

2026 European Strategy for Particle Physics Update (ESPPU) - Drafting the UK's national input

Sarah Williams, on behalf of:

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Introduction

- The 2026 ESPPU represents a pivotal moment for High Energy Physics, and aims to make key statements about future priorities for particle physics in Europe and at CERN and how it fits in the global landscape.
- Guidelines have now been released by the European Strategy Group (ESG) on the form of the national inputs:
<https://ecfa.web.cern.ch/ecfa-guidelines-collecting-input-european-high-energy-physics-community-2026-update-european> which will be:
 - Accepted at several points in the process.
 - Asked to address a list of key questions.
- We are eager to ensure the ECR community feel welcome and are integrated into the UK drafting process.

Guidelines for national input

(3) Questions to be considered by countries 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.

Plans for UK drafting

In preparation for the UK drafting, there was an ECFA-UK workshop on the physics/technology landscape across all HEP areas (both experiment and theory) in September- <https://conference.ippp.dur.ac.uk/event/1357/> - the slides from the workshop provide excellent references if you want some background reading!

Two national drafting days ahead of the 31st March 2025 to converge on a first draft of the UK input:

- 4th November at Daresbury Laboratory (11am-5.15pm, with coffee from 10.30am)- <https://conference.ippp.dur.ac.uk/event/1391/>
- 9th January at University College London (times tbc)

There will then be two additional meetings; one following the 31st March deadline but before the 26th May deadline, and a second following the release of the briefing book (probably October 2025).

Scope of drafting days

- These will be open to all, and run in a hybrid manner.
- Aiming to do drafting in ‘real-time’ (where possible), following discussions of suggested sample statements prepared by the drafting team and input provided by projects.
- Brief for project inputs have been circulated:
<https://docs.google.com/presentation/d/1BLL9ETCdwOfEcTebhsBLvjeMH4kkfYEd12Lrao-oJlQ/edit?usp=sharing>. We hope these will be useful for the discussion (some are already available) along with the “physics projection matrix”
<https://docs.google.com/document/d/1H8cdfyDapbKx6y0MBqfAECr4Evxjijie-y6pSZCNMFg/edit?tab=t.0>
- At the end of each drafting day, drafts/summaries will be circulated for further comment/reflection.
- After the second drafting day, a complete document (page limit 10 pages) will be circulated in February for comments and feedback. This will allow time for a second draft to be circulated to the community early/mid March to be submitted by the deadline on 31st March.

Drafting team

- Role is to facilitate the drafting of the national input in the drafting days.
- Aim for representation across broad range of areas (including ECR*).
- Where possible members drawn from current PPAP membership or the UK delegates on plenary ECFA. Otherwise selected after consultation with those leading efforts in the UK

(* ECR membership to be augmented with the new ECFA-ECR representatives upon changeover in January 2025)

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Conclusion/outlook

- I have tried to briefly go through the plans for drafting the UK's national input to the ESPPU.
- We hope you will consider getting involved- the deadline to register for in-person attendance for the Daresbury drafting day is noon on Monday: <https://conference.ippp.dur.ac.uk/event/1391/> but online participation is also supported.

Thanks for joining today- happy to take questions (and comments)

Backup

Project inputs to drafting days (to be provided in ≤ 5 slides)

For all projects:

Key physics deliverables (name up to 5) including:

- Parameter(s) of interest to measure and precision/ physics goals.
- Sensitivity to new particles (vs masses and couplings)

Please quote the datasets required for the numbers above (and the corresponding running duration).

Does your project plan dedicated submission(s) for the ESPPU (if so, give details).

Collider projects:

For each energy stage:

- centre-of-mass energy
- integrated luminosity
- number of interaction points
- time running at stage
- wall power
- accelerator length
- construction cost
- environmental cost of construction
- ?estimated year for first collisions
- future upgrade paths

Non-Collider Projects:

- Quantify the physics goals.
- Compare the physics goals with the current capability in the area.
- List the project's main advantages compared to competitor projects.
- How does the project align with UK PP strategy and what is the anticipated UK FTE/year and UK area of involvement?
- What is the preferred location for the project?
- What is the timeline for R&D/construction and the timeline for the exploitation phase required to reach the physics goals?
- What are the main risks/obstacles e.g. development of new technologies, construction of a new facility that need to be overcome for the physics goals to be realised?
- Give an estimate of the project's overall cost separately for the R&D/construction period and the exploitation period.
- Approximately how many FTE per year are required for the project to reach its goals?