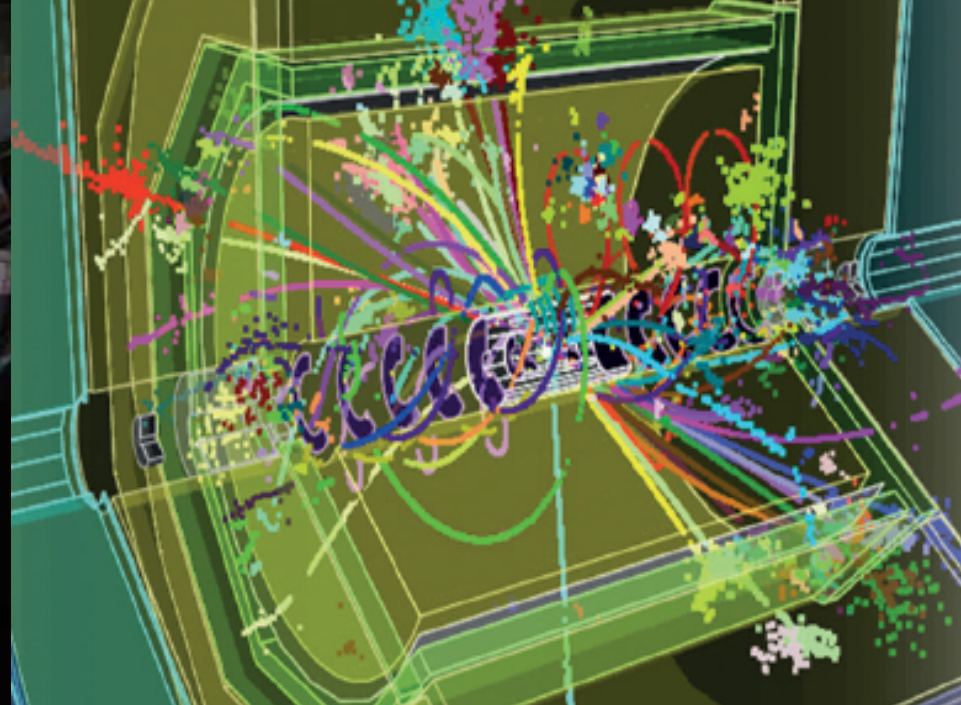
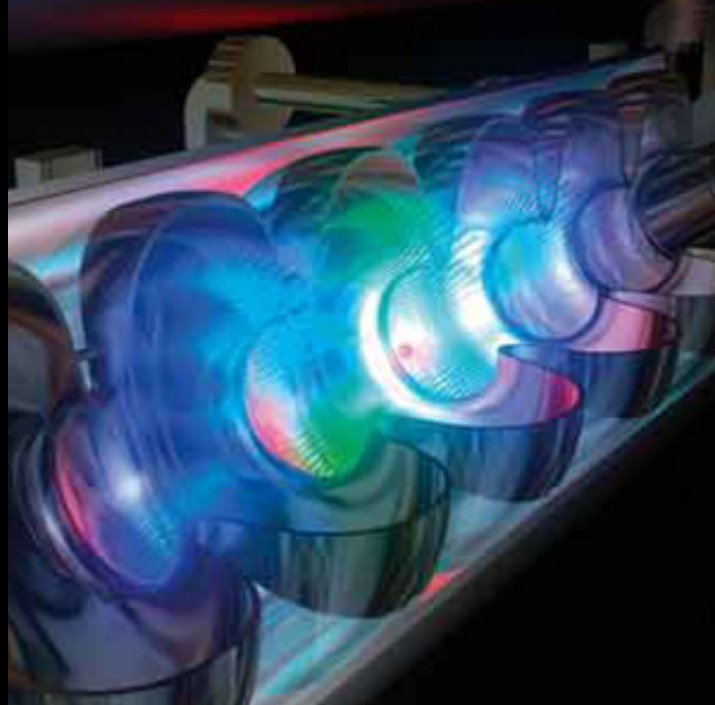
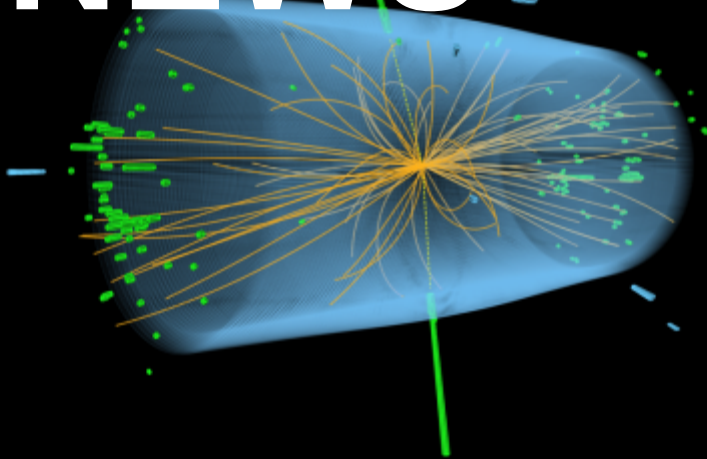


NEWS



Benno List, Christophe Grojean, Christian Schwanenberger, Jenny List
12th Future Colliders @ DESY meeting
1 July 2022

ECFA Higgs Factory Study

Upcoming meetings & events

- **Recent / upcoming topical events**

- ~~June 28: WG1-SRCH – “Mapping the landscape: working meeting”~~ **post-poned due to clash with Fabiola’s report from Council Week**
- June 29: WG1-FLAV - “1st Meeting” -> <https://indico.cern.ch/event/1165192/>
- July 1: WG1-GLOB - “Global interpretations in models via EFTs” -> <https://indico.cern.ch/event/1163668/>
- July 14: WG1-PREC - “MiniWorkshop: parametric uncertainties: α_{em} ” -> <https://indico.cern.ch/category/14871/>

- ECFA WORKSHOP 2022, Oct 5-7 in Hamburg

- <https://indico.cern.ch/event/1160770/>
- **abstract submission deadline post-poned to July 22 !**
however: acceptance will start today, so earlier submission has better chances for full consideration....

(parallel streams: WG2 “Physics analysis methods”, WG3 “Detector technology & performance”, WG1-GLOB, WG1-HTE, WG1-SRCH, WG1-PREC, WG1-PREC)

From Report from Council Week

some excerpts

- HL-LHC starts in 2029 and runs into the “early 40ies”
- depths for construction expected to be paid off in the “erly 30ies” => at that point 300MCHF / year for new projects
- after end of HL-LHC operation, this could increase to 600MCHF/year
- FCC feasibility study to be completed in 2025
- mid-term review in Q4 of 2023
- covering accelerators (ee + hh), physics and detectors
- recording: <https://cds.cern.ch/record/2813969>

Snowmass

the grand final

- Drafts of **Energy Frontier Reports** are available https://snowmass21.org/energy/start#final_reports
- have been presented last Friday at virtual EF community meeting
<https://indico.fnal.gov/event/54432/>
- **Summer Meeting**, Seattle, July 17-26,
<https://indico.fnal.gov/event/22303/>

10:00 AM

→ 11:15 AM

EF Report

Conveners: Alessandro Tricoli (BNL), Laura Reina (Florida State University), Meenakshi Narain (Brown U)

10:00 AM

Overview, EW and BSM Sections (15+10min)

Speaker: Laura Reina (Florida State University)

 EF-Meeting-June24-...

10:25 AM

QCD, Detectors and Enabling methods (15+10min) ¶

Speaker: Alessandro Tricoli (BNL)

 EF Meeting June24 ...

10:50 AM

Vision (15+10min)

Speaker: Meenakshi Narain (Brown University)

 EF Meeting June 24...

AM

→ 12:20 PM

Panel Discussion

Panelists: Jim Brau, Christophe Grojean, Elliot Lipeles, Caterina Doglioni, Sekhar Chivukula, Aidan Robson,

Conveners: Alessandro Tricoli (BNL), Laura Reina (Florida State University), Meenakshi Narain (Brown U)

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 EF-Meeting-June24-...

1:40 PM

→ 2:40 PM

e+e- and Muon Collider Forum Reports

1:40 PM

e+e- Collider Forum Report

Speaker: Maria Chamizo Llatas (Brookhaven National Laboratory)

 e+e- Collider Forum ...

2:10 PM

Muon Collider Forum Report

Speaker: Kevin Black

 MC_Report_EF.pptx

AM

2:40 PM

→ 3:10 PM

Higgs Physics Report (EF01+EF02)

2:40 PM

Higgs Physics Report

Speaker: Caterina Vernieri (SLAC)

 Snowmass-EF012-T...

3:00 PM

Discussion

3:10 PM

→ 3:40 PM

Top and Heavy Flavor Physics Report (EF03)

3:10 PM

Top and Heavy Flavor Physics Report

Speaker: Doreen Wackerroth (University at Buffalo, SUNY)

 2022-06-24-EFmeeti...

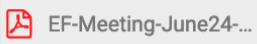
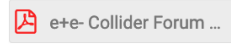
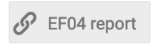
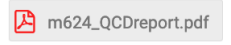
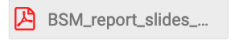
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Discussion

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2:10 PM	Muon Collider Forum Report	Speaker: Kevin Black
EW Physics and Global Fits Report (EF04)		
4:00 PM	EW Physics and Global Fits Report (EF04)	Speakers: Alberto Belloni, Ayres Freitas (University of Pittsburgh)  20m
4:20 PM	Discussion	10m
QCD&Strong Interactions Report (EF05+EF06+EF07)		
4:30 PM	QCD&Strong Interactions Report (EF05+EF06+EF07)	Speakers: Pavel Nadolsky (Southern Methodist University), Stefan Hoeche (Fermilab)  20m
4:50 PM	Discussion	10m
5:00 PM → 5:30 PM	BSM Physics Report (EF08+EF09+EF10)	
5:00 PM	BSM Physics Report (EF08+EF09+EF10)	Speakers: Caterina Doglioni (Lund University), Elliot Lipeles (University of Pennsylvania), Zhen Liu (University of Minnesota)  20m

Snowmass

EF Vision - The immediate future

The immediate future is the HL-LHC.

- During the next decade it is essential to complete the **highest priority recommendation of the last P5** and to fully realize the scientific potential of the HL-LHC collecting at least 3 ab^{-1} of data.
- **The physics case is very strong:**
 - It can extend the direct search for new elementary particles
 - It can measure the Higgs-boson couplings to reach sensitivity to BSM physics in the TeV range
 - It can put bounds on the Higgs-boson self coupling and give first indications on the Higgs potential
 - It can provide the best measurements of top-quark couplings beyond the reach of the first generation of future colliders
- **Continued strong US participation is critical** to the success of the HL-LHC physics program, in particular for the Phase-2 detector upgrades, the HL-LHC data taking operations and physics analyses based on HL-LHC data sets.

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EF Vision - The intermediate future

The intermediate future is an e^+e^- Higgs factory, either based on a linear (ILC, C^3 , CLIC) or circular collider (FCC-ee, CepC).

- **The physics case is compelling** and rest on the ability to
 - Measure the Higgs-boson couplings to sub-percent level and discern the pattern of BSM physics behind possible deviations from SM predictions
 - Search for exotic Higgs decays and explore the Higgs portal to hidden sectors
 - Measure the SM (W,Z,t,H) to very high precision and stress test its consistency
 - Perform precision measurements of QCD as testing ground of QFT in both perturbative and non-perturbative regimes.
- **The various proposed facilities have a strong core of common physics goals:** it is important to realize at least one somewhere in the world.
- **A timely implementation is important.** There is **strong US support** for initiatives that could be realized on a time scale relevant for early career physicists.

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EF vision - The long-term future

In the long term EF envision a collider that probes the multi-TeV scale, up or above 10 TeV parton center-of-mass energy (FCC-hh, SppC, MuC)

- **The physics case is outstanding** and rest on the potential to:
 - Significantly constrain scenarios motivated by naturalness
 - Produce the fundamental particles that generate the mechanism of EW symmetry breaking
 - Produce particle with flavor-dependent couplings to quarks and leptons
 - Search for dark-matter particles in the strong-coupling region of dark sectors
 - Explore the unknown at the highest possible energy scale
- A 100-TeV proton-proton collider (FCC-hh, SppC) provides an effective energy reach of a 10-TeV muon collider (MuC). A pp-collider has easier access to colored states and compositeness studies, a MuC can take advantage of VV-fusion and benefit from excellent signal to background,
- The main limitation is technology readiness. **A vigorous R&D program** into accelerator and detector technologies **will be crucial**.

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EF Resources and Timelines

➤ Five year period starting in 2025

- Prioritize HL-LHC physics program
- Establish a targeted e⁺e⁻ Higgs Factory detector R&D for US participation in a global collider
- Develop an initial design for a first stage TeV-scale MuC in the US (pre-CDR)
- Support critical detector R&D towards EF multi-TeV colliders

➤ Five year period starting in 2030

- Continue strong support for HL-LHC program
- Support construction of an e⁺e⁻ Higgs Factory
- Demonstrate principal risk mitigation and deliver CDR for a first-stage TeV-scale MuC

➤ After 2035

- Evaluate continuing HL-LHC physics program to the conclusion of archival measurements
- Begin and support the physics program of the Higgs Factories
- Demonstrate readiness to construct and deliver TDR for a first-stage TeV-scale MuC
- Ramp up funding support for detector R&D for EF multi-TeV colliders

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Other news & announcements

Summer is coming!

- **next European ILC Community meeting: July 13, 10:00**
- **IDT-WG3 Open Physics Meetings:** summer break -> resume Sep 15, Oct 13, ...
- **next FutureColliders@DESY meeting:** summer break -> resume end of August / September, tentatively with a report from Snowmass