



# Welcome

5<sup>th</sup> FCC Physics Workshop

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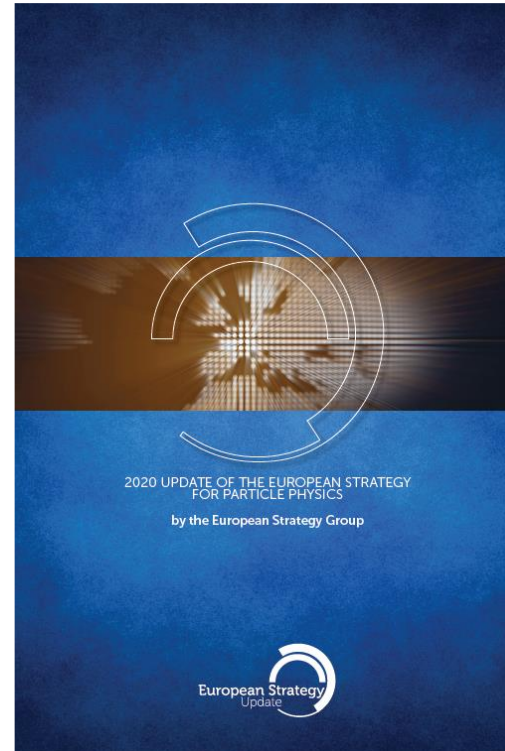
February 7<sup>th</sup>, 2022

# Reminder: Update European Strategy for Particle Physics

CERN Council updated the European Strategy for Particle Physics in June 2020

Scientific recommendations:

- full exploitation of the LHC and HL-LHC
- highest-priority next collider: e+e- Higgs factory
- increased R&D on accelerator technologies
- investigation of the technical and financial feasibility of a future  $\geq 100$  TeV hadron collider
- long-baseline neutrino projects in US and Japan
- high-impact scientific diversity programme complementary to high-energy colliders
- R&D on detector and computing
- theory



Other high priority items:

- Exploit synergies with neighboring field, in particular nuclear and astroparticle physics
- Mitigate environmental impact of particle physics
- Invest in next generation of researchers
- Support knowledge and technology transfer
- Public engagement, education and communication

**ESPPU provides guidelines to CERN for the coming years**

# What happened since then?

FCC: CERN Council endorsed in June 2021 the FCC feasibility study

**A major achievement for CERN and the field!**

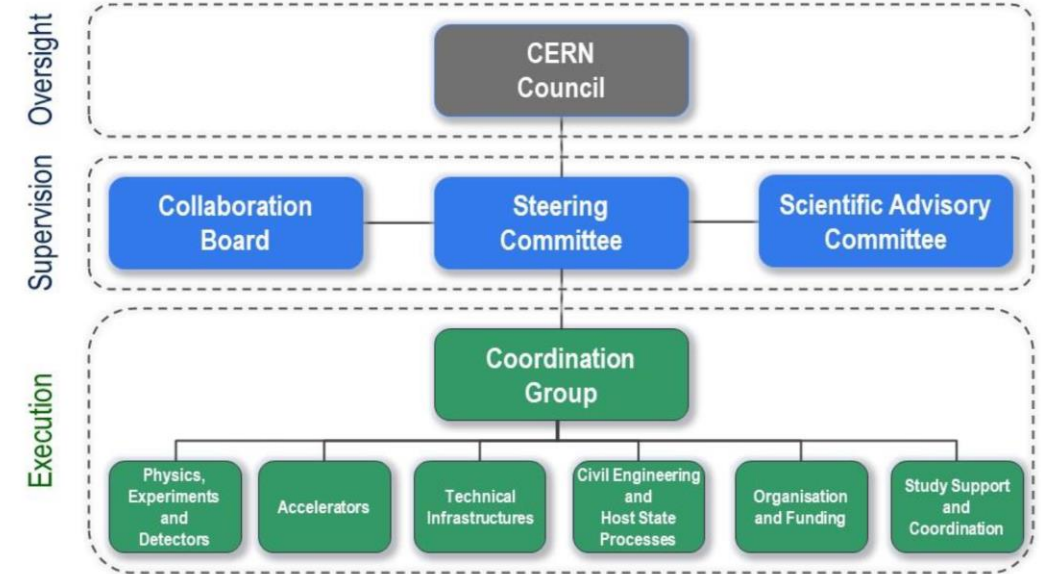
- approx. 100 MCHF in CERN 5-year Medium Term Plan
- technical, administrative, financial feasibility, consolidation physics case,...
- results of the study end 2025 will provide input for the next Strategy Update
- more in Michael's talk

(HL-)LHC:

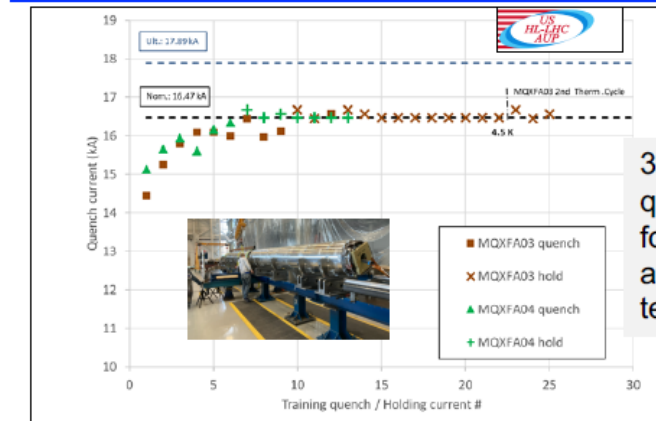
- LHC and all detectors are on track to start the next run (Run 3) in spring 2022
- HL-LHC: much progress made on the accelerator and detector upgrades despite the difficult situation (pandemic)

**But projects have acquired significant delays, necessitating a shift of the start of HL-LHC by 1.5 years**

## FCC study organisation



## HL-LHC 11-12 T Nb<sub>3</sub>Sn dipoles and quadrupoles



3 full-scale Nb<sub>3</sub>Sn quadrupoles for HL-LHC built and successfully tested in the US.

# Long-term Schedule

Run 3 will be extended by 1 year until end 2025 and LS3 by ½ year until end 2028

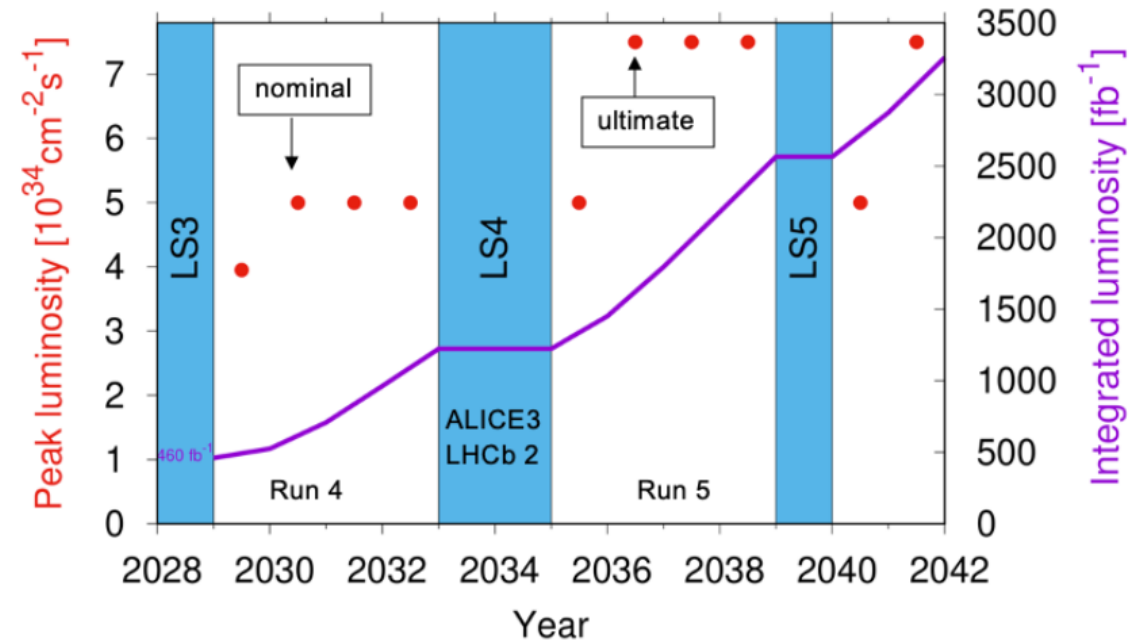
Note:

- **no further extension of Run 3 or LS3 possible!**  
For technical and political reasons
- the HL-LHC goal of providing 3000/fb integrated luminosity to ATLAS and CMS would require HL-LHC operation until  $\approx 2041$
- ending HL-LHC in 2038 would provide  $\approx 2500$ /fb per experiment

Final decision on the long-term HL-LHC schedule will have to be taken at the next (or next-to-next?) strategy update in light of:

- performance and results from the LHC, progress with the next project (FCC), ...

Preliminary (optimistic) schedule of HL-LHC



Important:

- we have to find the right balance between motivation and commitment of the community for the success of the LHC
- and preparing the ground for the future with a visionary project like the FCC

# Roadmaps

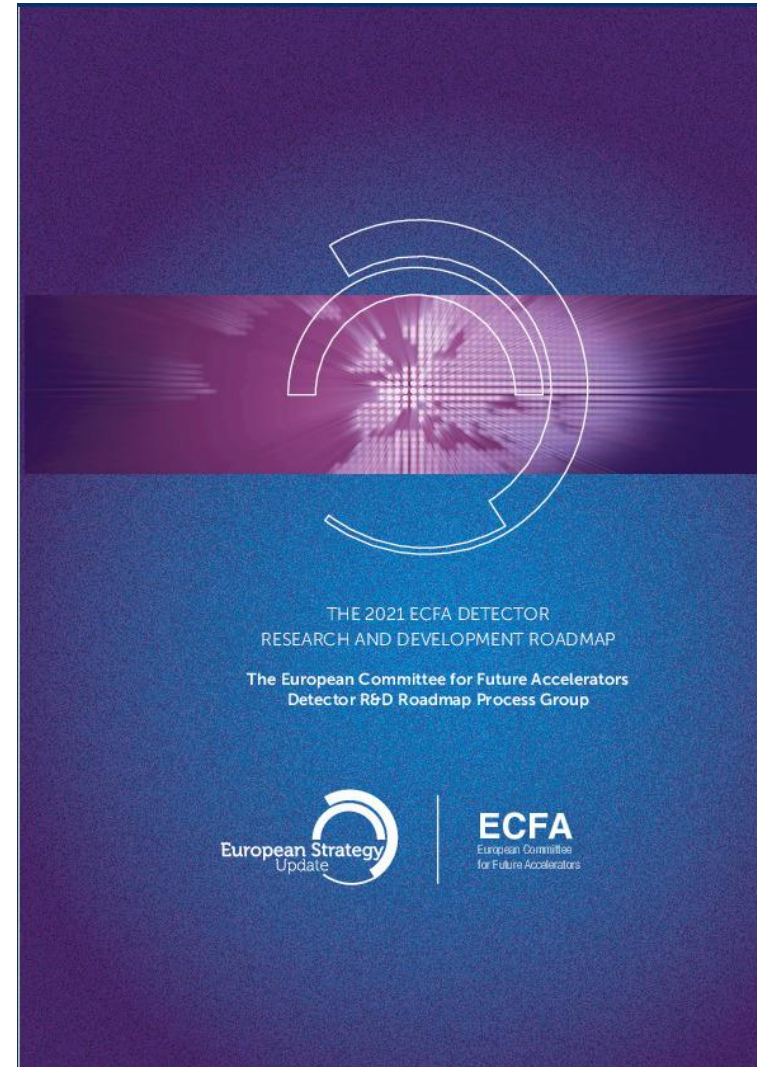
Further to the European Strategy, CERN Council has asked for R&D roadmaps

- Accelerator: group of the large European particle Physics labs (LDG)
- Detector: ECFA

Both roadmaps have been presented to CERN Council last December

Next step: development of implementation plans

**Both roadmaps are great opportunities in particular for FCC**



# A few final words

Why do we want the FCC and how we can justify the required resources?

- Particle physics is in competition with other fields (medicine, climate, energy, ...)
- They have also very appealing stories to tell, often much easier to understand than ours

I strongly believe that we have to strengthen and sharpen our physics arguments

- Just higher precision is not enough!
- What are the connections to the really big fundamental questions and miracles of the Universe?

We have to strengthen our efforts to convince public and politics provide very strong motivation: social, technological and scientific

**Sharpen the physics case for FCC!**  
**And I wish you an inspiring and successful workshop!**