

Higgs properties (mass/width/CP) and detector requirements at the FCC-ee

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The FCC-ee offers powerful opportunities to determine the Higgs boson parameters, exploiting about $2 \cdot 10^6$ $e^+e^- \rightarrow ZH$ events and almost 10^5 $WW \rightarrow H$ events at centre-of-mass energies around 240 and 365 GeV. The determination of the Higgs boson mass with a precision significantly better than the Higgs boson width (4.1 MeV in the Standard Model) is a prerequisite to either constrain or measure the electron Yukawa coupling via direct $e^+e^- \rightarrow H$ production at $\sqrt{s}=125$ GeV, as well as the being a limiting parametric uncertainty on the calculation of Higgs branching ratios. Approaching the statistical limit of 0.1% and $O(1)$ MeV on the ZH cross section and the Higgs boson mass respectively, and of $O(1\%)$ on the Higgs total width, sets highly demanding requirements on accelerator operation (ZH threshold scan, centre-of-mass energy measurement), detector design (lepton momentum resolution, hadronic final state reconstruction performance), theoretical calculations, and analysis techniques (efficiency and purity optimization with modern tools, constrained kinematic fits, control of systematic uncertainties). Perspectives for the precise measurement of CP properties of the HVV couplings have been also performed with the matrix-element package MELA, that has been used to introduce event based-weights into the Standard Model simulation and to calculate optimal kinematic observables.

Primary track

Is the speaker a PhD student or post-doc?

No

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