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## The Circular Electron Positron Collider (CEPC)

The Higgs boson, discovered in 2012 by the ATLAS and CMS Collaborations at the Large Hadron Collider (LHC), plays a central role in the Standard Model. The arrival of the Higgs boson brings along great scientific opportunities for the human being. Measuring the Higgs properties precisely will advance our understandings of some of the most important questions in particle physics, such as the naturalness of the electroweak scale and the nature of the electroweak phase transition. The Higgs boson could also be a window for exploring new physics, such as dark matter and its associated dark sector, heavy sterile neutrino, and more. The Circular Electron Positron Collider (CEPC), proposed by the Chinese High Energy community in 2012, is designed to run at a center-of-mass energy of 240 GeV as a Higgs factory. The CEPC can also be operated at lower energies to deliver unprecedented amount of Z and W bosons, and further be upgraded to run at higher energy to the top pair threshold. The estimated construction cost is approximately 4.6B CHF. The luminosities of the CEPC are mainly limited by the synchrotron radiation (SR) power. The CEPC baseline SR is set for 30 MW per beam, and is upgradable to 50 MW. A tentative “10-2-1-5” operation plan is devised to run the CEPC firstly as a Higgs factory for 10 years to produce about 2.6 million Higgs bosons with the baseline configuration, followed by 2 years of operation as a Super Z factory to produce 2.5 trillion Z bosons, and then 1 year as a W factory to produce approximately 130 million WW bosons. Finally, an energy upgrade will enable the CEPC to operate at the  $t\bar{t}$  energy to produce 0.4 million  $t\bar{t}$  pairs.

The CEPC Conceptual Design Report (CDR) was formally released in November 2018, while the Technical Design Report (TDR) for the CEPC accelerator was published on December 25, 2023. The TDR for the CEPC detector and an Engineering Design Report (EDR) are currently under development, and are expected to be released in June 2025 and December 2027, respectively. A CEPC proposal (including the accelerator, the detector, an EDR site feasibility study and the civil engineering design) will be submitted to the central Chinese government in 2025 to apply for the approval of the CEPC project. The planned schedule aims at starting the construction during the “15th five-year plan (2026-2030)” (for example, around 2027) and completing it around 2035. This document provides a brief summary of the development, the design and the plan of the CEPC accelerator and the detector, the associated physics potential, drawing from both published and forthcoming TDRs and EDRs, and the work being conducted to prepare CEPC for delivery. Effective international collaboration will be crucial at this stage. This submission for consideration by the ESPP reflects our commitment to seeking international cooperation and leveraging global synergies for a Higgs factory.

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