

Higgs/Top Performance meeting

Jan Eysermans (MIT), Andrew Mehta (Liverpool), Xunwu Zuo (KIT)

February 4, 2025

PED submissions to ESPPU

- FCC PED will present 10-page summary documents for the ESPPU
- Higgs/EW/Top physics will be documented in a single note
- The submission deadline is 31 March
- We need a draft by the beginning of March

From our Higgs/Top side, we mainly will present the table summarizing all the results

- **All results should be ready by the next Higgs/Top perf. Meeting – March 4**
 - We will give an overview of all the analyses and draft of the summary table
 - New results should be presented during the meeting
- Notes completed by end of March (ready for submission)
 - Give green light to make public
 - See backup for note submission

Current status

Table 2: Relative uncertainty (%) on $\sigma_{ZH} \times \mathcal{B}(H \rightarrow XX)$ and $\sigma_{\nu_e \bar{\nu}_e H} \times \mathcal{B}(H \rightarrow XX)$, as expected from the FCC-ee data at 240 and 365 GeV from current studies.

\sqrt{s}	240 GeV		365 GeV	
Integrated luminosity	10.8 ab^{-1}		3.0 ab^{-1}	
Channel	ZH	$\nu_e \bar{\nu}_e H$	ZH	$\nu_e \bar{\nu}_e H$
H \rightarrow any	$\pm 0.59(0.36)$		$\pm 1.48(0.6)$	
H \rightarrow bb	$\pm 0.21(0.20)$	XX	$\pm 0.41(0.35)$	$\pm 0.67(0.6)$
H \rightarrow cc	$\pm 1.65(1.5)$		$\pm 3.13(4.4)$	$\pm 3.49(7.1)$
H \rightarrow ss	$\pm 105(NA)$		$\pm 356(NA)$	$\pm 290(NA)$
H \rightarrow gg	$\pm 0.80(1.3)$		$\pm 2.21(2.5)$	$\pm 2.66(3.2)$
H \rightarrow W^+W^-	$\pm 1.1(0.8)$		$\pm 3.18(1.8)$	$\pm 5.36(2.1)$
H \rightarrow ZZ	$\pm 3.1(3.0)$??	??
H \rightarrow $\tau^+\tau^-$	$\pm 0.85(0.6)$		± 1.8	± 2.1
H \rightarrow $\gamma\gamma$	$\pm 3.1(6.1)$		± 13	± 16
H \rightarrow $Z\gamma$	NA	??	??	??
H \rightarrow $\mu^+\mu^-$	$\pm 11(13)$		$\pm 26(28)$	
H \rightarrow invisible (upper limit)	< 0.02		< 0.04	
H \rightarrow invisible (rel. unc. to SM)	± 27		± 75	

Being scrutinized/optimized
(including possibly hadronic)

Close to finalize combination
(update today)

Efforts ongoing among various
groups – combination pending

Updates today

Analysis ongoing (updates
next meeting)

CDR numbers in parentheses

Color code indicates better(green)/worse(red) w.r.t. CDR

Black means no study available yet – CDR numbers quoted

*Other (mature) studies:
mass/CP/Width*

Next Higgs/Top meeting March 4 2025

- <https://indico.cern.ch/event/1505672>

Annual US FCC Meeting, 15-17 April 2025, FNAL and Argonne

- Indico will become available soon

Higgs pairs, 11-17 May 2025, Italy

- <https://higgs-2022.web.cern.ch/higgs-pairs-workshop-2025-copy/>
- Look for a speaker to present Higgs self-coupling at FCC-ee (contact us if you're interested)

FCC physics week, 19-23 May 2025, Vienna

- <https://indico.cern.ch/event/1408515>

Agenda for today



- 14:00** → 14:10 **News** 🕒 10m ✎

Speakers: Andrew Mehta (University of Liverpool (GB)), Jan Eysermans (Massachusetts Inst. of Technology (US)), Xunwu Zuo (KIT - Karlsruhe Institute of Technology (DE))
- 14:10** → 14:25 **H→tautau final results** 🕒 15m ✎

Speaker: Sofia Giappichini (KIT - Karlsruhe Institute of Technology (DE))
- 14:25** → 14:40 **H -> invisible** 🕒 15m ✎

Speakers: Ang Li (Brookhaven National Laboratory (US)), Diallo Boye (Brookhaven National Laboratory)
- 14:40** → 15:00 **Higgs hadronic couplings update** 🕒 20m ✎

Speaker: Alexis Maloizel (APC, CNRS/IN2P3 and Université Paris Cité (FR))

Backup

Procedure for submission

- CDS community <https://repository.cern/communities/fcc-ped-sub/> -> “new upload”
- Visibility: “full record -> public”, “files only” -> restricted
- Already have DOI? -> Get a new DOI
- Awards/Grants -> FCCIS - Future Circular Collider Innovation Study
- Submit for review (PED conveners will accept and make public)

Potential template: <https://www.overleaf.com/latex/templates/revtex-4-dot-2-template-and-sample/yydsrzvrqrzs>