FCC Higgs Introduction

Giacomo Cacciapaglia (LPTHE), Marco Delmastro (LAPP), Ramona Gröber (Padova), Ang Li (BNL), Andrew Mehta (Liverpool)

Sept. 15, 2026

Meeting, Conference

- **Monthly meeting**: First Tuesday 2PM CERN time.
  - Additional meeting depends on demands

- **FCC-ee Higgs Analyses Tracker** [Link]
  - Please fill you finished or/and on-going work here

- Higgs 2026, Louvain-La-Neuve, Belgium, Oct. 26 – 30, https://indico.cern.ch/event/1668640/
  - Higgs physics at future e^+e^- colliders after the 2026 European Strategy [Ang Li]
  - Higgs boson couplings & total width at FCC-ee [Michaela Arampatzi]
  - The Higgs boson mass and the electron Yukawa coupling at FCC-ee [Reza Jafari]

- **FCC Higgs workshop**: Jan. 27-29, 2027 at CERN
  - https://indico.cern.ch/event/1728862/
  - Please reserve your time

News

- **New MC Contact: Shreyas Bakare (PSI) shreyas.bakare@psi.ch**
  - Contact him if you want to request centrally produced MC samples

Publications

- Think about publishing your work. Before submitting your work to Arxiv/journal, please **submit a note on CDS and ask for an internal review** (especially if work based on common samples and analysis framework). Instructions here.

Backup

Who are we?

- The conveners:
  - Giacomo Cacciapaglia (LPTHE) cacciapa@lpthe.jussieu.fr
  - Marco Delmastro (LAPP) Marco.Delmastro@cern.ch
  - Ramona Gröber (Padova) ramona.groeber@pd.infn.it
  - Ang Li (BNL) ang.l@cern.ch
  - Andrew Mehta (Liverpool) Andrew.Mehta@cern.ch

- Feel free to contact us individually or through fcc-ped-physicsgroup-higgs-admin@cern.ch

- General Mailing list: FCC-PED-PhysicsGroup-Higgs@cern.ch
  - Join the list if not done yet

Plans

- **Top priorities**
  - Full simulation studies in benchmark H decay channels
    - Since true FullSim probably not available in a while, begin by implementing mixed simulation or refined parametric version of performances likely to mostly impact Higgs channels (e.g. JES/JER, particle flow, leptons calibration, flavor tagging)
    - Possible benchmark channels:
      - H→invisible
      - Higgs mass
      - Higgs couplings to quarks
  - H-pole measurement (e.g. e Yukawa)

- **Other (uncovered?) measurements to brainstorm:**
  - Trilinear Higgs coupling
    - Interplay with EWPO for Higgs
    - EW correction to VBF production for HHH coupling?Non-SM decays of the Higgs:
    - H->bs, H-> ALPs, …
    - Collaboration with the flavor and BSM group
  - Quantum Information/tomography
  - Off-shell Higgs effects at WW and/or tt threshold
  - How model-independent is the Higgs width measurement?
    - Any models that can not be covered (multiple Higgs?)

- **Connection with detector/performance groups**
  - Path toward FullSim, intermediate spurs with mixed simulation
  - Any need for performance recalibration at the ZH threshold? (e.g., charm tagging efficiency for H→cc measurements)

FCC-ee Higgs Analyses Tracker (add yours!)

https://docs.google.com/spreadsheets/d/1LfIrf_IcT6lYxGEr1SxpMTta1dnQqJbUgBWZmKw1p60/edit?gid=0#gid=0

FCC-ee Higgs Analysis Tracker

Analysis	People	Simulation Ty	√s (GeV)	Status	Journal	Notes or Publications
Total ZH Cross-section	Ang, Gregorio, Jan, Kevin	FastSim	240, 365	Under Review	JHEP	[2512.21290], https://repository.cern/records/c5d
Higgs mass	Ang, Gregorio, Jan,	FastSim	240, 365	In Progress		https://repository.cern/records/c5dn3-c0s73
Higgs Hadronic Couplings	Andrea Del Vecchio, Jan Eysermans, Loukas Gouskos, George Iako	FastSim	240, 365	Published	JHEP	JHEP04(2026)181
Higgs to invisible	Andrew Mehta, Stephen Randles, Nikolaos Rompot	FastSim	240	Note		https://repository.cern/records/63abq-gc172
Higgs to invisible with mixed Full and Fast-Sim	Ang, Andrea, Diallo, Kétévi, Scott	Mix	240	Published	PRD	Phys. Rev. D 112, 052002
Electron Yukawa via ee>WW>lnu+jj	Apranik/Reza/Dd'E/Portales/Selvaggi	FastSim	125	Under Review	JHEP	[2604.24152] Probing the electron Yukawa couplir
Electron Yukawa via ee>H>WW (full) (i.e. topping up with ll'+2nu and 4j)	Apranik/Reza/Dd'E/Portales/Selvaggi	FastSim	125	In Progress		
Electron Yukawa via ee>H>gg (improved gluon vs. light-q jet tagging)	Apranik/Dd'E/FlorianJonas	FastSim	125	In Progress		
Higgs Hadronic Coupling in H>WW and H>ZZ	Abid Ratanshi, Sofia Giappichini, Nicolò Trevisani (KIT)	FastSim	365	In Progress		
Higgs Self-coupling	Roberto Salerno, Nico Harringer	FastSim	240	Note		https://repository.cern/records/kr447-hj308
Higgs Self-coupling SMEFT	Abraham Tishelman-Charny, Elizabeth Brost	FastSim	240	Published	PRD	Phys. Rev. D 112, 052002
Higgs width, ZH, H-->ZZ	Nicola Morange, Ines Combe	FastSim	240	Note		https://repository.cern/records/ysabc-wm427
Effective HZγ Coupling via Hγ Production	Michele, Lena, Ken, Louis, Sara	FastSim	160, 240, 365	In Progress		https://repository.cern/records/kd1n4-ajd66
CP-violating contributions in the Higgs-strahlung processe	Pinto, Nicholas Gritsan, Andrei Eysermans, Jan Slokenbergs, Valdi Mandacarú Guerra, Lucas Seiji	FastSim	240	Note		https://repository.cern/records/16980-qf683
Light Yukawa couplings and FCNC in Higgs hadronic decays	Michele, Lena, Ken, Louis, Sara	FastSim	240	Note		https://repository.cern/records/7xjde-ebj45
ZH-->ZZZ-->qqllnunu, qqnunull	Sara Aumiller, Michele Selvaggi	FastSim	240	Note		https://repository.cern/records/fnwcp-qfs39
ZH cross-section, H-->ZZ-->4l	Yehia Mahmoud, Nicola De Filippis, Michele Selvaggi, Jan Eyserma	FastSim	240	Note		https://repository.cern/records/ey2ff-hqv83
ZH, Z-->ll, H-->WW-->4q	Eysermans, Jan Hernandez Arellano, Haydee	FastSim	240	Note		https://repository.cern/records/1d9a2-qqm10

Recent Publications

- *Precision measurements of Higgs hadronic decay modes at the FCC-ee*
  - JHEP04(2026)181

- *Model-independent ZH production cross section*
  - [2512.21290], Submitted to JHEP

- *Probing the electron Yukawa coupling via resonant Higgs boson production at FCC-ee via e+e−→H→WW∗ in lepton-plus-jets final states*
  - [2604.24152], Submitted to JHEP

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