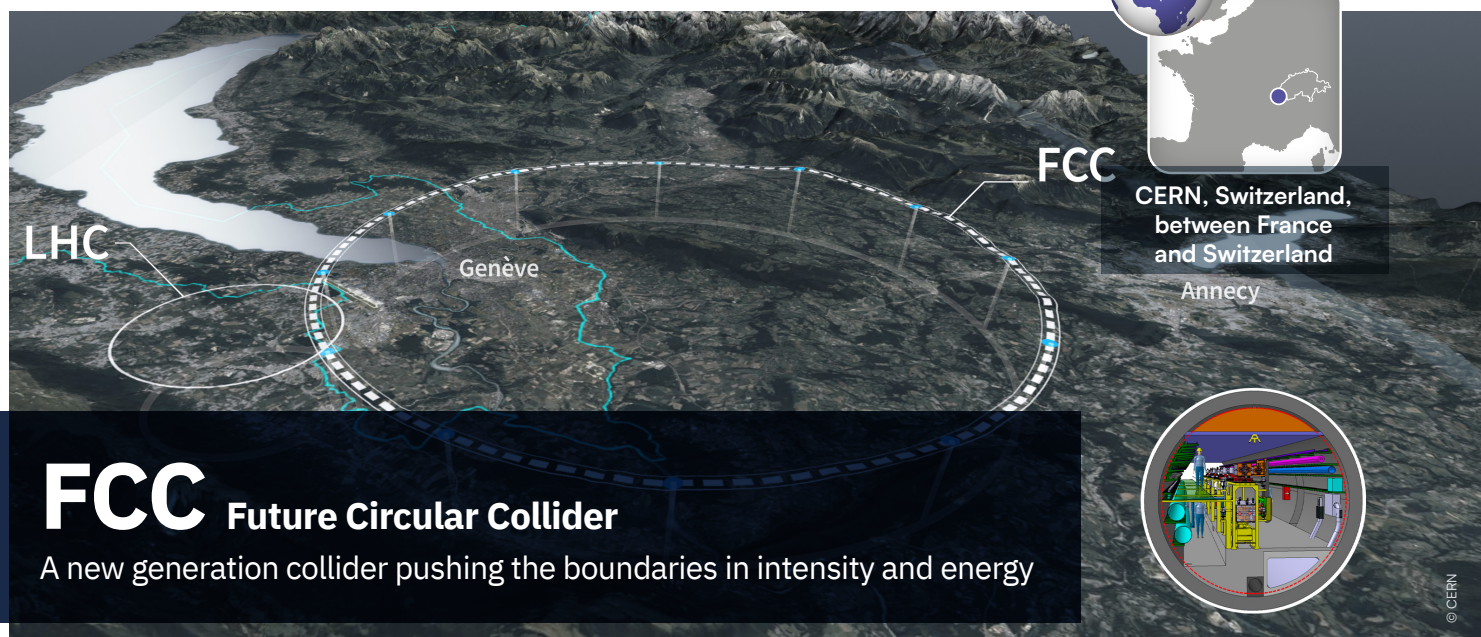


Colliders for high energy particle physics



FCC
CERN, Switzerland, between France and Switzerland
Anecny

FCC Future Circular Collider

A new generation collider pushing the boundaries in intensity and energy

Scientific leader: Angeles Faus-Golfe (IJCLab)*
Laboratories involved: IJCLab (Orsay), LAPP (Anecny)
Nature: research infrastructure
Status: a feasibility study and R&D project led by CERN with 147 institutions from 34 countries and 30 industrial partners
Website: <https://fcc.web.cern.ch/>

Scientific objectives

FCC-Study is an R&D project studying possible configurations for a new-generation collider dedicated to high-energy particle physics that will extend the research currently being carried out at the LHC once the High-Luminosity phase (HL-LHC) comes to an end in around 2040. The fixed objective is to reach the energy of 100 TeV at the centre of mass for the FCC-hh (compared to 14TeV for the LHC), with the prior passage through an e+ e- collider (FCC-ee) optimised for the detailed and precise study of the Higgs boson and its interactions with other particles, but also of the Z, W bosons and the top quark which is the heaviest elementary particle.

Resources deployed

The infrastructure will be housed in a 100 kilometres tunnel, crossing France and Switzerland via CERN, in which particle beams will circulate in both directions. Four beam interaction points equipped with detectors are planned to observe the collisions. Various configurations are being studied to maximise the collider's performance and optimise its placement.

75% of the tunnel is on French territory	30 partner companies
147 institutions	34 participating countries
100TeV collision energy targeted at the centre of mass	

IN2P3 CONTRIBUTIONS

- Manipulation of nano-sized beams to maximise the luminosity of the collider and development of new collision schemes to increase the energy resolution of the experiments.
- Stabilisation of nano beams in particular in the interaction regions.
- High intensity positron (e+) source.
- Design and optimisation of laser systems for Compton polarimeters.
- Understanding of global dynamic vacuum phenomena related to stimulated desorption, particle creation, etc.

Other french laboratories involved

Irfu (CEA Saclay)

2021-2025

Feasibility study, accelerator and detector R&D, and geological investigations

2027-2028

Decision phase for the occasion of the new European Particle Physics Roadmap (EPPSU)

2030-2045

Digging of the tunnel and construction of the electron/positron collider (FCC ee)

2045-2060

Data collection on FCC ee planned

2060-2070

Expected decommissioning of FCC ee and construction of the FCC hh proton collider

2070-2090

Proposed data collection on FCC hh