

Particle Physics Advisory Panel (PPAP)

IoP Town Meeting – Cambridge • 8.04.2025

On behalf of PPAP

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Overview

- **PPAP Role (reminder)**
- **Last PPAP Community Meeting**
- **Input to PPAN Roadmap**
- **European Strategy for Particle Physics Update 2026**
- **PPAP evaluation of HEP AI strategy**
- **Next steps**

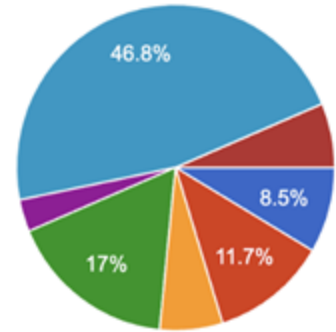
PPAP Role

Provide link between the Science Board and the Community and represent the needs of the Community to the STFC.

- Maintain an overview of activities within PP and future opportunities
- Consult and interact with PP community. Ensure its views are canvassed and effectively communicated to STFC. Organise regular PPAP community meetings.
- Advise Science Board on science and instrumentation strategy, skills development. ***Provide input to long-range PPAN Roadmap.***
- ***Coordinate PP community input to international roadmaps (e.g. ESPPU)***
- Provide advice to Science Board on specific questions, e.g. Infrastructure Fund proposals.
- Liaise with other advisory panels, e.g. PAAP, NPAP.

PPAP Community Meeting @ Birmingham 25-26 June 2024

- Main context: PPAN Roadmap, European Strategy for Particle Physics Update (ESPPU)
- Forward-looking, high-level review of research areas. Focus on future and UK strategy.
- Presentation and discussion of [Community Survey results](#).
- Discussion of PPAN Roadmap input
- Plans for UK input to ESPPU
- Discussion are documented and distributed via Hi-PHI
 - [Minutes](#)
 - [Feedback during/after meeting](#)



Input to PPAN Roadmap. Key messages. Priorities and Opportunities.

reported to SB, 18-Sep-24

- Priority for full HL-LHC exploitation
- CERN should remain world-leading energy frontier laboratory
- Support hosting XLZD at Boulby and *diverse* direct DM programme
- Support neutrino physics existing strengths (DUNE, HyperK, ν -ints, 0 $\nu\beta\beta$) and emerging opportunities (e.g. neutrino telescopes)
- Embrace cross-disciplinary, innovation-driven science. Build on success of QTFP Wave I to maintain leadership in quantum sensors for fundamental physics.
- Support and *protect* R&D: DRD, accelerators, software and computing
- Upcoming and emerging opportunities: muon and kaon programme, SHiP, EIC, proton EDM, etc
- Alignment with global effort. Engagement and coordination with other international roadmaps (e.g. APPEC)

Input to PPAN Roadmap. Key messages.

reported to SB, 18-Sep-24

Concerns and Risks

- No space for new initiatives due to significant forward commitment of UK PP
- Lack of balance between large, medium and small projects
- Pressure on core funds due to one-off IF investments
- Lack of strategy and funding for HEP accelerator R&D
- Underfunding of theory and disconnect between theory and experiment
- Low RA/Academic ratio compared to other countries with advanced PP, especially in theory
- Blue skies R&D vs DRD
- International recruitment

Prioritise the breadth of particle physics areas over the number of individual projects.

Update for **E**uropean **S**trategy for **P**article **P**hysics 2026

- Scientific deliberation to enable Europe's decision making for the future of PP
 - Initiated in 2006, updates in 2013 and 2020
- Community workshops to provide UK input to ESPP
 - Landscape workshop, [Durham 23-26 Sep 2024](#)
 - Drafting day I, [Daresbury 4 Nov 2024](#)
 - Drafting day II, [UCL 9 Jan 2025](#)
- Coordinated by PPAP and ECFA-UK.
- Strong input from ECR throughout the process
- UK input submitted on 31 Mar 2025
- Updates of national inputs are possible
 - by 26 May ahead of Open Symposium in Venice ← meeting 28 Apr @ RAL
 - Final updates by 14 Nov ← possibly another meeting in Oct



Community feedback

Physics briefing book expected in Oct'2025.

- Massive community effort
- Transparent and documented
 - Outstanding effort by ECR
- Facilitated by ~20-member drafting team
- Coordinated by J. Clarke, D. Costanzo*, R. Saakyan*, M. Williams*, S. Williams*
- Addressed key questions raised by ESG** and other relevant topics
- Strong support to retain CERN leadership in energy frontier
- Support for FCC tunnel at CERN as major next PP infrastructure
- Support for diverse programme of collider and non-collider physics (balance of small, medium and large projects)
- Call for critical mass support for R&D in detectors, accelerators, S&C and sustainability.
- Embracing new research approaches, e.g. QTFF, as a model for cross-disciplinary, innovation-driven science.
- Scenarios and prioritisation of "plan B" will be discussed at RAL drafting day III, 28 Apr

National input from the United Kingdom to the 2026 Update to the European Strategy for Particle Physics

Compiled on behalf of the UK's national particle physics community

March 31, 2025

This document has been prepared on behalf of the UK particle physics community to provide input to the 2026 Update to the European Strategy for Particle Physics (ESPPU). The UK process began with an initial workshop hosted by the IPPP in Durham in September 2024, aiming to bring together the experimental and theoretical communities to discuss the physics and technological opportunities and challenges associated with the future of particle physics. This was followed by two community drafting days in November 2024 and January 2025. These drafting days focussed on the questions provided by the European Strategy Group (ESG) on both collider and non-collider physics along with additional topics outside the direct scope of the questions but relevant to the future roadmap. These include detector R&D; software and computing; attracting and maintaining talent and expertise; industrial return, and public engagement and outreach. The drafting was facilitated by a drafting team which had representation from both plenary and Early Career Researcher (ECR) UK ECTA delegates and the STFC Particle Physics Advisory Panel (PPAP). For the first submission (31st March 2025) answers to most questions are provided (including q3a – the next high-priority collider at CERN) but prioritisation of alternative options if this is not feasible under various scenarios, and prioritisation of non-collider and complementary areas of exploration, is not provided. These will be discussed further in the next community drafting meeting on 28th April (when further information will be available following community submissions) and updated ahead of the Open Symposium. We anticipate one final community meeting following the release of the briefing book in September 2025 to discuss possible revisions/updates to the draft but we expect these to be minor.

Email contact for submission: ppap@stfc.ac.uk

* PPAP members

** European Strategy Group

Next drafting day

28-Apr-2025 @ RAL

Registration deadline 14 April

- Brief digests on key new developments from project submissions to ESPPU
 - Collider, non-collider, accelerator
- Should FCC pathway influenced by?
 - ILC in Japan
 - CEPC in China
 - Muon collider in US
 - Unexpected results from HL-LHC

ESPPU Drafting day

Monday 28 Apr 2025, 10:30 → 17:00 Europe/London

Pickavance Lecture Theatre (RAL)

Description This is the third community drafting day for the 2026 European Strategy for Particle Physics Update (ESPPU). This will discuss further updates to the UK's national input following the deadline for community submissions on 31st March 2025. This meeting will discuss in detail:

- Updated information from project submissions.
- Prioritisation of alternative options (q3c and q3e) under various scenarios that might deem FCC unfeasible.
- Possible prioritisation of non-collider options.

Additional topics will likely be brought up for discussion following comments raised on the first draft of the UK's national input (available here: <https://indico.stfc.ac.uk/event/1434/>).

Please note the discussions will run from 11am-5pm with arrival coffee available from 10.30am.

Zoom Link: <https://ukri.zoom.us/j/95178297014>

Registration



You are registered for this event.

[Check details](#)

- Scenario planning
 - FCC unfeasible on cost or environmental grounds
 - CEPC is realised
 - FCC timescale pushed back
- Scenario planning for non-collider physics
- Cross-cutting themes: R&D, talent pipeline, sustainability, industrial return, outreach

HEP AI Strategy

- In Feb'2025 PPAP was asked to evaluate the summary of community meeting (Oct'2024) on "[AI for High Energy Physics Experiment and Theory](#)".
- Key findings and recommendations (submitted to the SB):
 - Recognised AI's *essential* role in HEP and alignment with STFC and UKRI strategies
 - Support calls for better coordination via AI Forum and comprehensive HEP AI strategy
 - Call for better leveraging HEP's strengths such as AI validation, quantitative estimation of ML uncertainties, Fast ML.
 - Call for building on highly successful AI training programmes, such as CDTs in DIS
 - Recommend to strengthen collaboration with industry, including placements to bridge skills gap (CDT have been highly successful with that)
 - Need to improve AI training access, address shortages of computing facilities
 - Balanced approach to integrate AI with traditional HEP computing

Final thoughts and next steps

- PPAN Roadmap survey and ESPPU process showed community is **engaged**, solution-focused and **collaborative**.
- Strong **community concerns** about potential “**cliff edge**” for flagship **projects**, and even entire **programmes**.
- Clear need for **transparency** in how difficult decisions are made. Timely **communications** are crucial.
- Key next steps:
 - ESPPU drafting day III, RAL, 28-Apr ←———— watch out for Hi-Phi !
 - ESPPU Open Symposium, Venice 23-27 Jun
 - PPAP Community Meeting 2025
 - Focus on PPAP Roadmap discussion, but also ESPPU follow-up
 - Very tentatively: Durham in mid-September, after PPAN Roadmap release. TBC.