

**Préparation
à la stratégie Française**

13/12/2024

ECFA guidelines for inputs from national HEP communities to the European Strategy for Particle Physics

National inputs to the ESPP update can be sent at different points in time: prior to the deadline of **31 March 2025**; after the March 2025 deadline and by **26 May** at the latest, so it can be analysed by the ESG in time for the Open Symposium; after the Briefing Book release, in time for the Strategy Drafting Session (12/2025). The deadline for input to the ESG at its Drafting Session is **14 November 2025**.

2) “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”.

3) **Questions to be considered by countries/regions when forming and submitting their “national input” to the ESPP:**

a) **Which is the preferred next major/flagship collider project for CERN?**

b) **What are the most important elements in the response to 3a)?**

- 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

c) Should CERN/Europe proceed with the preferred option set out in 3a) 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 3a), what other accelerator R&D topics (e.g. highfield magnets, RF technology, alternative accelerators/colliders) should be pursued in parallel?
- e) What is the prioritised list of alternative options if the preferred option set out in 3a) is not feasible (due to cost, timing, international developments, or for other reasons)?
- f) What are the most important elements in the response to 3e)? (The set of considerations in 3b should be used).

4) The remit given to the ESG also specifies that “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 4a)? (The set of considerations in 3b 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.

Should CERN/Europe proceed with the preferred option 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?

Heard statements:

"There should not be two Higgs factory machines operating globally at the same time"

"If China proceeds with CEPC then CERN should build ILC"

"CERN should prioritise energy-frontier exploration and proceed towards FCC-hh as quickly as possible"

"If China proceeds with CEPC then CERN should not build FCC-ee"

"If China proceed with CEPC then Europe should seek to participate"

-What is the prioritised list of alternative options if the preferred option set out in 3a) is not feasible (due to cost, timing, international developments, or for other reasons)?

-What are the most important elements in the response to 3e)? (The set of considerations in 3b should be used).

Sur les questions posées par la stratégie:

a) Which is the preferred next major/flagship collider project for CERN?

Ici nous sommes partis du fait que pour nous la réponse est évidente (FCC). Nous passerons en revue les arguments en faveur de FCC vendredi 13/12.

b) What are the most important elements in the response to a)?

Nous avons essayé de converger sur une liste ordonnée, sans qu'un consensus soit clairement établi au-delà des deux premières priorités. Nous pouvons cependant nous rappeler de l'ordre suivant:

1) Physics potential

2) Long-term perspective / CERN future

3 - 4 ou 4 - 3)

- Careers and training

- Timing

5 - 6 ou 6 - 5)

- Financial and human resources: requirements and effect on other projects

- Sustainability

Nous avons ensuite discuté si les [3 conclusions de la contribution IRFU à la stratégie française](#) étaient également soutenues par notre groupe FCC-contacts et voici les conclusions:

1) If, for any reason, the FCC can't be considered a viable option (and CEPC is not built), a linear ee collider facility (LCF) at CERN would be the next best option for a Higgs factory.

→ il n'y a pas eu de consensus pour soutenir ce statement. Indeed, si FCC n'était pas construit pour des questions d'argent, un LC compétitif (avec upgrade à haute énergie) aurait un coût comparable, alors qu'un LC de basse énergie n'est pas nécessairement la meilleure option (LEP3 pourrait être une alternative)

2) Should China proceed with CEPC, an e+e- collider with energies at and below the ZH production threshold of $\sqrt{s} = 240$ GeV, the LCF would be relevant only if it allows covering higher energies, from the top-antitop production threshold ($\sqrt{s} = 345$ GeV) to the TeV scale, allowing direct access to the H self-coupling through HH production.

→ Le statement est correct mais il est incomplet, car une partie importante des contacts pense qu'une autre option serait de continuer FCC-ee indépendamment du devenir de CEPC et donc ceci devrait apparaître dans le statement.

3) Alternatively, the strategy could shift towards the earlier development of a high-energy hh/eh program, ideally implemented in a new tunnel as in the case of FCC, that would optimally complement the CEPC ee program and efficiently reduce time gaps between exploitation periods.

→ C'est effectivement une possibilité, mais les timings et les performances ne sont pas encore disponibles donc il est difficile de faire un statement précis sur ce cas de figure.

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

General accelerator R&D Topics for consideration:

- *High temperature superconductors.*
- *High efficiency RF (klystrons)*
- *Muon acceleration (including production, cooling, etc)*
- *Neutrino beam technologies*
- *?*