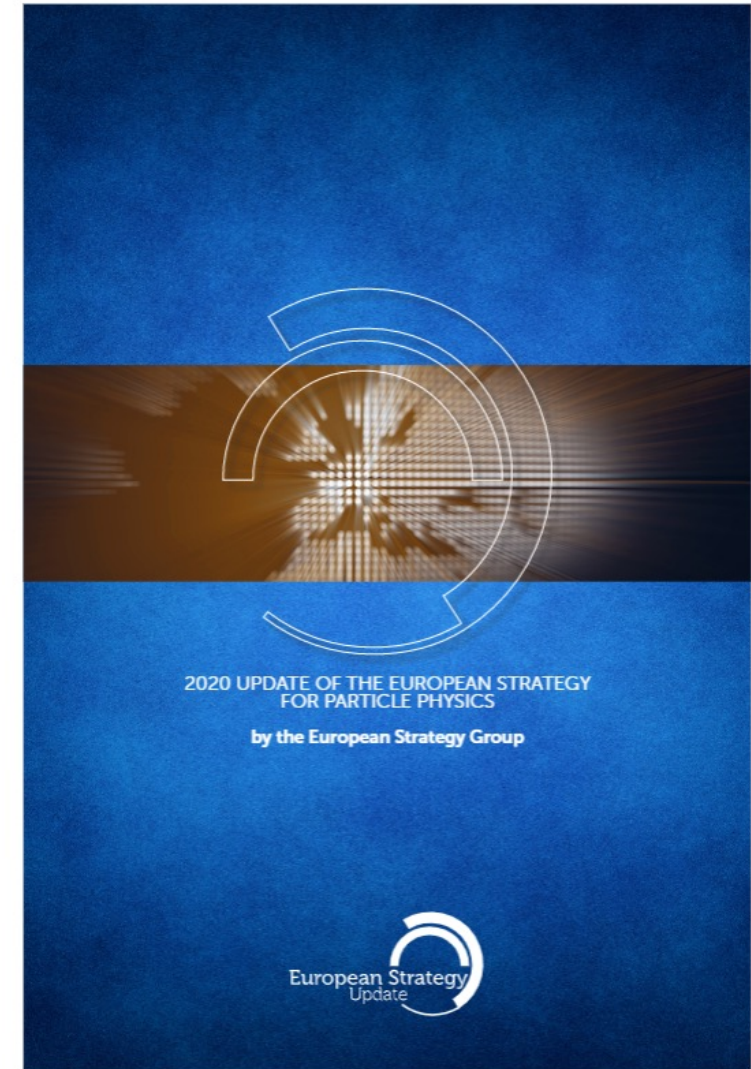
Christophe Grojean



<http://cern.ch/fcc>

Recommendations of the 2020 update of the European Strategy for Particle Physics (ESPP):

- Full exploitation of the high-luminosity LHC upgrade
- An **electron-positron Higgs factory is the highest-priority next collider**. For the longer term, the European particle physics community has the ambition to operate a **proton-proton collider at the highest achievable energy**.
- 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**.
- **FCC Feasibility Study is one of the main recommendations of the 2020 update of the European Strategy for Particle Physics**



FCC timeline

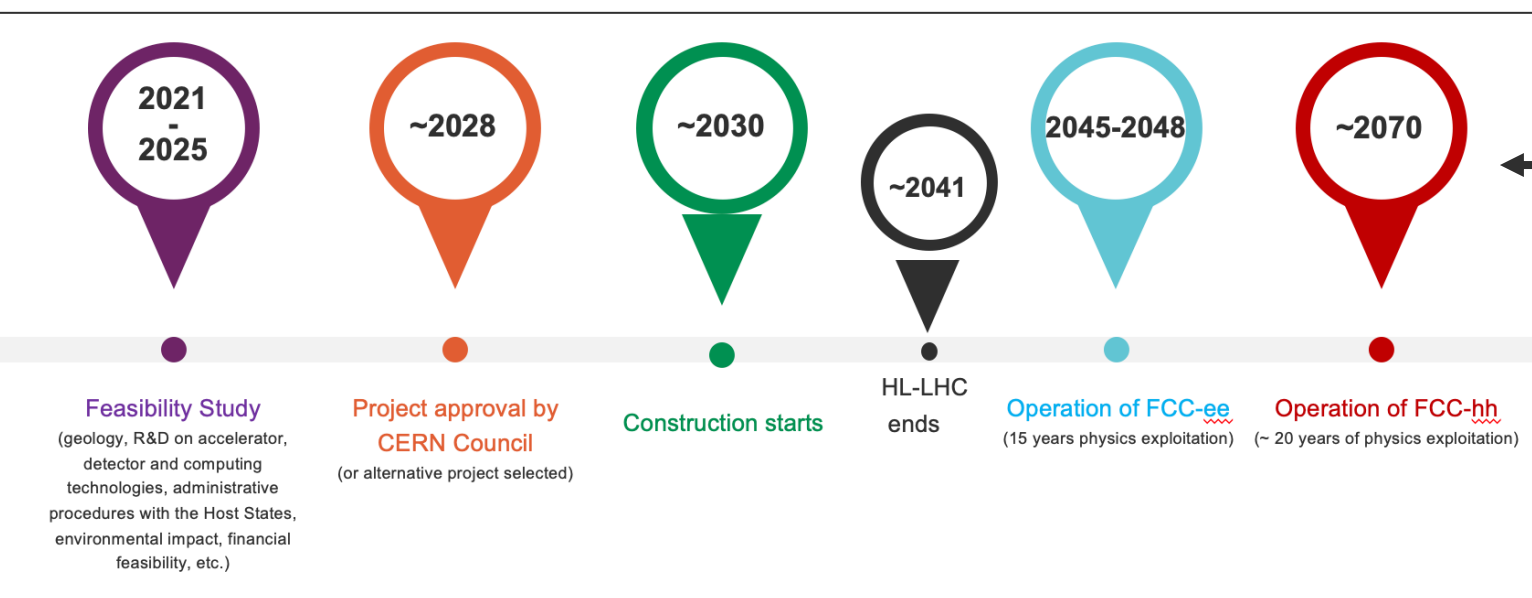
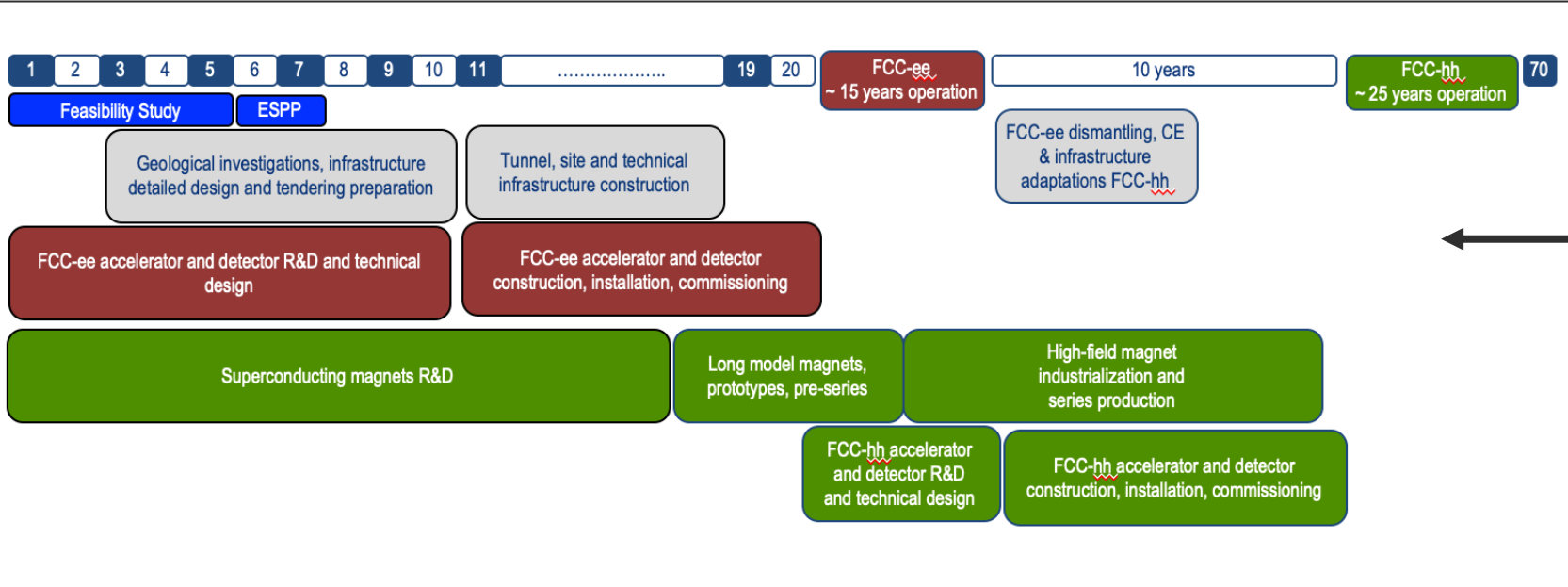
Note: FCC Conceptual Design Study started in 2014 leading to CDR in 2018

Technical schedule:
FCC-ee could start operation in **2040 or earlier**

Realistic schedule takes into account:

- ☐ CERN Council approval timeline
- ☐ past experience in building colliders at CERN
- ☐ that HL-LHC will run until ~ 2041

→ **ANY future collider at CERN cannot start physics operation before 2045-2048** (but construction will proceed in parallel to HL-LHC operation)





FCC Feasibility Study (2021-2025): 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
- ❑ Optimisation of the design of FCC-ee and FCC-hh colliders and their injector chains, supported by R&D to develop the needed key technologies
- ❑ Elaboration of a sustainable operational model for the machine 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 (emphasis on FCC-ee)
- ❑ Identification of substantial resources from outside CERN's budget for the implementation of first stage project (tunnel and FCC-ee)
- ❑ Consolidation of the physics case and detector concepts and technologies

Feasibility Study funded from CERN budget (~ 35 MCHF/year over 5 years, including high-field magnet R&D).
Additional funding from the European Commission and collaborating institutes (e.g. CHART collaboration with Switzerland)

Mid-term review end of 2023 → final results in Feasibility Study Report by end of 2025

Following 2020 European Strategy Update, the **FCC Feasibility Study (FCC FS)** was **launched in 2021 with full support from CERN Council**.

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**

Mid-term review (~700 pages)

FCC team

→ **Scientific Advisory Committee (17-18/10/23)**

→ **SPC**

→ **Council (special session in February 2024)**