

CEPC Detector Design and Physics Simulation

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The discovery of a Standard Model like Higgs boson at the LHC brought up an opportunity to investigate the feasibility of a Circular Electron Positron Collider (CEPC)[1] as a Higgs factory. CEPC is initially proposed by the Chinese HEP community with an anticipated circumference about 50-70 km and operating at $\sqrt{s} = 240\text{-}250$ GeV to maximize the Higgs production cross section. Compared with the LHC, the major advantages of the CEPC include clean collision environment, the Higgs can be detected through the Z recoil method without tagging the Higgs decays and capability of determining the Higgs coupling model independently. CEPC is likely to be economically affordable, technologically feasible, and offers high luminosity for precision measurements of the Higgs properties.

The CEPC conceptual detector design takes the International Large Detector (ILD) [2, 3] of ILC as a reference. It fulfills the requirement of the physics program at the lepton collider with precision measurements of the Higgs boson at 240-250 GeV and SM electroweak precision measurements. The CEPC detector design has significantly shorter L^* (1.5 m) than that of ILD detector (3.5 m) to increase luminosity. As a consequence, the CEPC detector geometry and the Machine Detector Interface (MDI) are redesigned. In this talk, we will present preliminary CEPC detector design including MDI, vertex, silicon tracker, TPC tracker, ECAL, HCAL and muon sub-detectors. Based on the first version of CEPC detector, we simulated some benchmark physics processes to study and estimate physics potential related to the Higgs properties measurements at the CEPC, some preliminary results will be presented as well in the talk. Our future plans include detailed detector optimization, R&D of critical detector technologies, development of reconstruction algorithms and softwares, comprehensive studies of critical physics processes based on full simulations etc..

References:

[1] CEPC website, <http://cepc.ihep.ac.cn/>

[2] ILD Concept Group - Linear Collider Collaboration, T. Abe et al., The International Large Detector: Letter of Intent, [arXiv:1006.3396 \[hep-ex\]](https://arxiv.org/abs/1006.3396).

[3] T. Behnke et al., The International Linear Collider Technical Design Report - Volume 4: Detectors, [arXiv:1306.6329 \[physics.ins-det\]](https://arxiv.org/abs/1306.6329).