

ECFA Higgs/EWK/Top Factory study: Status & report planning

- 3rd ECFA workshop @Paris
- Status of study report
- The next steps

Christos Leonidopoulos
& Aidan Robson

115th Plenary ECFA Meeting
CERN - 15 November 2024

The Big Picture

- Capture the Physics Case & ECFA study activities
 - Demonstrate what can be achieved at a future collider
 - Encourage synergies among projects & build e^+e^- community
- Physics Performance (WG1)
 - Forum to collect and discuss physics potential
 - Particular initiative: Develop thematic areas to concentrate common work → Focus topics
- Analysis Methods (WG2) & Detector Technologies (WG3)
 - Cross-referenced with Physics Topics (WG1)
 - Legacy: Common software, common studies/discussions
- Report:
 - Coherent & self-contained: should be a useful document
 - Focus on new studies (avoid already published material)
 - With references to more detailed notes/papers, when available

14 Focus Topics

• Focus Topics

- Showcase of physics potential
- Development of analysis tools cooperatively across projects
- Delivery of physics results by people across projects

Focus topics for the ECFA study on Higgs / Top / EW factories

Juan Alcaraz Maestre¹, Juliette Alimena², John Alison³, Patrizia Azzi⁴, Paolo Azzurri⁵, Emanuele Bagnaschi^{6,7}, Timothy Barklow⁸, Matthew J. Basso⁹, Josh Bendavid¹⁰, Martin Beneke¹¹, Eli Ben-Haim¹², Mikael Berggren², Jorge de Blas¹³, Marzia Bordone⁶, Ivanka Bozovic¹⁴, Valentina Cairo⁶, Nuno Filipe Castro¹⁵, Marina Cobal¹⁶, Paula Collins⁶, Mogens Dam¹⁷, Valerio Dao⁶, Matteo Defranchis⁶, Ansgar Denner¹⁸, Stefan Dittmaier¹⁹, Gauthier Durieux²⁰, Ulrich Einhaus², Mary-Cruz Fouz¹, Roberto Franceschini²¹, Ayres Freitas²², Frank Gaede², Gerardo Ganis⁶, Pablo Goldenzweig²³, Ricardo Gonçalo^{24,25}, Rebeca Gonzalez Suarez²⁶, Loukas Gouskos²⁷, Alexander Grohsjean²⁸, Jan Hajer²⁹, Chris Hays³⁰, Sven Heinemeyer³¹, André Hoang³², Adrián Irlés³³, Abideh Jafari², Karl Jakobs¹⁹, Daniel Jeans³⁴, Jernej F. Kamenik³⁵, Matthew Kenzie³⁶, Wolfgang Kilian³⁷, Markus Klute²³, Patrick Koppenburg³⁸, Sandra Kortner³⁹, Karsten Köneke¹⁹, Marcin Kucharczyk⁴⁰, Christos Leonidopoulos⁴¹, Cheng Li⁴², Zoltan Ligeti⁴³, Jenny List², Fabio Maltoni²⁰, Elisa Manoni⁴⁴, Giovanni Marchiori⁴⁵, David Marzocca⁴⁶, Andreas B. Meyer², Ken Mimasu⁴⁸, Tristan Miralles⁴⁷, Victor Miralles⁴⁹, Abdollah Mohammadi⁵⁰, Stéphane Monteil⁵¹, Gudrid Moortgat-Pick²⁸, Zohreh Najafabadi⁵², María Teresa Núñez Pardo de Vera², Fabrizio Palla⁵, Michael E. Peskin⁸, Fulvio Piccinini⁵³, Laura Pintucci⁵⁴, Wiesław Płaczek⁵⁵, Simon Plätzer^{56,32}, Roman Pöschl⁵⁷, Tania Robens⁵⁸, Aidan Robson⁵⁹, Philipp Roloff⁶, Nikolaos Rompotis⁶⁰, Andrej Saibel³³, André Sailer⁶, Roberto Salerno⁶¹, Matthias Schott⁶², Reinhard Schwienhorst⁶³, Felix Seikow², Michele Selvaggi⁶, Frank Sieger⁶⁴, Frank Simon²³, Andrzej Siodmok⁵⁵, Torbjörn Sjöstrand⁶⁵, Kirill Skovpen⁶⁶, Maciej Skrzypek⁴⁰, Yotam Soreq⁶⁷, Raimund Ströhrmer¹⁸, Taikan Suehara⁶⁸, Junping Tian⁶⁸, Emma Torro Pastor³³, Maria Ubiali³⁶, Luiz Vale Silva³³, Caterina Vernieri⁸, Alessandro Vicini⁶⁹, Marcel Vos³³, Aidan R. Wiederhold⁷⁰, Sarah Louise Williams³⁶, Graham Wilson⁷¹, Aleksander Filip Zarniecki⁷², Dirk Zerwas^{73,57}

Abstract

In order to stimulate new engagement and trigger some concrete studies in areas where further work would be beneficial towards fully understanding the physics potential of an e^+e^- Higgs / Top / Electroweak factory, we propose to define a set of focus topics. The general reasoning and the proposed topics are described in this document.

- **HtoSS**: $e^+e^- \rightarrow Zh$; $h \rightarrow ss$
- **ZH**ang: ZH angular distributions and CP studies
- **Hself**: Determination of the Higgs self-coupling
- **Wmass**: Mass and width of the W boson
- **WWdiff**: Full studies of WW and evW
- **TTthresh**: Top threshold - detector-level studies of $e^+e^- \rightarrow t\bar{t}$
- **LUMI**: Precision luminosity measurement
- **EXscalar**: New exotic scalars
- **LLPs**: Long-lived particles
- **EXtt**: Exotic top decays
- **CKMWW**: CKM matrix elements with on-shell and boosted W decays
- **BKtautau**: $B^0 \rightarrow K^{0*}\tau^+\tau^-$
- **TwoF**: EW precision - 2-fermion final states
- **BCfrag/Gsplit**: Measurement of b - and c -fragmentation functions and hadronisation rates and measurement of gluon splitting to bb / cc

<https://arxiv.org/abs/2401.07564>

Analysis Tools & Detector Tech

- WG2 (Physics Analysis Tools) & WG3 (Detector Technologies) follow a more top-down approach
- WG2: software, generators, technical benchmarks, beamstrahlung, luminosity, simulation, reconstruction
- WG3: bridge between DRD collaborations and HET factory detector concepts (Vertex, Tracking, Calorimetry, PID) Integration, Mechanics & Cooling

3rd ECFA workshop on HET factories

The banner features a central image of a particle detector cross-section with concentric rings and a central detector structure. Overlaid on this are particle physics diagrams: on the left, a process involving e^- , e^+ , Z^+ , Z , gz , and H ; on the right, a process involving e^+ , e^- , W , W , H , $\bar{\nu}_e$, and ν_e . Labels Z , t , and W are placed near the detector rings. The text '3rd ECFA workshop on e⁺e⁻ Higgs, Top & ElectroWeak Factories' is at the top, and '9-11 October 2024' is in the middle. A search bar at the bottom right contains the text 'Enter your search term'.

9-11 Oct 2024

Campus des Co

Europe/Paris timezone

Overview

Committees

Timetable

Participant List

Satellite events (Public
Event on FCC & French
ECFA ECR workshop)

- Following tradition of previous ECFA workshops, aim for real “working workshop”
- Last ECFA workshop before next European Strategy for Particle Physics update
- Last opportunity for teams to advertise latest & greatest work ahead of ESPP update

<https://indico.in2p3.fr/event/32629/overview>

3rd ECFA workshop on HET factories



- Plenary contributions: 40
- Parallel contributions: 88
- In addition: ECR discussions
- Participants: 206

<https://indico.in2p3.fr/event/32629/overview>

Timeline: what has happened

- 20 October: deadline for analysis teams to submit 2-page summary
- 20 Oct – 10 Nov: Compilation & editing by WG1 subgroup conveners & editors and WG2/WG3 editors (+coordinators & chief editors)

The screenshot shows a web interface for 'Contributions to ECFA Higgs/top/ew report'. The header is blue with white text. Below the header, the date '20 October 2024' and 'Europe/Zurich timezone' are displayed. A left sidebar contains a menu with items: Overview, Scientific Programme, Call for Abstracts, Reviewing Area (selected), Timetable, and Contribution List. The main content area is titled 'Reviewing Area' and includes a sub-header 'The reviewing area shows the tracks for which you are a reviewer'. Below this, five tracks are listed with their respective reviewer counts: FLAVour (9), GLOBal interpretations (16), HTE Higgs, Top, EW (21), PRECision (12), and SeaRCHes (40).

Track	Reviewer Count
FLAVour	9
GLOBal interpretations	16
HTE Higgs, Top, EW	21
PRECision	12
SeaRCHes	40

98 contributions in total

Timeline: what has happened

- 20 October: deadline for analysis teams to submit 2-page summary
- 20 Oct – 10 Nov: Compilation & editing by WG1 subgroup conveners & editors and WG2/WG3 editors (+coordinators & chief editors)

taking shape in Overleaf

Outline Structure

Contents		Contents	
1	Introduction	18	6.2 Analyses in specific models
1.1	Physics Landscape Overview	19	7 Direct Searches for New Particles
1.2	Higgs Factories Overview	19	7.1 Phenomenological Introduction
1.2.1	Runtans	19	7.1.1 General motivation for BSM
2	Common Developments	19	7.1.2 Possible scenarios with focus on direct signatures
2.1	Software Ecosystem	19	7.1.3 Possible search strategies
2.2	Generators	19	7.1.4 Expected search landscape after HL-LHC
2.3	Beamstrahlung & Luminosity Spectra	20	7.2 Focus topic: Exotic scalar searches
2.4	FOCUS TOPIC: Luminosity	20	7.3 Focus topic: Long lived particles
2.5	Technical Benchmarks	20	7.3.1 Heavy Neutral Leptons
2.6	Simulation	22	7.4 Focus topic: Exotics top decays
2.7	Reconstruction	22	7.5 Further topics
3	Developments in Higgs Physics	22	7.5.1 Heavy Neutral Leptons
3.1	FOCUS TOPIC: ZH production and angular studies	22	7.5.2 Dark Photons (?)
3.1.1	CP-odd coupling studies	22	7.5.3 SUSY searches
3.1.2	CP-even coupling studies	22	7.5.4 Dark Matter
3.1.3	Entanglement sensitivity	22	7.5.5 Exotic Z decays (?)
3.2	FOCUS TOPIC: H → SS	22	7.5.6 Exotic Higgs boson decays (including invisible)
3.3	Other rare Higgs couplings	23	7.5.7 Two-particle angular correlations in the search for new physics
3.3.1	Higgs-electron Yukawa	23	7.6 Detector and running option considerations
3.3.2	Flavour-violating Higgs decays	23	7.6.1 Role of polarization
3.4	FOCUS TOPIC: Higgs self-coupling	23	7.6.2 Key detector design issues
3.4.1	Introduction	23	7.6.3 Key challenges in systematics
3.4.2	Progress in theory	24	8 Flavour
3.4.3	Progress in single-Higgs approach	24	8.1 Flavour landscape at the time of Higgs factories
3.4.4	Progress in di-Higgs approach	24	8.1.1 Challenges in []
4	Developments in Electroweak Physics & QCD	24	8.2 Focus Topic: CKM 4
4.1	FOCUS TOPIC: W boson mass measurement	24	8.3 Focus Topic: B → K
4.2	Precision W-boson coupling measurements	25	9 New Detector Technologies
4.3	FOCUS TOPIC: 2-fermion final states	25	10 References
4.3.1	Introduction	25	
4.3.2	Theoretical and phenomenological aspects	25	
4.3.3	Experimental aspects	25	
4.4	Other Z-boson and neutrino interactions	25	
4.4.1	Electron couplings from transversely polarized beams	25	
4.4.2	Flavour-changing Zecays	25	
4.4.3	Zoson decays in models with right-handed neutrinos	25	
4.4.4	Four-fermion interactions with neutrinos	25	
4.4.5	Neutrino anomalous magnetic moment	25	
4.5	FOCUS TOPIC: WWif	25	
4.6	FOCUS TOPIC: Fragmentation and hadronisation	25	
5	Developments in Top Physics	25	
5.1	FOCUS TOPIC: Threshold	25	
5.1.1	Top quark properties from the threshold scan	25	
5.1.2	Top quark couplings in the SMEFT	25	
5.2	FOCUS TOPIC: EXit (?)	25	
6	Global Interpretations	25	
6.1	Model independent: Global SMEFT fits	25	
6.1.1	Interpretation in terms of particular scenarios	25	

Draft: 07.10.2024 – 07.14

Status of report on 7 October

- ◆ Sections:
- Introduction
 - Common Developments
 - Developments in Higgs Physics
 - Developments in Electroweak Physics & QCD
 - Developments in Top Physics
 - Global Interpretations
 - Direct Searches for New Particles
 - Flavour
 - New Detector Technologies



Timeline: what has happened

- 20 October: deadline for analysis teams to submit 2-page summary
- 20 Oct – 10 Nov: Compilation & editing by WG1 subgroup conveners & editors and WG2/WG3 editors (+coordinators & chief editors)

Contents			
1 Introduction			
1.1 Physics Landscape Overview			
1.2 Higgs Factories Overview			
1.2.1 Runplans			
2 Common Developments			
2.1 Software Ecosystem			
2.1.1 Key4hep: Turnkey			
2.1.2 Core Building Blocks			
2.1.3 Infrastructure			
2.1.4 Testing and Validation			
2.2 Generators			
2.2.1 Interfacing to beamlines			
2.2.2 Hard matrix elements			
2.2.3 Parton showers			
2.2.4 Special processes			
2.2.5 Simulation of physics			
2.2.6 Sustainable generation			
2.2.7 Generator Summary			
2.3 Beamstrahlung & Luminosity			
2.4 FOCUS TOPIC: Luminosity			
2.5 Technical Benchmarks			
2.5.1 k4Generators Comparison			
2.5.2 Cross Sections			
2.5.3 Differential Distributions			
2.6 Simulation			
2.6.1 Introduction			
2.6.2 Simulation Tools			
2.6.3 Detector Models			
2.6.4 Outlook			
2.7 Reconstruction			
2.7.1 Introduction			
2.7.2 Tracking			
2.7.3 Calorimetry and reconstruction			
2.7.4 Particle Identification			
2.7.5 Isolated Lepton			
2.7.6 Jet Clustering			
2.7.7 Flavour Tagging			
3 Developments in Higgs Physics			
3.1 FOCUS TOPIC: Z H production			
3.1.1 Higgs boson production			
3.1.2 Higgs boson width			
3.1.3 $H \rightarrow ZZ$ coupling			
3.1.4 $H \rightarrow \tau\tau$ coupling			
3.1.5 Impact of vector bosons			
3.1.6 HZZ CP studies			
3.1.7 CP tests with photons			
3.1.8 HVV CP studies			
3.1.9 CP studies in Higgs			
3.1.10 Models of CP violation			
3.1.11 Entanglement studies			
3.2 FOCUS TOPIC: $H \rightarrow ss$			
3.2.1 Introduction			
3.2.2 Theoretical motivation			
3.2.3 Interpretation as Higgs			
3.2.4 Fragmentation modelling			
3.2.5 Overview of existing experiments			
3.2.6 Target detector performance			
3.2.7 Algorithm R&D: jet flavour			
3.2.8 Ideas for future studies			
3.2.9 Conclusion			
3.3 Other rare Higgs couplings			
3.3.1 Higgs-electron Yukawa			
3.3.2 Invisible Higgs decays			
3.3.3 Flavour-violating Higgs			
3.4 FOCUS TOPIC: Higgs self-coupling			
3.4.1 Introduction			
3.4.2 $e^+e^- \rightarrow ZH$ at NLO			
3.4.3 Progress in theory			
3.4.4 Single-Higgs processes			
3.4.5 Progress in Higgs-pair production			
4 Developments in Electroweak Physics			
4.1 FOCUS TOPIC: W boson mass			
4.2 Precision W-boson coupling measurement			
4.3 FOCUS TOPIC: 2-fermion final states			
4.3.1 Introduction			
4.3.2 Theoretical and phenomenology			
4.3.3 Experimental aspects			
4.3.4 Ongoing studies at Z-pole			
4.3.5 Ongoing studies with 2-fermion			
4.4 Other Z-boson and neutrino interactions			
4.4.1 Electron couplings from Z-pole			
4.4.2 Flavour changing Z-boson			
4.4.3 Z-boson decays in models			
4.4.4 Four-fermion interactions			
4.4.5 Neutrino anomalous magnetic moment			
4.5 FOCUS TOPIC: WWdiff			
4.6 FOCUS TOPIC: Fragmentation			
4.6.1 Fragmentation functions			
4.6.2 Gluon splitting			
4.6.3 Improved hadronization			
4.6.4 Colour reconnection			
4.6.5 Relevance for physics			
4.6.6 Target physics observations			
4.6.7 Target detector performance			
4.6.8 Summary and open questions			
4.7 Determination of fundamental constants			
5 Developments in Top Physics			
5.0.1 Motivation for top quark			
5.1 FOCUS TOPIC: TThreshold: top quark			
5.1.1 Predictions for top quark			
5.1.2 Experimental studies			
5.1.3 Machine-related systematic uncertainties			
5.1.4 Results for the top quark mass and width			
5.1.5 Determination of the top quark Yukawa coupling			
5.1.6 Mass measurements above the top quark pair production threshold			
5.2 FOCUS TOPIC: TThreshold: Top quark couplings in the SMEFT			
5.2.1 Fit to the top sector of the SMEFT			
5.2.2 The top quark Yukawa coupling			
5.3 FOCUS TOPIC: Exotics top decays			
5.3.1 $t \rightarrow cZ$ in Randall-Sundrum			
5.3.2 $t \rightarrow cg$ in ZHDM			
5.3.3 Direct search for new states in top quark decays			
6 Global Interpretations			
6.1 Model independent: Global SMEFT fits			
6.1.1 Combining EW/Higgs/Top measurements in the SMEFT at future colliders			
6.1.2 BSM interpretation of SMEFT results			
6.1.3 Global constraints on Single-Particle SM extensions			
6.1.4 New Physics Beyond Leading Order at Tera-Z: The third family			
6.1.5 New Physics Beyond Leading Order at Tera-Z: Single-Particle SM extensions			
6.2 Analyses in specific models			
7 Direct Searches for New Particles			
7.1 General motivation for BSM searches at the HTE factory			
7.2 Focus topic: Exotic scalar searches			
7.2.1 Overview of scalar extensions of the Standard Model			
7.2.2 Focus topic targets			
7.2.3 Search for scalar-strahlung production			
7.2.4 Production of exotic scalars in Higgs boson decays			
7.2.5 Searches in other production channels			
7.3 Focus topic: Long lived particles			
7.3.1 Heavy Neutral Leptons			
7.3.2 Axion-like particles			
7.3.3 Exotic decays of the Higgs boson			
7.3.4 Model-independent searches for LLPs			
7.3.5 Machine learning methods for LLP searches			
7.3.6 Target detector performance aspects			
7.4 New gauge bosons			
7.4.1 Flavored gauge bosons			
7.4.2 New (dark) $U(1)$ gauge bosons			
7.4.3 Exotic Z boson decays into new $U(1)$ gauge bosons			
7.4.4 A complete model for a new $U(1)$ gauge interaction: (dark) Higgs and			
7.4.5 Further characterization of a new (dark confining) gauge interactions at			
7.4.6 Two-particle angular correlations in the search for new physics			
7.5 A portal scenario: Heavy Neutral Leptons			
7.5.1 Theoretical introduction			
7.5.2 Searching for heavy neutral leptons through exotic Higgs decays at the			
7.5.3 Searching for type I seesaw mechanism in a two Heavy Neutral Lepton			
FCC-ee			
7.5.4 Search for heavy neutrinos in prompt decays at future lepton colliders			
7.5.5 Search for Heavy Neutral Leptons in $\mu + X$ channels at the FCC-ee			
7.5.6 Measuring heavy neutrino properties at the FCC-ee			
7.5.7 Heavy neutrino-antineutrino oscillations at the FCC-ee			
7.5.8 Probing the Neutrino Portal at Future Lepton Colliders			
7.5.9 Right-Handed Majorana Neutrinos at a e^+e^- collider			
7.6 SUSY searches			
7.7 Dark Matter			
8 Flavour			
8.1 Introduction			
8.2 The new physics perspective and UV models			
8.2.1 Flavour Deconstruction Models			
8.3 Anticipated theoretical and experimental landscape at the dawn of future colliders			
8.3.1 Expected precision from Lattice QCD			
8.4 CKM profile prospects			
8.4.1 Global analyses: New Physics in neutral meson mixings			
8.4.2 FOCUS TOPIC: Measuring $ V_{cb} $ and $ V_{cb} $ from W decays			
8.4.3 Measuring $ V_{cb} $ from $t \rightarrow Ws$			
8.4.4 $B_{(c)}^0 \rightarrow \tau\nu$ leptonic decays as probes of $ V_{ub} $ and new physics			
8.5 Rare decays of b- and c-flavoured particles			
8.5.1 Time-Dependent Precision Measurement of $B_s^0 \rightarrow \phi\mu\mu$ Decay at FCC-ee			
8.5.2 FOCUS TOPIC: $b \rightarrow s\tau^+\tau^-$ and $b \rightarrow s\nu\bar{\nu}$			
8.6 Tau physics			
8.6.1 τ mass, lifetime, and leptonic decays: lepton universality test			
8.6.2 LFV from τ decays			
8.7 Outlook on other avenues			
9 New Detector Technologies			
10 References			

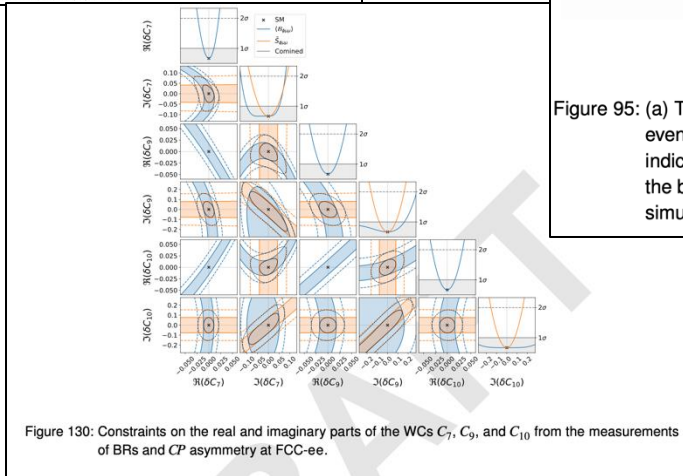
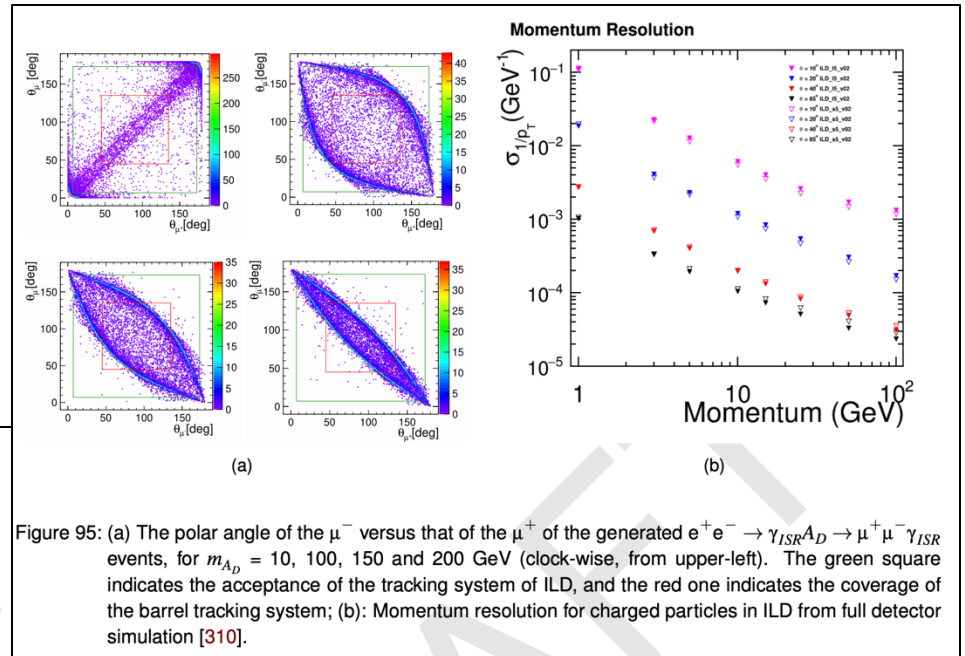
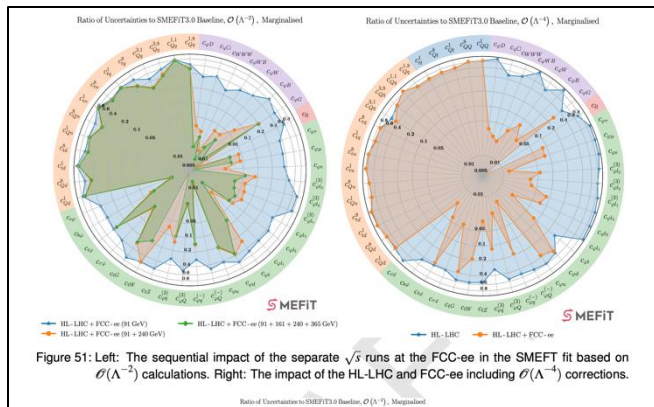
Status of report on 13 Nov:

- 200+ pages of WG1 contributions
- 1.2k+ of references



Timeline: what has happened

- 20 October: deadline for analysis teams to submit 2-page summary
- 20 Oct – 10 Nov: Compilation & editing by WG1 subgroup conveners & editors and WG2/WG3 editors (+coordinators & chief editors)



Timeline: the next steps

- 20 October: deadline for analysis teams to submit 2-page summary
- 20 Oct – 10 Nov: Compilation & editing by WG1 subgroup conveners & editors and WG2/WG3 editors (+coordinators & chief editors)
- 10 – 27 Nov: Editing by WG1 coordinators, WG2/3 editors & coordinators, and chief editors

WG coordinators & chief editors

- **Physics program - WG1 coordinators:** Fabio Maltoni, Jenny List, Jorge de Blas, Patrick Koppenburg (ECFA-WHF-WG1-coords@cern.ch)
- **Physics analysis methods - WG 2 coordinators:** Patrizia Azzi, Fulvio Piccinini, Dirk Zerwas (ECFA-WHF-WG2-coords@cern.ch)
- **Detector technologies - WG3 coordinators:** Felix Sefkow, Mary Cruz Fouz, Giovanni Marchiori (ECFA-WHF-WG3-coords@cern.ch)
- **Chief editors:** Christos Leonidopoulos, Aidan Robson

WG2 editors

Section editors

Andre Sailer, Frank Gaede, Gerardo Ganis
Carlo Carloni Calame, Juergen Reuter, Marco Zaro
Alan Price
Thorsten Ohl, Daniel Schulte
Andre Sailer, Briec Francois, Daniel Jeans
Loukas Gouskos, Taikan Suehara, Ulrich Einhaus

Timeline: the next steps

- 20 October: deadline for analysis teams to submit 2-page summary
- 20 Oct – 10 Nov: Compilation & editing by WG1 subgroup conveners & editors and WG2/WG3 editors (+coordinators & chief editors)
- 10 – 27 Nov: Editing by WG1 coordinators, WG2/3 editors & coordinators, and chief editors
- 27 Nov – 18 Dec: Editing by chief editors
- 18 December: circulation of 1st draft to contributors, IAC, P-ECFA/R-EFCA
- 17 January: Deadline for comments on 1st draft
- 24 January: Deadline for final results/plots from contributors
- February: incorporation of comments & latest results/plots
- 21 February: Final version sent to P-ECFA/R-ECFA
- 7-8 March: R-ECFA approval during country visit, followed by arXiv submission

Summary

Huge amount of activity, exciting new results on HET factory prospects, large number of contributions

Challenge: produce a coherent & self-contained document in a very short time

Months ahead are going to be intense for contributors, editors, coordinators, reviewers

We are on track to deliver the 1st draft to community before the Xmas break

Backup

FAQ: late submissions

- What happens if a study/contribution misses these deadlines?
- Analyses/work/results that may mature on a longer timescale should not (and will not) be ignored.
- There is the possibility of submitting a short addendum to our report in time for consideration at the Symposium.

WG coordinators

- **Physics program - WG1 coordinators:** Fabio Maltoni, Jenny List, Jorge de Blas, Patrick Koppenburg (ECFA-WHF-WG1-coords@cern.ch)
- **Physics analysis methods - WG 2 coordinators:** Patrizia Azzi, Fulvio Piccinini, Dirk Zerwas (ECFA-WHF-WG2-coords@cern.ch)
- **Detector technologies - WG3 coordinators:** Felix Sefkow, Mary Cruz Fouz, Giovanni Marchiori (ECFA-WHF-WG3-coords@cern.ch)
- **Chief editors:** Christos Leonidopoulos, Aidan Robson

WG1 convenors

WG1-PREC (Precision in theory & experiment):

Ayres Freitas (Pittsburgh), Paolo Azzurri (Pisa),
Adrian Irlles (Valencia), Andreas Meyer (DESY)
ecfa-whf-wg1-prec-conveners@cern.ch

WG1-GLOB (Global interpretations in (SM)EFT and UV complete models):

Sven Heinemeyer (IFCA/IFT), Alexander Grohsjean (DESY),
Junping Tian (Tokyo), Marcel Vos (Valencia), Jorge de Blas (Granada)
ecfa-whf-wg1-glob-conveners@cern.ch

WG1-HTE (TOP-HIGGS-EW and connection with LHC):

Chris Hays (Oxford), Karsten Koeneke (Freiburg),
Fabio Maltoni (Louvain)
ecfa-whf-wg1-hte-conveners@cern.ch

WG1-FLAV (Heavy Flavours):

David Marzocca (Trieste), Stephane Monteil (Clermont Ferrand),
Pablo Goldenzweig (KIT)
ecfa-whf-wg1-flav-conveners@cern.ch

WG1-SRCH (Feebly interacting particles, direct low mass searches):

Roberto Franceschini (Rome III), Rebeca Gonzalez (Uppsala),
Filip Zarnecki (Warsaw)
ecfa-whf-wg1-srch-conveners@cern.ch

WG2 editors

Section editors

Andre Sailer, Frank Gaede, Gerardo Ganis

Carlo Carloni Calame, Juergen Reuter, Marco Zaro

Alan Price

Thorsten Ohl, Daniel Schulte

Andre Sailer, Briec Francois, Daniel Jeans

Loukas Gouskos, Taikan Suehara, Ulrich Einhaus

Focus Topics Expert Teams

- Expert teams formed for each Focus Topic to guide study in collaboration with WG1 coordinators/convenors

EXscalar (SRCH)	LLPs (SRCH)	EXtt (SRCH)	HtoSS (HTE)	ZHang (HTE(GLOB))	TwoF (HTE)
Filip Zarnecki	Rebeca Gonzalez Suarez	Nuño Castro	Valentina Cairo	Ivanka Bozovic	Adrian Irlles
Mikael Berggren	Juliette Alimena	Marina Cobal	Taikan Suehara	Markus Klute	Daniel Jeans
Sven Heinemeyer	Jan Hajer	Gauthier Durieux	Loukas Gouskos	Sandra Kortner	Freya Blekman
Abdollah Mohammadi	Marcin Kucharczyk	Roberto Franceschini	Matt Basso	Cheng Li	Mogens Dam
Tania Robens	Emma Torro Pastor	María Teresa Núñez Pardo de Vera	Caterina Vernieri	Gudrid Moortgat-Pick	Jorge de Blas
Nikolaos Rompotis	Sarah Louise Williams	Kirill Skovpen	Valerio Dao	Ken Mimasu	Eram Rizvi (tbc)
	Filip Zarnecki	Marcel Vos	John Alison		Emanuele Bagnaschi
			Yotam Soreq		
Hself (Glob)	WWdiff (Glob)	TTthres (Glob(HTE))	BCFrag/Gsplit (FLAV/PREC)	Wmass (PREC)	LUMI (PREC)
Junping Tian	Patrizia Azzi	Marcel Vos	Eli Ben-Haim	Paolo Azurri	Ayres Freitas
Gauthier Durieux	Timothy Barklow	Patrizia Azzi	Maria Ubiali	Josh Bendavid	Ivanka Bozovic
Jose Goncalo	Jorge de Blas	Martin Beneke	Andrzej Siodmok	Martin Beneke	Mogens Dam
Sven Heinemeyer	Ansgar Denner	Jorge de Blas	Simon Plaetzer	Stefan Dittmaier	Fulvio Piccinini
Michael Peskin	Alexander Grohsjean	Matteo Defranchis	Loukas Gouskos	Simon Plätzer	Wiesław Płaczek
Philipp Roloff	Wolfgang Kilian	Gauthier Durieux	Torbjörn Sjöstrand	Matthias Schott	André Sailer
Roberto Salerno	Frank Siegert	Roberto Franceschini		Raimund Ströhmer	Maciej Skrzypek
		Andre Hoang		Graham Wilson	Graham Wilson
CKMWW (FLAV)	BKtautau (FLAV)	Adrian Irlles		Jorge de Blas	
U. Einhaus	T. Miralles	Yasuhiro Kiyo			
M. Selvaggi	S. Monteil	Andrej Saibel			
P. Goldenzweig	A. Wiederhold	Reinhard Schwienhorst			
M. Bordone	M. Kenzie	Frank Simon			
D. Marzocca	E. Manoni	Filip Zarnecki			
	P. Goldenzweig				
	J. Kamenik				