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Higgs Physics at the FCC-ee

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Now that the masses of the Higgs and Top quark are known, circular electron positron colliders, able to measure the properties of these particles with high accuracy, are receiving considerable attention. As part of the Future Circular Collider study at CERN, the Future e+e- Circular Collider, FCC-ee, (formerly called TLEP) is a new generation collider, fitting in a 80 to 100km tunnel, and able to deliver high luminosity in up to four interaction points from at least the Z peak to above the top pair threshold.

At the ZH production optimum, around 240 GeV, the luminosity of $6 \cdot 10^{34} / \text{cm}^2/\text{s}$ in four IPs yields more than 2 Million Higgs decays in 5 years through the $e^+e^- \rightarrow ZH$ process. This sample opens the possibility of sub-percent precision measurement of the Higgs boson couplings to light fermions and to gauge-bosons, and of the Higgs boson width. These precision measurements are sensitive to multi-TeV new physics interacting with the scalar sector. The ZH production mechanism also gives access to the invisible or exotic branching ratios down to the per mil level, and with a more limited precision to the triple Higgs coupling. The luminosity expected at the top pair production threshold ($\sqrt{s} \sim 340\text{-}350$ GeV) further improves some of these figures by a factor of two, and is sensitive to the Higgs boson coupling to the top quark.

Summary

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