

# ECFA Higgs/Top/EW Factory WG 1 - Physics Potential

**ECFA**

workshops on  $e^+e^-$   
Higgs/Top/EW factory

**WG1:**

**H**

**T**

**E**

European Committee for Future Accelerators

iggs

op

EW

## ECFA HTE mini-workshop of $e^+e^-$ physics at 240-350 GeV

25 September 2023



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# SECOND • ECFA • WORKSHOP

## on $e^+e^-$ Higgs / Electroweak / Top Factories

11-13 October 2023  
Paestum / Salerno / Italy

### Topics:

- Physics potential of future Higgs and electroweak/top factories
- Required precision (experimental and theoretical)
- EFT (global) interpretation of Higgs factory measurements
- Reconstruction and simulation
- Software
- Detector R&D

<https://agenda.infn.it/event/34841/>

Over 120 registered participants  
already

Another “overall” workshop envisioned in 2024

Physics Potential WG1 group organizes ~monthly [seminar series](#)

# Focus topics

WG 1 on the physics potential has created focus topics

- Physics topics that highly benefit from more and detailed studies
- Teams are formed
  - Not static, rather the opposite: **get engaged!**
  - **Please let us know if you are interested in working on these topics**
- **H → ss decays (and strange Yukawa coupling):**
  - Strange tagging, BSM models, EFT flavor assumptions, BR measurement/prediction precision,  $dN/dx$ ,  $dE/dx$ , ToF, RICH, strange vs. anti-strange, etc.
- **ZH angular distributions:**
  - Production and decay angles, CP observables, EFT fits, benchmarks, quark-antiquark separation, etc.
- **Two fermion final states ( $\sqrt{s} = 91$  GeV and beyond):**
  - Focus on  $bb$ ,  $cc$ ,  $ss$ ,  $\tau\tau$ , constraints on four-fermion interactions, tau polarization, asymmetries, strange tagging, separating up and down, Kaon-ID, vertex charge, etc.

# Our activities

[Kickoff workshop](#): April 20-22 2022 (hybrid CERN/zoom)

- Reviewed  $e^+e^-$  and LHC studies including from Snowmass
- Sessions on Higgs, top, Electroweak, and quark fragmentation/tagging

**Series of mini-workshops (3-4h) going up in  $e^+e^-$  cms energy [zoom-only]:**

- [First mini workshop](#): September 23 2022
  - Z-pole physics at 91 GeV: overview; rare decays; fragmentation/hadronization
- [Second mini workshop](#): February 10 2023
  - $e^+e^-$  physics at 125 and 160 GeV
- [Third mini workshop](#): May 12 2023
  - $e^+e^-$  physics at 160-240 GeV
- ...

# Our activities

- [Today's mini workshop: e+e- physics at 240-350 GeV:](#)

<b>14:00</b>	→ 14:05	<b>Introduction</b>	🕒 5m	✎
		<b>Speakers:</b> Chris Hays (University of Oxford (GB)), Fabio Maltoni (Universite Catholique de Louvain (BE)), Karsten Koeneke (Albert Ludwigs Universitaet Freiburg (DE))		
<b>14:10</b>	→ 14:30	<b>Rare top decays and interpretations</b>	🕒 20m	✎
		<b>Speaker:</b> Liantao Wang		
<b>14:40</b>	→ 15:00	<b>Impact of quark flavor violating SUSY on h(125) decays at future lepton colliders</b>	🕒 20m	✎
		<b>Speaker:</b> Keisho Hidaka		
<b>15:10</b>	→ 15:30	<b>Single Transverse Spin Asymmetry as a New Probe of SMEFT Dipole Operators</b>	🕒 20m	✎
		<b>Speaker:</b> Mr Xin-Kai Wen		
<b>15:40</b>	→ 16:00	<b>Quantum information and CP measurement in <math>H \rightarrow \tau^+ \tau^-</math> at future lepton colliders</b>	🕒 20m	✎
		<b>Speaker:</b> Kazuki Sakurai (University of Warsaw)		
<b>16:10</b>	→ 16:30	<b>CP sensitivity in e+e- to ZH: Snowmass and beyond</b>	🕒 20m	✎
		<b>Speaker:</b> Andrei Gritsan (Johns Hopkins University (US))		

Extra material

# Higgs-Top-EW and connection with (HL-)LHC subgroup (HTE)

## Subgroup of WG1 on physics potential

### Organization:

- Group meetings: WG1-HTE
- egroup [mailing list](#)
  - You can also subscribe to the egroups; just search for “ECFA-WHF-WG1” in egroups list .
- Conveners: Chris Hays (Oxford), Karsten Köneke (Freiburg), Fabio Maltoni (Louvain)
- Conveners' email: [ecfa-whf-wg1-hte-conveners@cern.ch](mailto:ecfa-whf-wg1-hte-conveners@cern.ch)
  - **Please don't hesitate to talk to us for any ideas, suggestions, questions!**

### Mandate:

- The group activities consist of the study of potential Higgs, top, & EW measurements not covered by the Precision and Flavour topical WG1 subgroups
- Identify measurements that the (HL-)LHC can perform in order to increase the physics potential of a future Higgs/Top/EW Factory.
  - High-precision inclusive measurements
  - Differential measurements, e.g., at high  $p_T$
  - ...
- The physics potential of an  $e^+e^-$  HTE factory will also be compared to the potential of other future colliders.

You can find all our events, meetings, and workshops in our [indico category](#).

Twiki page: <https://twiki.cern.ch/twiki/bin/view/ECFA/ECFAHiggsFactoryWG1>