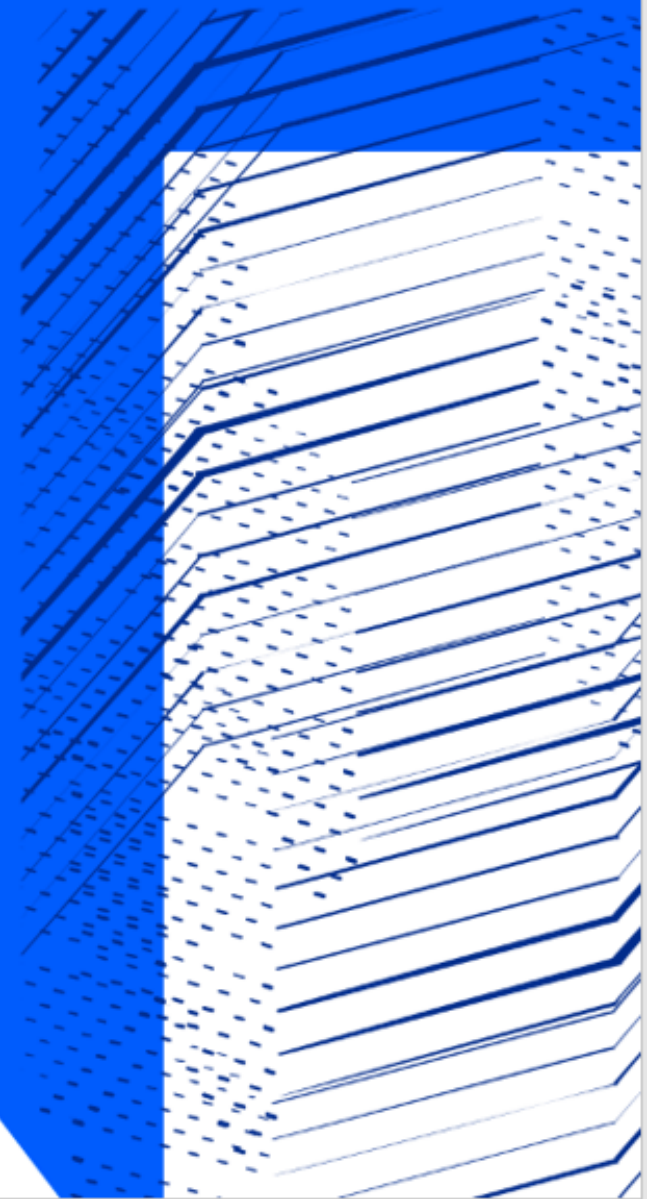




Science and
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Introduction

Roger Jones



Why We're Here

- PPAP has been asked to provide a new Particle Physics roadmap in response to the ESPPU.
- It's important for the UK to have a national position following the ESPPU to input into other exercises going on in Europe through ECFA and LDG, and worldwide.
- **PPAP Roadmap timeline:**
 - 28 September – community meeting
 - November – possible current experiment update meeting
 - New Year – community meeting to discuss the new roadmap
 - April 2021 – roadmap published

Structure of this Meeting

- Different to previous 2-3 day community meetings held in person.
- This meeting will focus on discussion.
- Using Zoom breakout rooms to hold parallel sessions – in the morning the focus will be within science themes, and the afternoon session will look across the programme.
- The output from this meeting will be used by PPAP to inform the new roadmap.
- If you wish to contribute to the roadmap process on themes other than your breakout room theme (or feel you were unable to contribute fully during this meeting), PPAP welcome written contributions to ppap@stfc.ac.uk at any time.

Zoom Etiquette

- Please set your microphone to mute as default.
- Use the 'raise hand' and chat functions during the breakout sessions to make comments/contributions/ask questions.
- Try to make your comments as concise as possible – we are large in number and short on time! 😊
- There is limited capacity to answer questions in the plenary sessions owing to the number of people in the meeting, so please use the chat function to ask questions and we will endeavour to pick these up in real time or answer them after the meeting.

PPAP membership

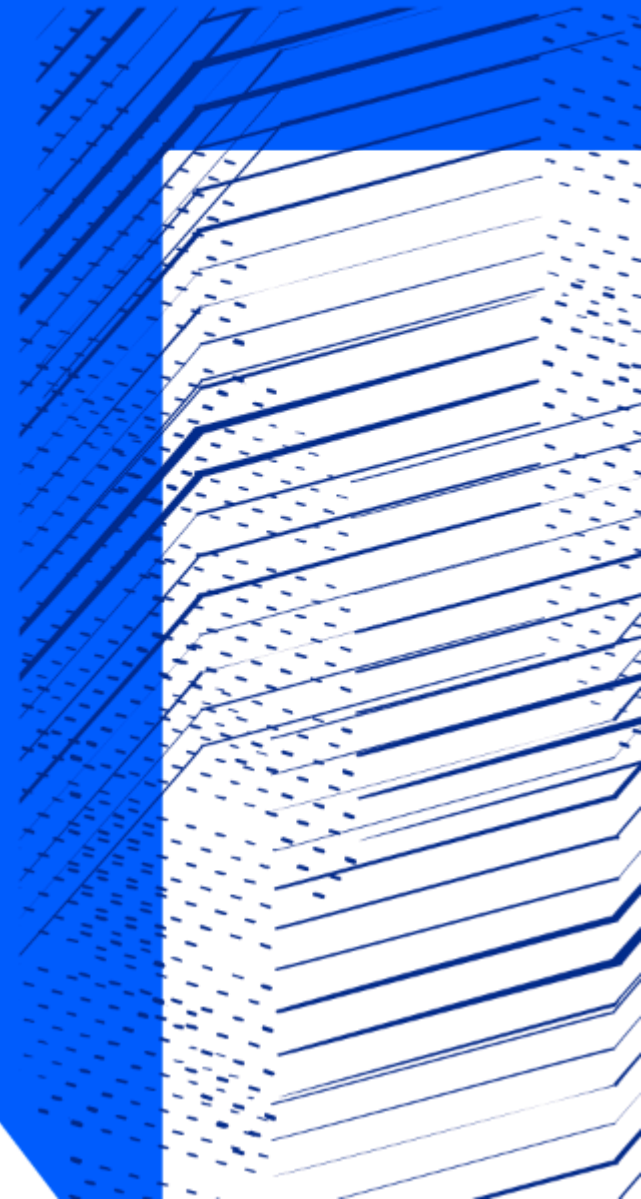
- In 2020 STFC introduced a new panel application process, that is more transparent and consistent with the principles of equality, diversity and inclusion.
- Good applications were received for the PPAP, but numbers were still small.
- The community are encouraged to apply to future rounds.
- We thank the outgoing PPAP members: Joanne Cole, Pawel Majewski, and Matthew Malek
- We welcome three new PPAP members: Adrian Bevan, Monica D'Onofrio, and Ruben Saakyan
- Matthew Needham will be the new chair of the PPAP
- Roger Jones will continue to support the panel to produce to its new roadmap

N.B. Full membership is still being finalised.



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European Strategy key points and current UK programme



European Particle Physics Strategy 2020

The European Strategy has seven sections:

- Major developments from the 2013 Strategy
- General considerations for the 2020 update
- High-priority future initiatives
- Other essential scientific activities for particle physics
- Synergies with neighbouring fields
- Organisational issues
- Environmental and societal impact

Overall, the UK programme aligns reasonably well with the European Strategy, but there is more we can do.

It will be important for the future UK programme to be focussed and to identify priorities.

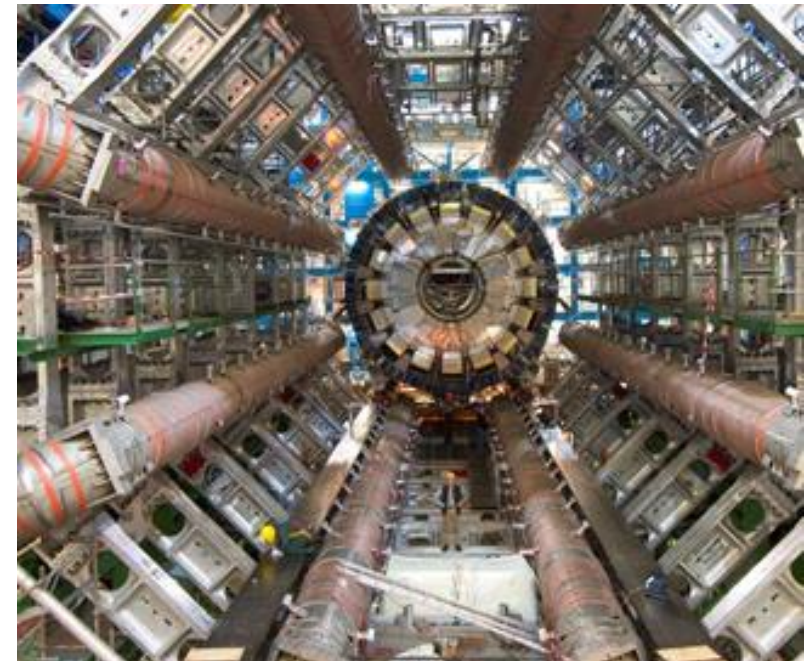
Major developments from the 2013 Strategy

Full exploitation of LHC physics potential and successful completion of the high-luminosity upgrade of accelerators and experiments are high priorities.

- Phase 2 upgrades for ATLAS and CMS are underway
- Phase 1 upgrade for LHCb is near completion
- R&D for LHCb future upgrades is to be reviewed in 2020
- HL-LHC-UK-2 is underway
- SwiftHEP initiative will help software readiness

European support for the long-baseline neutrino projects in Japan and US is a high priority.

- DUNE construction project underway
- Hyper-K preconstruction is ongoing and a proposal for construction will be reviewed in 2020-21



General considerations for the 2020 update

The implementation of the European strategy should ensure Europe's continued scientific and technological leadership, strengthen the ecosystem of research centres in Europe, and be in collaboration with global partners and neighbouring fields.

- UK researchers regularly hold leadership positions in experiments – current spokespersons for DUNE, LHCb and NA62.
- We should look for ways to make the most of UK national laboratory facilities through collaboration within the UK, and with European partners, CERN, and beyond.
- The UK community is encouraged to actively engage in the implementation of the strategy, working with ECFA, the European Lab Directors' Group and the other relevant committees.

High-priority future initiatives

The strategy calls for increased R&D for accelerator technologies: high-field superconducting magnets, high-gradient accelerating structures, plasma wakefield, muon colliders, etc. and investigating the technical and financial feasibility of a future hadron and e^+e^- collider at CERN.

The International Linear Collider (ILC) in Japan is highlighted in the strategy, with a timely realisation being consistent with that strategy.

- Its potential was noted in the STFC infrastructure prioritisation process (PPAP flagged this as true for all HE e^+e^- options).

We need to strengthen our engagement with early stage R&D for future accelerators and detectors – but we have to prioritise.



AWAKE helicon plasma cell R&D lab

Other essential scientific activities for particle physics

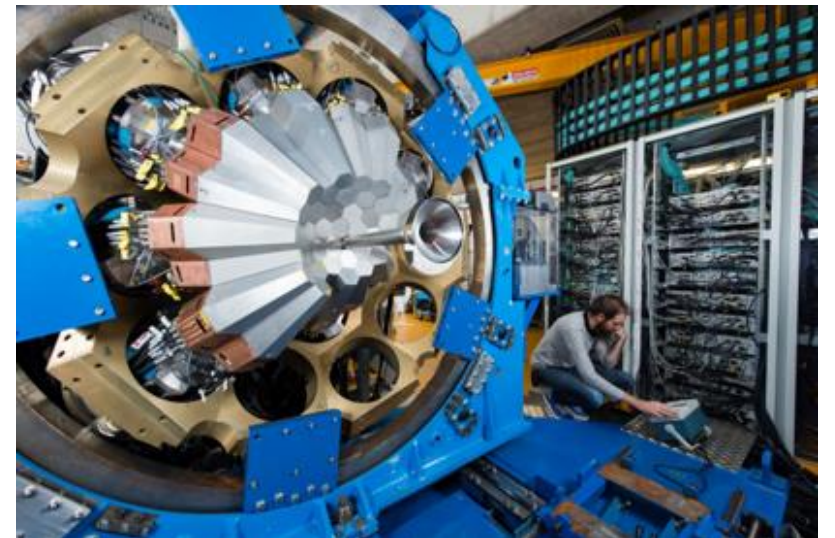
The strategy emphasises the importance of supporting a diverse range of experiments in Europe and beyond, having a strong theory programme, and coherence across R&D activities.

- The UK has maintained a broad programme in particle physics, particle astrophysics and accelerators, through consolidated grant funding and project funding.
- The concerns raised in the Programme Evaluations around future programme diversity have been noted by the Balance of Programme 2.
- STFC supports a diverse theory programme and the Institute of Particle Physics Phenomenology, and the number of PDRAs was increased in CG 2019.
- We can do more to address the future computing challenge for the HL-LHC and beyond.
- We can do more to engage with industry, recognising that this is important and seeking out opportunities that support engagement and knowledge transfer.

Synergies with neighbouring fields

The strategy notes the importance of synergies between particle physics with particle astrophysics and nuclear physics.

- The importance of supporting PA and NP is recognised in Balance of Programme 2, including concerns around levels of funding.
- The Electron-Ion Collider (EIC) was seen as a high priority in the STFC infrastructure prioritisation process.



Organisational issues

Key points

- An ambitious next-generation collider project will require global collaboration and a long-term commitment to construction and operations by all parties. CERN should initiate discussions with potential major partners as part of the feasibility study for such a project being hosted at CERN.
- The strategy stresses the importance of working in partnership.
- The particle physics community and the European Commission have a strong record of collaboration and this should be further strengthened.
- European science policy is quickly moving towards Open Science, which promotes and accelerates the sharing of scientific knowledge with the community at large.
- The particle physics community should work with the relevant authorities to help shape the emerging consensus on Open Science to be adopted for publicly funded research.

Environmental and societal impact

Key points

- The energy efficiency of present and future accelerators, and of computing facilities, is and should remain an area requiring constant attention.
- Travel represents an environmental challenge, due to the international nature of the field.
- Education and training are crucial for the needs of the field and of society at large. Ensure support for early career researchers and to recognise individuals developing and maintaining experiments, computing and software.
- Ensure the principles of equality, diversity and inclusion are at the heart of all activities.
- Promote knowledge transfer and engage with industry.
- Public engagement, education and communication in particle physics should continue to be recognised as important components of the scientific activity and receive adequate support.