

The European Strategy for Particle Physics Update (ESPPU)

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KAT meeting, 16.10.2024

Remark: Used several slides from ECFA chair (Paris Sphicas)
shown at the ECFA HET workshop, Paris, Oct 9-11, 2024

ESPP (I): launch of next (current) update

In March 2024 CERN Council launched the new ESPP process:

Timeline for the update of the European Strategy for Particle Physics



ESPP: responsibilities of PPG/WG and ESG

PPG: Physics Preparatory Group

Physics + Technology working groups

- Electroweak physics (including Higgs physics)
- Strong interaction
- Flavour physics
- Beyond the Standard Model physics
- Neutrino physics and cosmic messengers
- Dark matter and dark sector
- Accelerator science and technology
- Detector instrumentation
- Computing

→ Physics Briefing Book

ESG: European Strategy Group

ESG: Overarching topics

- **National input / roadmaps (→ Strategic)**
- **Projects (FCC, LC, LE-FCC-hh, MC, ..)**
(timeline, costs, (physics à PPG))
- Comparisons across proposed projects
- Relations with other fields of physics
- Implementation of the Strategy
(role of CERN and National Labs, coordination of European participation in projects sited outside Europe, ...)
- Knowledge and Technology transfer
- Sustainability, environmental impact
- ...

ESPP (II): Secretariat, ESG, PPG and working groups

- **"Secretariat":**
 - Secretary (chair): K. Jakobs
 - CERN SPC chair: H. Montgomery
 - ECFA chair: Paris Sphicas
 - Lab Directors Group (LDG) chair: D. Newbold
 - M. Seidel from 1/1/2025
- **European Strategy Group (ESG):**
 - Secretariat (secretary chairs ESG);
 - One rep per CERN member state;
 - One rep per lab in LDG;
 - CERN DG, CERN DG-elect;
 - Invitees: PPG, President of Council, 1 rep from each Associate Member State and Observer State, 1 rep from EC; chairs of ApPEC, NuPECC, ESFRI
- **Physics Preparatory Group (PPG):**
 - Secretariat (secretary chairs ESG);
 - 4 people nominated by SPC
 - 4 people nominated by ECFA
 - 2 people nominated by Americas (A.Canepa, R. Rosenfeld)
 - 2 people nominated by Asia (X. Lou, Y. Yamazaki)
 - 1 person nominated by CERN (G. Arduini)
- **Nine Working Groups (WGs):**
 - Last time's Computing and Instrumentation split (8 WGs of 2020 ESPP → 9 WGs):
 - Computing WG and
 - Instrumentation WG
- **Increase engagement by HEP community:**
 - Each WG: only one co-convenor from PPG
 - Second co-convenor from SPC/ECFA lists
 - So: Ex-officio members (ECFA, SPC and LDG Chairs) and representatives from the Americas and Asia are not co-convenors.
- **Role of representatives from Asia and the Americas, and ex-officio members and Chair: maintain coherence of overall effort.**
- **Engage the generation most concerned: Each WG must appoint a scientific secretary who is an Early Career Researcher:**
 - A scientist without an indefinite position and within 10 years from PhD.
 - To be selected by convenors, using nominees collected by ECFA and their own knowledge of the people in the thematic area.

ESPP (III): Working Groups and Conveners

- ❑ **Charge to WG conveners:**
 - ❑ Selection of Early Career Scientists
 - ❑ Definition of sub-topics and appointment of additional WG members
 - ❑ Definition of Benchmark processes
 - ❑ Organisation of WG meetings
 - ❑ Writing the Physics Briefing Book (will be supported by Roger Forty, who has agreed to be Scientific Secretary of the Strategy update)
- ❑ **Instrumentation WG:**
 - ❑ The “portal” to all that we want the next ESPP to contain
 - ❑ Co-convened by Thomas Bergauer and Ulrich Husemann
 - ❑ Things to consider: areas of concentration; suggestions for key participants (to Thomas & Ulrich)
 - ❑ Closer to EDP: it would be very useful to have active involvement by EDP members in the Instrumentation group

Working group	Co-convener	Co-convener
	PPG member	
Electroweak physics	Monica Dunford (DE, exp)	Jorge de Blas (ES, <u>theory</u>)
Strong interaction	Cristinel Diaconu (FR, exp)	Andrea Dainese (IT, exp, HI)
Flavour physics	Gino Isidori (CH, theory)	Marie-Hélène <u>Schune</u> (FR, <u>exp</u>)
BSM physics	Fabio Maltoni (BE/IT, theory)	Rebecca Gonzales-Suarez (SE, exp)
Neutrino physics and cosmic messengers	Pilar Hernandez (ES, theory)	Sara Bolognesi (FR, exp)
Dark matter and dark sector	Jocelyn Monroe (UK, exp)	Matthew McCollough (CERN, theory)
Accelerator science and technology	Gianluigi Arduini (CERN, acc)	Phil Burrows (UK, exp, acc)
Detector instrumentation	Thomas Bergauer (AT, exp)	Ulrich Husemann (DE, exp)
Computing	Tommaso Boccali (IT, exp, comp)	Borut Kersevan (SL, exp, comp)

**10 European countries and CERN represented
12 men, 6 women; 13 experiment, 5 theory**

The European Strategy Group (ESG)

Member States	
Austria	Prof. Jochen Schieck
Belgium	Prof. Pierre Van Mechelen
Bulgaria	Prof. Venelin Kozhuharov
Czech Republic	Prof. Rupert Leitner
Denmark	Prof. Jens-Jørgen Gaardhøje
Estonia	Prof. Martti Raidal
Finland	Prof. Katri Huitu
France	Dr Christelle Roy
Germany	Prof. Klaus Desch
Greece	Prof. Costas Fountas
Hungary	Prof. Dezső Varga
Israel	Prof. Marek Karliner
Italy	Prof. Antonio Zoccoli
Netherlands	Prof. Eric Laenen
Norway	Prof. Heidi Sandaker
Poland	Prof. Tadeusz Lesiak
Portugal	Prof. Mário Pimenta
Romania	Dr Calin Alexa
Serbia	Dr Lidija Zivkovic
Slovakia	Dr Marek Bombara
Spain	Dr Maria Jose Costa
Sweden	Prof. Richard Brenner
Switzerland	Prof. Ben Kilminster
United Kingdom	Prof. Mark Lancaster

CERN Director-General	Dr Fabiola Gianotti
CERN Director-General-Elect	To be appointed in late 2024

Major European National Labs	
CIEMAT	Dr Nicanor Colino
DESY	Prof. Beate Heinemann
IJCLab	Prof. Achille Stocchi
IRFU	Prof. Franck Sabatié
LNF	Dr Sandra Malvezzi
LNGS	Prof. Ezio Previtali
NIKHEF	Prof. Jorgen D'Hondt
PSI	Prof. Klaus Kirch
STFC-RAL	Prof. Dave Newbold
STFC-Daresbury Lab.	Prof. Jim Clarke

Strategy Secretariat Members	
Strategy Secretary (ESG Chair)	Prof. Karl Jakobs
SPC Chair	Dr Hugh Montgomery
LDG Chair	Prof. Dave Newbold
ECFA Chair	Prof. Paris Sphicas

ESG INVITEES

President of the CERN Council	Prof. Eliezer Rabinovici → Costas Fountas
Associate Member States in the pre-stage to Membership	
Cyprus	Prof. Panos Razis
Slovenia	Prof. Borut Paul Kerševan
Associate Member States	
Brazil	Prof. Leandro Salazar de Paula
Croatia	Dr Budimir Kliček
India	tbc
Latvia	Ms Antra Gaile
Lithuania	Dr Andrius Juodagalvis
Pakistan	Dr Masood Iqbal/Dr Zafar Yasin
Türkiye	Dr Bahadır Saygı
Ukraine	Prof. Borys Grynyov
Observer States	
Japan	Dr Kazunori Hanagaki
United States of America	Prof. Michael Tuts
Organisations with Observer status	
European Commission	Ms Patricia Postigo McLaughlin
Other invitees	
Chair ApPEC	Dr Andreas Haungs
Chair NuPECC	Prof. Marek Lewitowicz
Chair ESFRI	Prof. José Luis Martínez
Other members of the PPG (in addition to the Strategy Secretariat)	

**ESPP: ECFA guidelines
for inputs by the
National HEP communities**

ESPP: Some lessons learned from 2020 update

- **Last ESPP: there was a round of receiving “national inputs”**
 - Responses varied widely:
 - For small(er) countries, feedback was ~uniform and easy to interpret.
 - For large(r) countries, feedback was non-uniform, often favoring multiple priorities (e.g. type of next collider)
 - Wide range of responses made it difficult to summarize the “opinion” or “position” of several countries
 - Lesson learned: while it will always be difficult to summarize the “position” of an entire country, at least we can aim at uniform responses and targeted questions.
- **Plan for ECFA: facilitate wide discussion(s);**
 - Engage maximum number of colleagues, especially ECRs
 - Guide the formation of the “national inputs” to better inform the ESPP process.
 - National inputs can be collected individually by each single country or a group of countries/region.
 - Formulated set of questions and issues for discussion by national communities
 - Clearly, not an exclusive list, countries/groups could/should add their own issues/concerns/wishes etc

National Input on “next collider at CERN” (I)

Central element of the next ESPP: the choice of next collider at CERN.

ESG remit: “The Strategy update should include the preferred option for the next collider at CERN and prioritised alternative options to be pursued if the chosen preferred plan turns out not to be feasible or competitive”.

→ It is imperative that the European HEP community should provide explicit feedback on both the preferred and alternative options for this “next collider at CERN”, which will be the Laboratory's next flagship project, and an explanation of any specific prioritisation.

- a) Which is the preferred next major/flagship collider project for CERN?
- b) What are the most important elements in the response to (a)?
 - i) Physics potential
 - ii) Long-term perspective
 - iii) Financial and human resources: requirements and effect on other projects
 - iv) Timing
 - v) Careers and training
 - vi) Sustainability

National Input on “next collider at CERN” (II)

c) Should CERN/Europe proceed with the preferred option set out in (a) or should alternative options be considered:

- i) if Japan proceeds with the ILC in a timely way?
- ii) if China proceeds with the CEPC on the announced timescale?
- iii) if the US proceeds with a muon collider?
- iv) if there are major new (unexpected) results from the HL-LHC or other HEP experiments?

d) Beyond the preferred option in (a), what other accelerator R&D topics (e.g. high-field magnets, RF technology, alternative accelerators/colliders) should be pursued in parallel?

e) What is the prioritised list of alternative options if the preferred option is not feasible (due to cost, timing, international developments, or for other reasons)?

f) What are the most important elements in the response to (e)? (The set of considerations in (b) should be used).

National Input on non-collider projects and other fields

Remit to ESG also specifies:

“The Strategy update should also indicate areas of priority for exploration complementary to colliders and for other experiments to be considered at CERN and at other laboratories in Europe, as well as for participation in projects outside Europe.”

It would thus be most useful if the national inputs explicitly included the preferred prioritisation for non-collider projects. Specific questions to address:

- a) What other areas of physics should be pursued, and with what relative priority?

- b) What are the most important elements in the response to (a)? (The set of considerations as for the “next collider” should be used).

- c) To what extent should CERN participate in nuclear physics, astroparticle physics or other areas of science, while keeping in mind and adhering to the CERN Convention? Please use the current level and form of activity as the baseline for comparisons.

KET organises 3 workshops

May	FC@CERN (22.-24., Bonn): already planned before strategy process was announced
Oct	Last (!) ECFA Higgs-EW-Top factory workshop; 9.-11.: Paris
Nov	Annual Meeting (21./22.)+ “The future of Non-collider Particle Physics” (22.-24.: Bad Honnef) „The future of Collider Particle Physics“ (27.-29.: DESY)
Dec	Iterate workshop summaries → to be finalized well before:
Jan	„Concluding Workshop“ (19.(evening)-22.(afternoon): Bad Honnef)
Feb	Iterate text
Mar	Submission (31.)

Coordination with KAT, KHuK, KfB

Chairs of KET, KAT, KHuK, KfB agreed on:

- * Individual ESPPU inputs preferred → preserve different perspectives**
- * Coherence on common topics: → physics, computing, detector R&D, role of CERN...**

KAT feedback on „Non-Collider“ workshop:

- * cover complete neutrino physics**
- * Gravitational Waves**
 - KET considers talks on connections with Particle Physics/Cosmology of interest**

„The Future of Non-Collider Particle Physics“

Date/venue: 22.11. (Fri, late afternoon)-24.11.24 (Sunday)
Bad Honnef (following the annual KET meeting)

<https://indico.desy.de/event/45358/>

Orga Team:

KET: F. Ellinghaus (Co-Chair), L. Feld, F. Kahlhöfer, H. Lacker (Co-Chair), M. Schott

KAT: M. Lindner, M. Wurm

KHuK: A. Denig

ν -related talks: Thomas Schwetz-Mangold (theory), Felix Kling (FASER, SND, FPF),
Alfons Weber (Long-Baseline ν), Susanne Mertens (non-accelerator ν),
Marek Kowalski (astrophysical ν), Marc Schumann (SHiP)

GW: Pedro Schwaller (theory), Krisztian Peters (experiments)

„The Future of Collider Particle Physics“

Date/venue: 27.11.(Wed)-29.11.24 (Fri) @ DESY
including a dedicated yHEP session

Orga Team:

Johannes Haller (co-chair), Jenny List (co-chair), Markus Schumacher, Lutz Feld,
Ruth Jacobs, Thomas Kuhr, Tilman Plehn, Karsten Könecke, Daniel Mohler (KHuK), Uli Uwer

Concluding Workshop

Date/venue: 19.01. (Sunday evening)

-22.01.25 (Wednesday afternoon)/Bad Honnef

Orga Team:

L. Feld (co-chair), H.-C. Schultz-Coulon (co-chair), H. Lacker (RECFA, non-collider),
K. Desch (council delegate, LHC, future collider, axions), F. Simon (future collider, detectors),
M. Klute (LHC, future collider, computing), T. Kuhr (heavy flavour, computing),
B. Heinemann (DESY, HGF), M. Kado (MPI, CERN-SPC), G. Weiglein (theory), M. Krämer (theory),
R. Jacobs (yHEP), D. Mohler (KHuK), E. Bründermann (KfB), U. Katz (KAT)