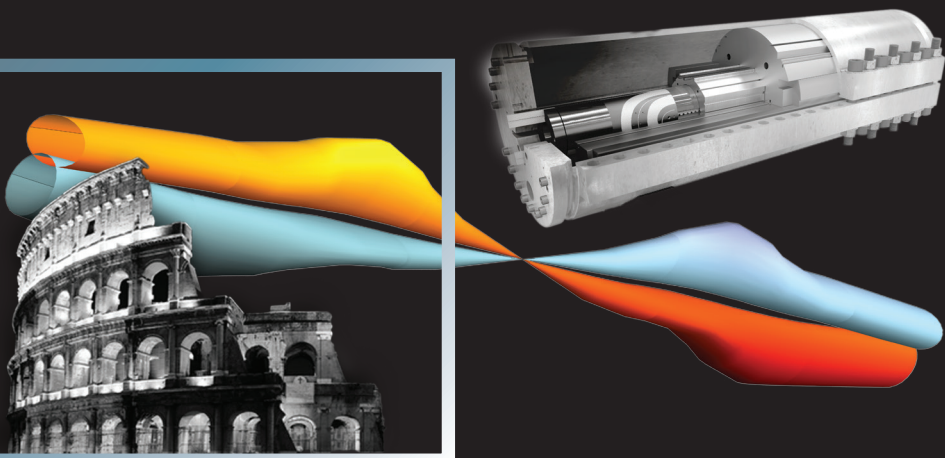


FCCWEEK2016

FUTURE CIRCULAR COLLIDER STUDY

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The Future Circular Collider study (FCC) explores different designs of circular colliders for the post-LHC era. The FCC collaboration will deliver a conceptual design report by the end of 2018 together with preliminary cost estimates and feasibility assessments that will lay the foundations for the construction of a future circular collider.

Reaching higher energies and unprecedented luminosities would allow us to explore the fundamental laws of nature and probe yet unexplained observations. A Future Circular Collider seems as the obvious direction to go, given its ultimate access to energies and intensities far beyond anything that can be directly probed within the 21st century. Each of the suggested possibilities – proton-proton, electron-positron or electron-proton – has its own specific virtues and the future results from the next runs of the LHC will pin down the physics questions.

The development of baseline designs for an energy-frontier hadron collider and a luminosity frontier electron-positron collider forms the core of the study. The FCC-hh scenario focuses on a 100TeV hadron collider in a 100 km tunnel that defines the boundary for the overall infrastructure. A lepton-lepton collider reaching energies of up to 350GeV for electron-positron collisions is also explored under the FCC-ee scenario. A hadron-lepton collider is also considered under the FCC study.

The realisation of these machines relies on leapfrog advancements of key enabling technologies. The lead time of approximately twenty years for the design and construction of an accelerator of this size calls for a coordinated effort.

The FCC study is an international collaboration of more than 70 countries ensuring that the worldwide scientific community is involved from the beginning of this endeavour. It was launched as a response to the last EC Strategy Update for particle physics which stated that: "...to propose an ambitious post-LHC accelerator project...CERN should undertake design studies for accelerator projects in a global context, with emphasis on proton-proton and electron-positron high-energy frontier machines". Support to the project also came from the international community. Soon the study received international support from the US P5: "US P5 recommendation 2014: "...A very high-energy proton-proton collider is the most powerful tool for direct discovery of new particles and interactions under any scenario of physics results that can be acquired in the P5 time window...." and from the International Committee for Future Accelerators (ICFA).

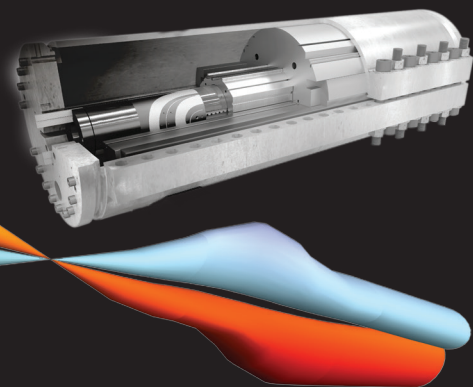
The study covers different aspects related to the design, commissioning and operation of this powerful machine in a reliable, efficient and sustainable way. A number of R&D programmes to push novel technologies have been launched including high-field magnets (with almost double the magnetic field of the LHC magnets), new high-gradient accelerating structures and an efficient large-scale cryogenics infrastructure and refrigeration systems.

The FCC study coordinates the research and development work that is being done for accelerators and detectors around the world. It prepares the ground for contributions from world experts. Two key

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aspects are the capacity building for young students in a number of different areas as well as partnership with industrial partners to maintain the current level of technological knowhow and collaborate on technology evolution beyond 2025.

The FCC study profits from the previous experience gained from the design and operation of LEP and LHC while the scheduled upgrade of the High Luminosity LHC provides an excellent opportunity to test the new technologies and make the next step in advancing fundamental research in a new territory. A future circular collider with its high precision and high energy reach, will extend well-beyond the LHC the search of new particles and interactions that could prove our current theories or lead to new developments. Creativity and innovation are needed to develop the physics case, meet the required accelerator parameters and realize unprecedented experiments. The FCC study sets the foundations for humanity's next step towards the exploration of our World!

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