Designing the
FUTURE CIRCULAR COLLIDER

The field of particle physics works on long timescales. LHC, the world's flagship research facility was conceived in the 1980s, began operation in 2008, and will run until 2035. Following the discovery of the Higgs boson, we look forward to much more from the next LHC runs.

Expanding our understanding of the fundamental laws of nature requires to push back further the energy and intensity frontier. Given the long timescales it is timely to start planning a post-LHC research infrastructure that will offer a rich physics programme for the rest of the 21st century.

The Future Circular Collider study brings together more than 150 academic institutes and industries from 34 countries to design a scientific tool and embark in a new journey of discovery. By tne end of 2018, the FCC collaboration will deliver a design report to inform the next update of the European Strategy for Particle Physics.

fcc.web.cern.ch

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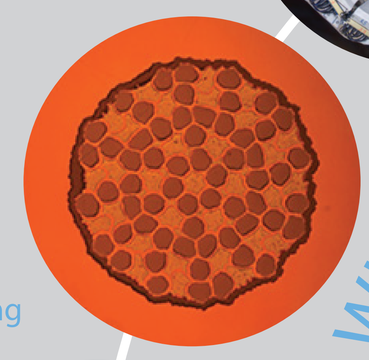
Experience from LEP and the LHC and the unique opportunity to test novel technologies in the High Luminosity LHC provide a solid basis to assess the feasibility of a future particle collider. Building high-performance colliders calls for leapfrog advancements of key technologies:

WHAT

Vacuum system.

16 Tesla high-field accelerator magnets.

Superconducting materials.



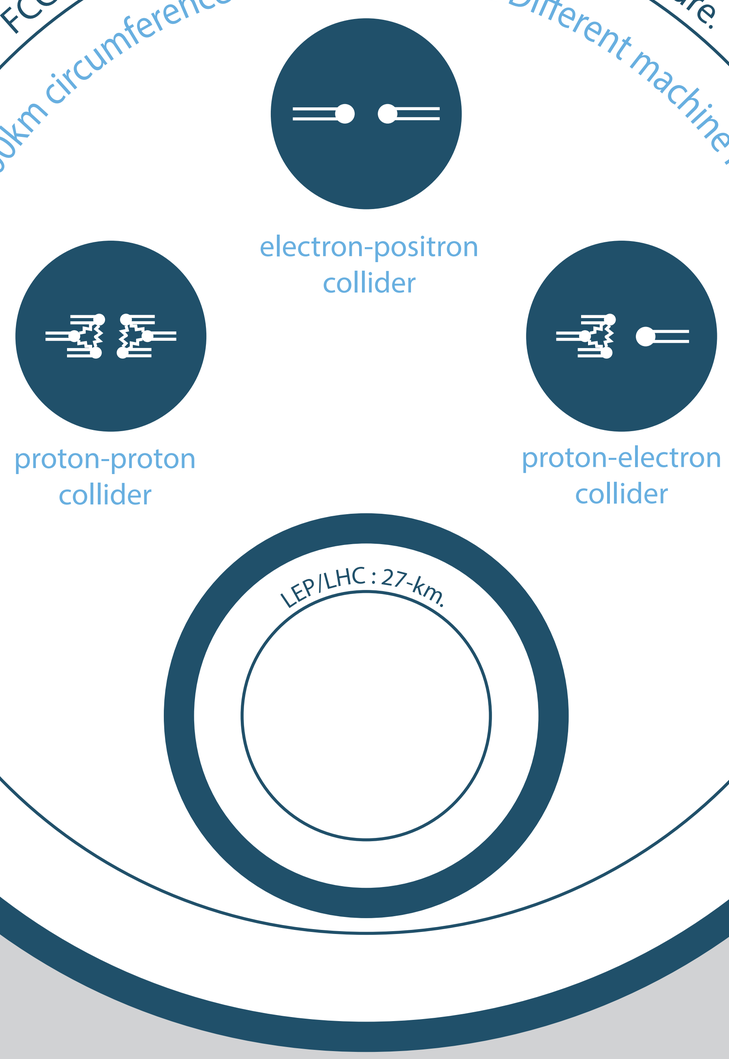
Efficient radiofrequency acceleration systems.

Large-scale cryogenic plants and refrigeration.

FCC: Designing a post-LHC Research Infrastructure.

One 100km circumference tunnel

Three Different machine modes



WHY

The discovery of the Higgs boson is a milestone in the effort to complete the Standard Model of Particle Physics; the theory that describes all of our visible universe. Yet the Standard Model leaves many open questions:

FCC could offer the key to answer some of the fundamental questions about the Universe!

- What is the origin of matter-antimatter asymmetry?
- Why is the Higgs boson so light?
- Why do masses of elementary particles differ so much?
- How do neutrinos acquire their mass?
- What is dark matter?

HOW

34 COUNTRIES

150 INSTITUTES

H2020
- EuroCirCol
- EASITrain
- ARIES
- FuSuMaTech
- RI Impact Pathways

EU SUPPORT

A global R&D programme for a research infrastructure that will serve the world throughout the 21st century.

The Large Hadron Collider (LHC) research programme generates about 3.3 € billion in added value during the period 1993 - 2038. Each euro invested, pays back approximately 1.3 € in socio-economic benefits, mainly stemming from training, cultural & educational impact and industrial spillovers.

Ensure the seamless continuation of the world's particle physics programme after the LHC.