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FCC detector concepts

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The Future Circular Colliders (FCC) project is centered on the construction of a large, 91 km in circumference, circular tunnel located around the Geneva area. The project foresees two distinct phases of operation. In the first one, denominated FCC-ee, the tunnel will house an electron positron collider. FCC-ee will be operated at several center-of-mass energies, ranging from the Z peak to the WW production threshold, to the Higgs boson production peak (~ 250 GeV), and then to just above the ttbar production threshold (~365 GeV). FCC-ee promises exceptionally high luminosities, beyond $10^{36} \text{ cm}^{-2}\text{s}^{-1}$ at the Z peak and will allow to explore with unprecedented precision the electroweak sector while also producing a sample of more than a million Higgs boson events in very clean experimental conditions. In a second phase, denominated FCC-hh, the tunnel will instead house a proton-proton collider with the aim of producing the highest possible collision energies, up to more than 100 TeV in the center-of-mass.

Such a challenging project calls for extremely high-performance detectors being able to study all the many channels of interesting physics that both FCC-ee and will FCC-hh will unravel. Especially for FCC-ee there are already three different detector concepts that are being studied and that will be presented. FCC-ee will in fact have four interaction points that could house each a different detector. There is a significant detector R&D program that has started since a few years in order to optimize and improve the detector concepts for the best possible exploitation of FCC-ee. Many different technologies, going beyond the state-of-the-art in the field, are being investigated for the various subdetector components. The final detectors will likely be a mix and match of the currently investigated technologies.

FCC-hh is farther in the future and presents extremely challenging experimental conditions, nevertheless a possible detector concept has been devised and will also be presented.

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