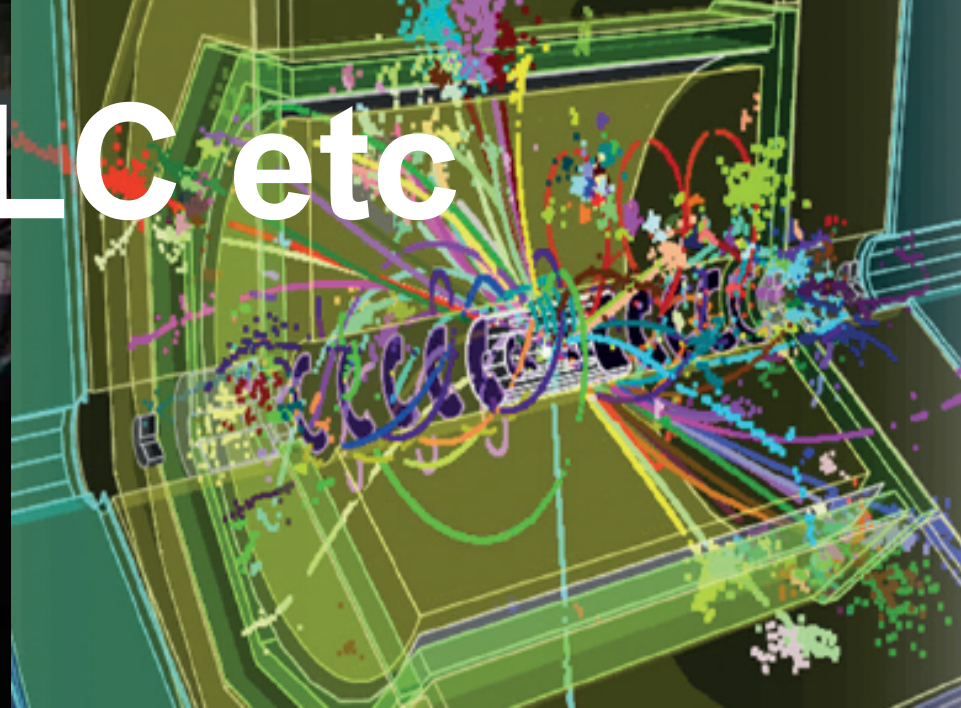
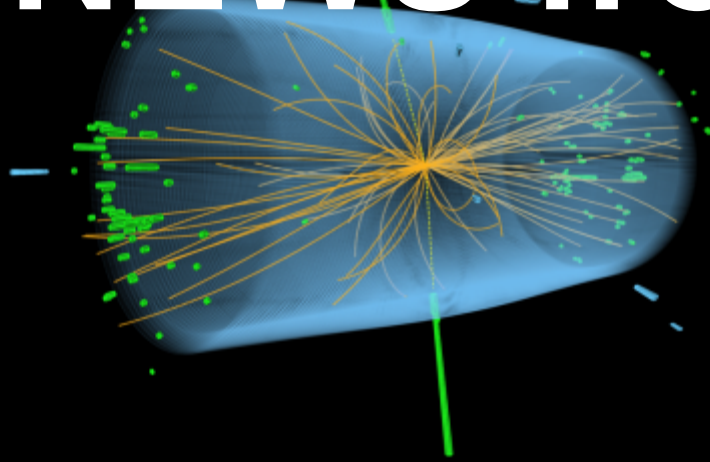


NEWS from ECFA, ILC etc



Benno List, Christophe Grojean, Christian Schwanenberger, Jenny List
5th Future Colliders @ DESY meeting
18 Nov 2021

ECFA Higgs Factory Study

Overview

- “big boss”: Karl Jakobs (ECFA chair), IAC, WG conveners
- Final deliverable: big document / “Yellow Report” by early 2024 as input to the next European Strategy
- Working groups:
 - WG1 on Physics Potential
 - WG2 on Physics Analysis Methods
 - WG3 on Detectors: tba....
- Kick-off workshop June 18: <https://indico.cern.ch/event/1033941/>
- mailing list (CERN e-group): ECFA-Workshop-Higgs-factory@cern.ch,
 - self-subscription with (leight-weight) CERN account at <https://e-groups.cern.ch/e-groups>
 - if no CERN account: contact your friendly local co-convener :)
- Comprehensive Workshops planned in Fall 2022, Summer 2023, Spring 2024 (report presentation)

ECFA Higgs Factory Study - WG2 Physics Analysis Methods

Update

- chairs: Patrizia Azzi (CERN), Dirk Zerwas (ICJLab), Fulvio Piccinini (Padova)
- central topic so far: Key4HEP as joint framework
- eventually also: reconstruction algorithms (kinematic fit, jet finding, ...)
- series of 2-day topical workshops, in-person / hybrid
 - **Nov 9/10: MC Generators for e⁺e⁻ Higgs Factories => see Jürgen's talk**
 - Feb 1/2: Simulation Tools
 - ... Reconstruction ...
- specialized discussions, 2-3h online - tbd

ECFA Higgs Factory Study - WG1 Physics Potential

Update

- chairs: Juan Alcaraz (CERN), Fabio Maltoni (Louvain), JL
- identified five main topics:
 1. WG1-EFT: Global interpretation in (SM)EFT and UV complete models
 2. WG1-PREC: Precision calculations and theoretical, parametric and experimental syst. uncertainties
 3. WG1-HTE: Higgs, top and electroweak physics, incl. high-p T
 4. WG1-HF: Flavour physics
 5. WG1-SRCH: Direct discovery potential, incl. FIP

WG1-EFT - Global interpretation in (SM)EFT and UV complete models

relevant excerpt from mandate:

EFT (global) interpretation of Higgs factory measurements, including EW, Z pole and top physics, and its impact on concrete new physics scenarios and models. Extend the study of the impact also on specific models that cannot be matched onto EFT

- (SM)EFT fits of Higgs / EW / top sector
- SUSY fits (and other explicit BSM model interpretations?)
- higher dimensional operators
- usage of differential distribution as inputs
- focus on model independence, or rather no model preference, as much as possible (usually cannot escape some rudimentary model-dependence choices though)
- impact on concrete BSM models and how far they could be distinguished
- fit pseudo-measurements \neq SM, but from example BSM models
- It does cover explanation of how "kappa" parameters connect to EFT (e.g., $|H|^2 Q_{Ht_R} \rightarrow \kappa_t$) and may discuss the implications of these kinds of connections
- triboson couplings, four-fermion interactions, longitudinal W scattering, $WW \rightarrow tt$, etc.

Target members:

- the “usual suspect” SMEFT fitting groups
- the “usual suspect” fitting groups (Mastercode, ...)
- experimentalists in interaction with other subgroups on experimental inputs

WG1-PREC: Precision calculations and theoretical, parametric and experimental syst. uncertainties

relevant excerpt from Mandate:

Requirements for accuracy in theoretical calculations and parametric uncertainties, and perspectives to achieve it.
Perspectives for experimental uncertainties

- cross-section and decay rate calculations for Higgs / EW / top / BSM
=> interact eg with LHC Higgs cross section WG
- careful enumeration and determination of uncertainties (theory & parametric)
- define requirements for the future and develop perspectives to achieve these
- ...

Target members:

- theorists working on precision calculations and propagation of parametric uncertainties
- experimentalists
 - bringing experience from LHC, Belle II, ...
 - techniques to reduce the impact of certain systematics
 - prospects on measurements needed as input for parametric uncertainties
 - ...

WG1-HTEW: Higgs, top and electroweak physics, incl. high-p T

Relevant excerpts from mandate:

Identification of measurements that HL-LHC can do in order to increase the physics potential of the future Higgs and top/EW Factory. HL-LHC precision physics interplay with the Higgs and top/EW factory potential, including the not-yet-complete assessment of the high-pT probes potential at the HL-LHC. Comparative attention should also be paid to the potential of other future colliders.

- projections on Higgs / top / EW for the e+e- projects
- HL-LHC projections on Higgs / top / EW measurements
- including differential / high-pt potential
- implications for e+e- Higgs factory
- interplay / joint analysis of pp and e+e- data ?
- added value of an e+e- Higgs factory wrt HL-LHC

Target members:

- experimentalists from LHC experiments and e+e- projects working on Higgs /top/ EW projections
- theorists interested to work out eg details of the pp / ee interplay, develop further differential methods etc

WG1-HF: Flavour physics

relevant excerpt from mandate:

Exploration of different flavour scenarios and interplay with flavour data

- projections on the flavour physics potential of future Higgs factories
- projections on the flavour physics potential of existing colliders
- implication of these and other flavour experiments (g-2, ...)
- interpretation of flavour anomalies in BSM models and what they imply for Higgs factories
- added value of an e^+e^- Higgs factory wrt HL-LHC & Belle 2
- EFT interpretations of flavour data, eventually joined global-global effort with WG1-EFT ?

Target members:

- experimentalists working in flavour physics (LHCb, Belle-II, ATLAS, CMS, ...) and in flavour physics projections for e^+e^- projects
- flavour physics model builders
- flavour fitting groups

WG1-SRCH: Direct discovery potential, incl. FIP

relevant excerpt from mandate:

Broad exploration of the new physics discovery potential of the future Higgs and top/EW factory, including the search for Feebly Interacting Particles also in connection with “Physics Beyond Colliders” activities.

- projections for searches at e+e- projects
- HL-LHC projections on direct searches
- including potential of “very exotic” signatures, FIPS,
- including non-SM decays of H(125)
- implications of these and of other non-collider / dark matter search experiments on e+e- Higgs factory
- added value of an e+e- Higgs factory wrt searches at HL-LHC, non-collider, ...

Target members:

- experimentalists from LHC and non-collider experiments and e+e- projects working on searches and exotic Higgs decays
- theorists interested to work out eg details of the interplay, develop new methods etc
- model builders

Role of sub-WGs

globally

- deliver one chapter of final Yellow Book :-)
- report at the “big” workshops
- organize parallel sessions at “big” workshops?
- organize small topical workshops
- contribute to overall seminar series
- identify crucial to-do items
- but also - community building:
 - reach out to parts of the HEP community so far not involved in e+e- Higgs factory studies
 - and engage more people so far focussed on LHC experiments, Belle II, ...
 - this includes “education” on e+e- physics, tools, ...
- this will be essential for strengthening the consensus in the community and create supportership strong enough to convince funding agencies to put O(10 Billion) EUR / Sfr / \$ on the table!

Ongoing:

- **identify a few key people for each topic**
- **hold meeting with each group**
- **discuss scope, ideas, names of other people to get involved, interest to get involved etc**
- **plan 2-3 day topical workshops in first half**

Update from European ILC Community Meeting

next steps for ILC

- recent ILCX showed a lot of interesting science and R&D progress
- Scientific parts of IDT (WG2/WG3) very active, lot of international interest
- however political process in Japan currently stalled due to various reasons
- Japanese lobby for ILC reorganizing
- review of recent project progress and preLab proposal by MEXT's ILC Advisory Panel is ongoing, report expected by March
- IDT in discussion with ICFA about a preLab-light
 - Japanese funding for some accelerator workpackages of preLab -> 3-10 million EUR/\$/CHF
 - some agreement between KEK and other labs
- Europe:
 - revisiting European action plan
 - thinking about an E-JADE II application covering "Higgs factories based on lepton beams"
- **Should IDT consider sites outside Japan for ILC?**


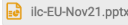
European ILC community meeting

Wednesday Nov 17, 2021, 10:00 AM → 12:00 PM Europe/Zurich

Steinar Stapnes (CERN), Thomas Schoerner-Sadenius (Deutsches Elektronen-Synchrotron (DE))

Description: Join Zoom Meeting
ZOOM connection

Meeting ID: 993 4171 8959
Passcode: 190525
Find your local number: <https://desy.zoom.us/j/99341718959>

10:00 AM	→ 10:05 AM	Welcome	🕒 5m
Speaker: Steinar Stapnes (CERN)			
10:05 AM	→ 10:25 AM	IDT news	🕒 20m
Speaker: Tatsuya Nakada (EPFL - Ecole Polytechnique Federale Lausanne (CH))			
10:55 AM	→ 11:15 AM	ILCX and follow up	🕒 20m
Speakers: Benno List (DESY), Jenny List (Deutsches Elektronen-Synchrotron (DE)), Steinar Stapnes (CERN)			
 			
11:15 AM	→ 11:27 AM	A brief update about EU project(s) and a European Prelab plan	🕒 12m
Speakers: Steinar Stapnes (CERN), Thomas Schoerner-Sadenius (Deutsches Elektronen-Synchrotron (DE))			
11:30 AM	→ 11:40 AM	Other news (ECFA and LDG roadmaps, Snowmass)	🕒 10m
11:45 AM	→ 11:50 AM	AOB	🕒 5m

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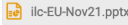
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There is still a significant community who is convinced the next e+e- collider should be straight, and thereby energy-upgradable with a long-term perspective for upgrades with advanced accelerator technologies

News & Announcements

Upcoming meetings & events

- today & tomorrow: Plenary ECFA Meeting
 - Friday afternoon: reports by all Higgs factory projects: <https://indico.cern.ch/event/1085137/>
- Nov 24/25: KET Jahresversammlung
 - topic of evening discussion: Germany's involvement in FCC feasibility study: <https://indico.desy.de/event/31557/>
- next **FutureColliders@DESY** meetings
 - **6th meeting: Dec 2**, <https://indico.desy.de/event/31588/>
 - 7th meeting: Jan 13 or 20 tba
- **IDT-WG3 Open Physics Meetings**: winter time -> 23:00 DESY time
 - **next meeting Dec 16**: <https://agenda.linearcollider.org/event/9352/>
 - Jan 13, Feb 10, Mar 10, ...
- ECFA Higgs Factory WS on **Simulation Tools**, Feb 1/2 in Padova, <https://indico.cern.ch/event/1097819/>
- **5th FCC physics workshop**, 7-11 February 2022, <https://cern.ch/FCCPhysics2022>
 - 150 people in person, first come first serve