

ECFA

European Committee for Future Accelerators



European Strategy for Particle Physics Update

Early Career Researcher session

IOP HEP/APP

8th April 2025

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European Strategy Update

EUROPEAN STRATEGY FOR PARTICLE PHYSICS

The European Strategy for Particle Physics is the cornerstone of Europe's decision-making process for the long-term future of the field. Mandated by the CERN Council, it is formed through a broad consultation of the grass-roots particle physics community, it actively solicits the opinions of physicists from around the world, and it is developed in close coordination with similar processes in the US and Japan in order to ensure coordination between regions and optimal use of resources globally.

European Strategy Update

**The projects YOU may
be working on in your
career**

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Priorities of the 2026 ESPPU: collider

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

- 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).

<https://ecfa.web.cern.ch/ecfa-guidelines-inputs-national-hep-communities-european-strategy-particle-physics-0>

Priorities of the 2026 ESPPU: non-collider

- 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.

<https://ecfa.web.cern.ch/ecfa-guidelines-inputs-national-hep-communities-european-strategy-particle-physics-0>

ESPPU timeline



263 documents submitted as input to the strategy before 31st March from future collider communities, national input, collaborations... and **us** → ECFA ECR panel initiated European ECR input

ECFA ECR panel

ECFA

European Committee for Future Accelerators



Our mandate:

*The objective of the ECFA Early-Career Researcher (ECR) Panel is for its members to **discuss all aspects that contribute in a broad sense to the future of the research field of particle physics**. In its advisory role to ECFA, the panel reports to ECFA on a regular basis. An annual report of the ECFA ECR Panel is added as a standing item to the agenda of Plenary ECFA meetings.*

UK members: Patrick Dougan, Alison Elliot (RAL), HW, Aidan Wiederhold

[UK drafting team, ECFA ECR panel members](#)

Input drafting process

UK

- Sept: [RECFA visit](#), UK survey
- Oct: [ECR open ESPPU session](#)
- Nov: [drafting day](#)
- Jan: [drafting day](#)
- Feb/March: gathering feedback, circulating second draft
- March 31st: UK national input submission, drafts [here](#)

European ECRs

- Dec: Survey design and circulation
- Feb: [Symposium on the Early Career White Paper Input to the ESPPU](#)
- Feb/March: Gathering feedback on the white paper draft
- March 26th: White paper submission [arxiv:2503.19862](#)
- March 27th: Endorsement of white paper by ECFA ECR panel
- Add your signature of support [here](#)

Input drafting process

UK

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- Feb/March: gathering feedback, circulation
- March: submission

European ECRs

- Dec: Survey design and circulation
- Feb: [Symposium on the Early Career White Paper Input to the ESPPU](#)
- Feb/March: Gathering feedback on the white paper draft

Coming up

- [28th April drafting day, RAL](#)
→ Come and participate! Registration closes on the 14th
- [Venice Open Symposium](#) 23 - 27 June
→ Discussions ongoing for possible remote participation for ECRs [here](#)

UK input



UK input to ESPPU

Highlights shown here - refer to [document](#) for full context

National input collated through a series of drafting days, put together by the drafting team and aiming to answer [ESG questions](#) → 10 page document

Support of FCC infrastructure

“There is strong support in the UK for a new large-circumference tunnel at CERN, the FCC tunnel, as a major infrastructure for the future of collider particle physics.”

Prioritisation of alternative colliders in April meeting

“During the second community drafting day in January the decision was made to postpone any prioritisation of alternative options until the next community meeting on 28th April when additional information will be available.”

Breadth of physics programme should be maintained

“A key message in UK discussions is that diversity of our physics programme should remain a priority in the coming decades.”

ECRs in the UK input

Highlights shown here - refer to [document](#) for full context

- Section 2 “**Priorities for the future**” features a paragraph dedicated to ECR perspectives
 - These are also highlighted where relevant throughout
- Main points
 - **Funding/career progression:** maintaining our community & expertise
 - **Decision on next flagship project:** certainty for the future of the field
 - **Experiments beyond colliders + R&D:** maintaining a broad European programme
- Informed primarily by UK drafting sessions – independent of the ECR white paper
 - Though it happens to be that main concerns are somewhat similar

Is there anything that you feel is missing?

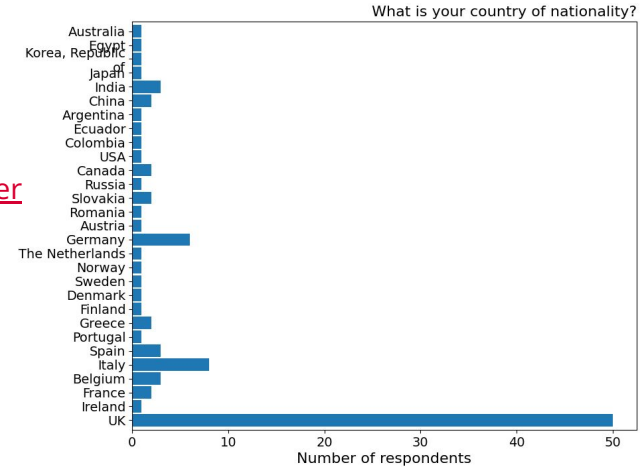
UK April Drafting Day

- [April 28th](#) is the final UK drafting discussion day
 - Detailed discussion on project inputs to ESPPU, e.g. collider studies
 - Prioritisation of alternative options under various scenarios that might deem FCC unfeasible
 - Possible prioritisation of non-collider options
 - Settle unanswered comments from previous drafts
 - Other discussions are also welcome – add to [ECR Google form](#)
- Hosted at RAL
 - **Sign up for in-person attendance before April 14th**, remote participation also available

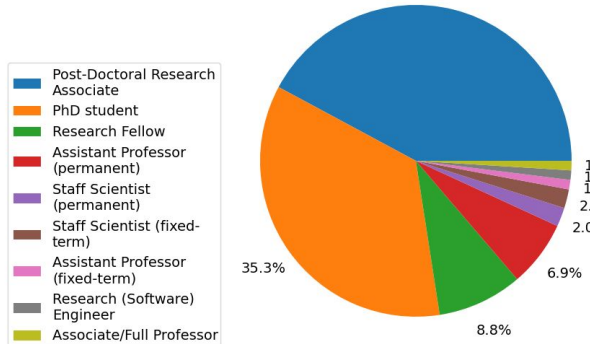
UK ECFA ECR Survey 2024

- Primarily be used to inform the RECFA Panel during their visit to the UK in September 2024, results presented by Holly Pacey
- Focused on gathering experiences and views on **future prospects in academia**
- 102 Responses from self-identifying ECRs across particle physics
 - Most respondents PDRAs or PhD students
 - 40% experimental collider physicists
 - 64% Male; 28% Female; 3% other gender identity
 - 7% have children (all had as PDRA or above)

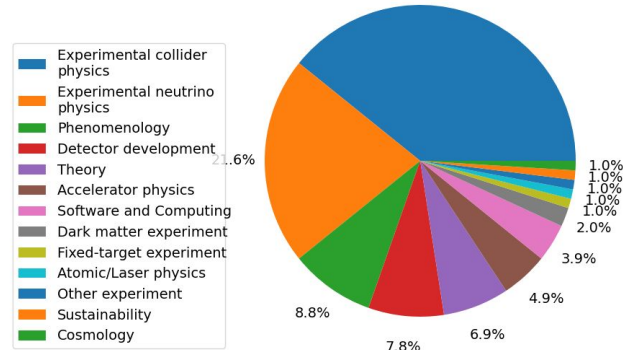
Plans to publish the full results on arXiv soon!



What is your current position? (102 answers)

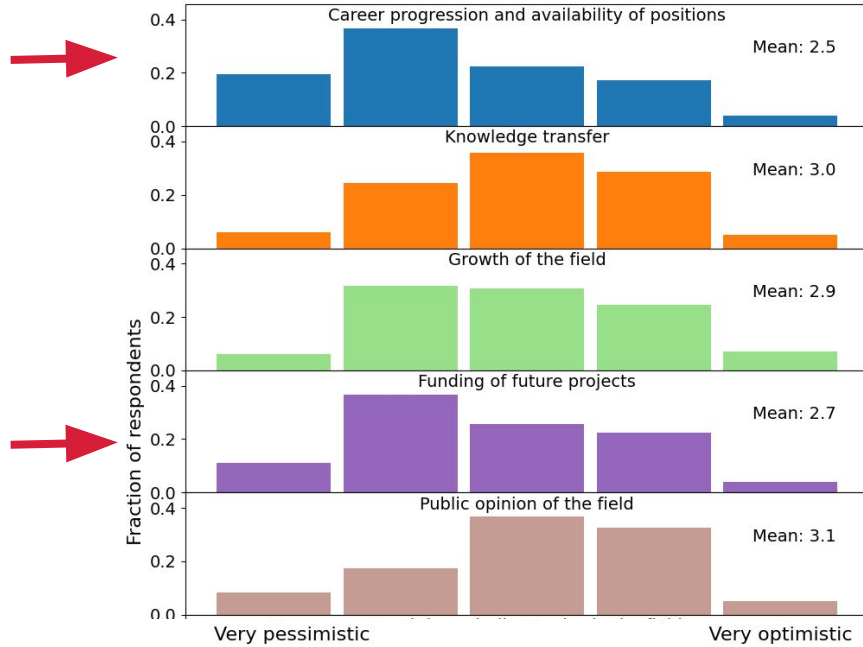


What is your primary field of research? (102 answers)

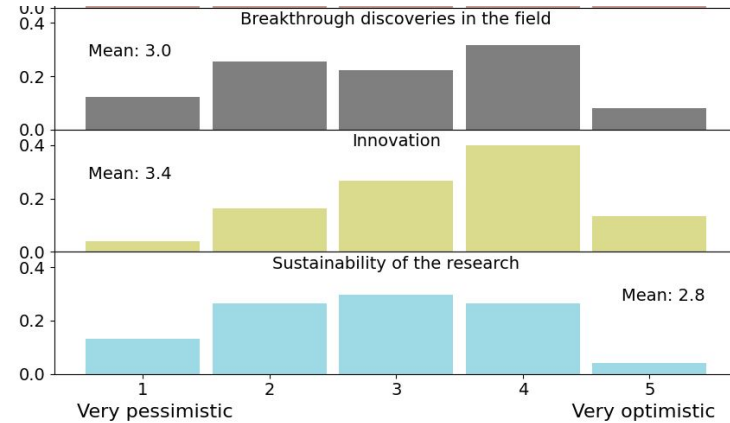


Credit also to Holly Pacey, Julia Allen, Atanu Modak (Previous UK ECFA ECR panellists)

Feelings about the future

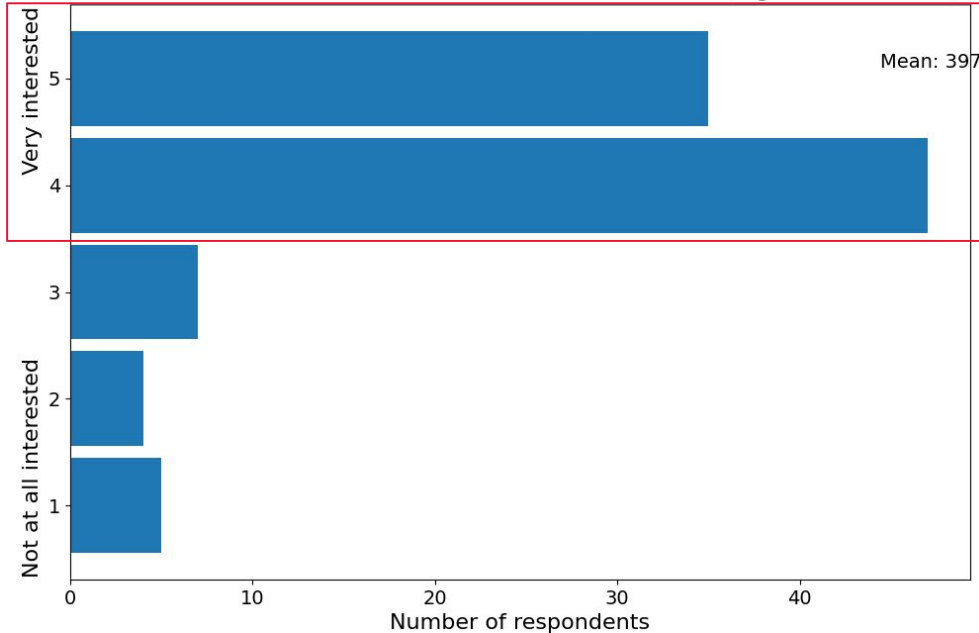


“How optimistic do you feel about these aspects of the future of your field of research in the UK?”



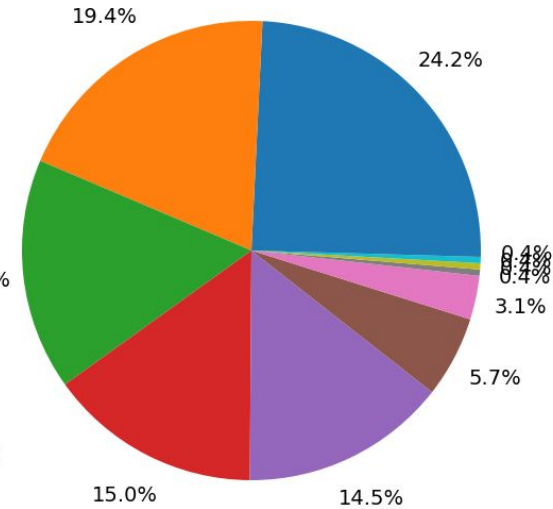
Barriers to future project work

How interested are you in working on future projects for your field of research (e.g. future colliders)?



What are the biggest barriers to you working on future projects for your field of research? (227 answers)

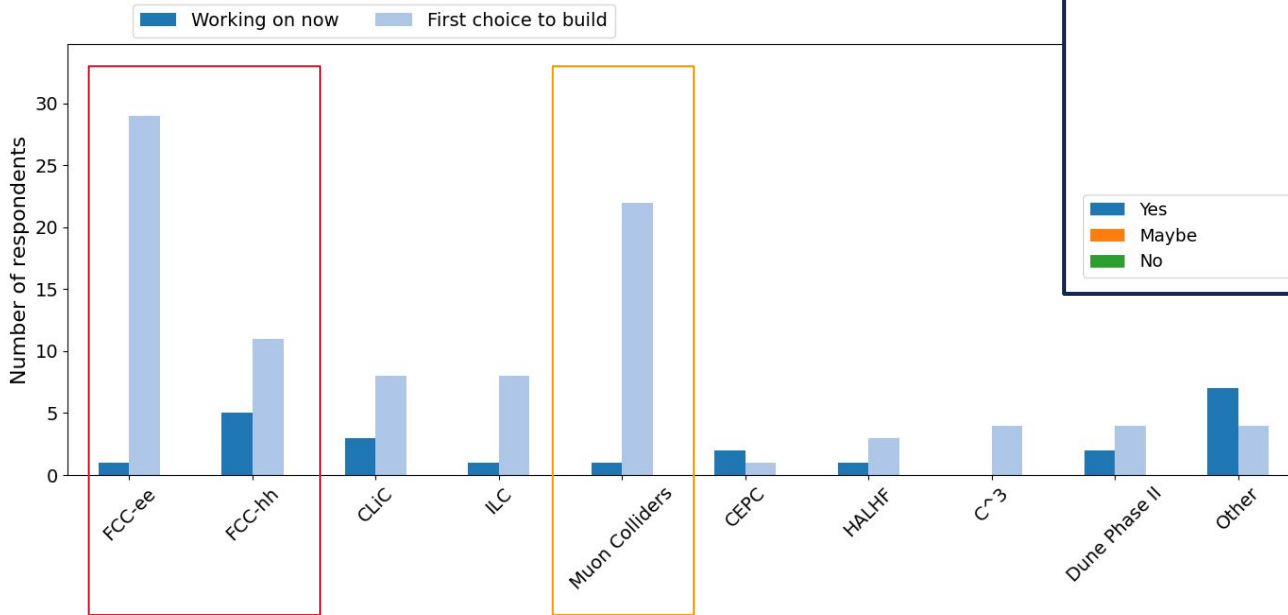
- Lack of funding
- Long timescales involved
- Lack of time to allocate
- Concern about impact on career prospects
- Risk from lack of confirmation of project go-ahead
- Lack of training
- Lack of interest
- Not supported by my boss/PI
- Little overlap with my other research
- Impact on the environment
- Concerns about environmental impacts



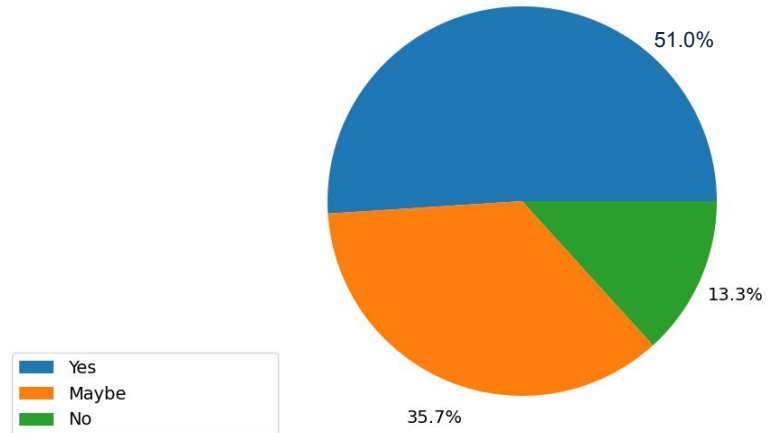
Concerns about a lack of funded time and certainty

Future project decision

Future HEP Projects: Current Work and Preferred Choice



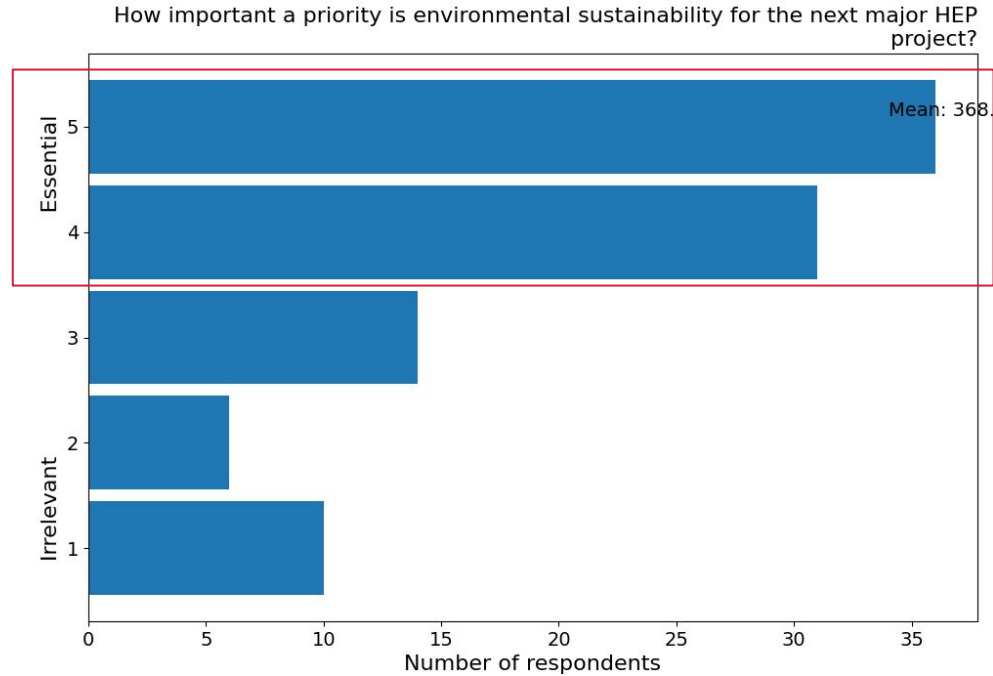
Would the confirmation of the next major HEP project encourage you to do more work on future prospects/R&D for it? (98 answers)



- ECRs in favour of FCC
- Muon demonstrator also supported in UK input

Sustainability

[More details](#)



Questions



European ECR input



European ECR input to ESPPU

Full White Paper:
[arXiv:2503.19862](https://arxiv.org/abs/2503.19862)

Aimed to provide recommendations on all aspects of ECR working life:

- Career prospects and ECR leadership
- Diversity, inclusion and mental health
- Communicating the importance of particle physics
- Future colliders
- Future experiments beyond colliders
- Interplay with neighbouring fields
- Open for contribution from all European* ECRs[†]
- Recommendations largely based on survey circulated in December
 - received ~800 European ECR responses
- 100 pages in total, 55 recommendations for ESPPU & field in general
 - 10 page executive summary + extended document
- Personal support can be shown by adding your signature [here](#) (non-ECR support welcome)

*: Focus on ECRs employed in European institutes, but input beyond Europe was appreciated

†: Non-permanent position or <10 years after PhD

Thematic overview of recommendations

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Thematic overview only - refer to [arXiv:2503.19862](https://arxiv.org/abs/2503.19862) for full recommendations

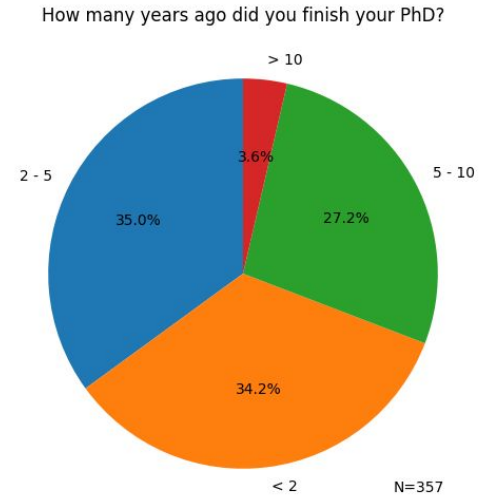
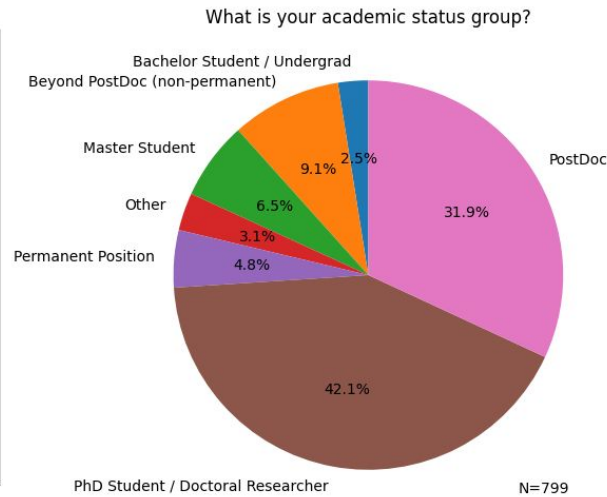
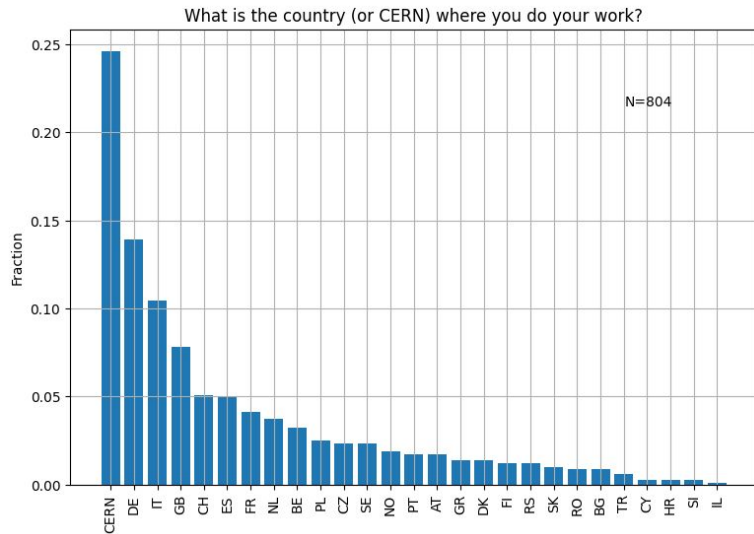
Thematic overview of recommendations

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Thematic overview only - refer to [arXiv:2503.19862](https://arxiv.org/abs/2503.19862) for full recommendations

European ECR white paper survey

Who did we reach?

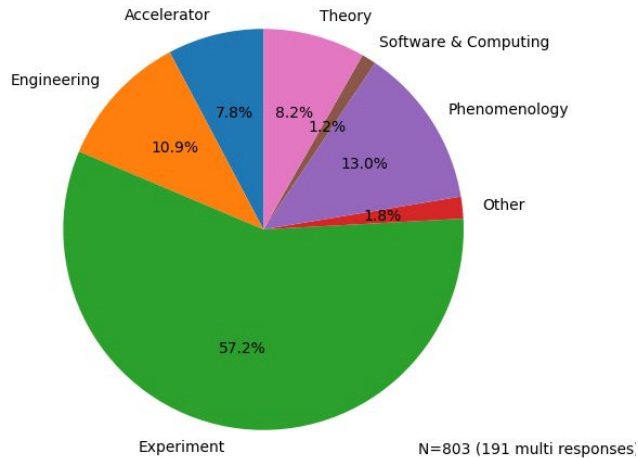


Gender: 72.5% Male, 25.8% Female, 1.7% Non-binary / diverse
 4.6% considered themselves disabled or with a chronic condition

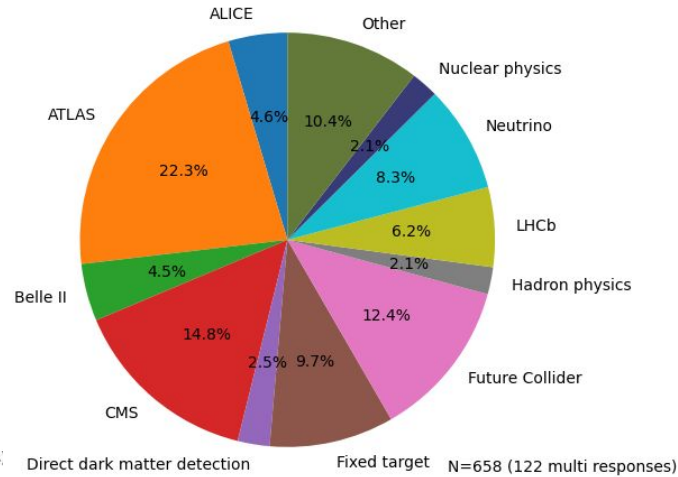
European ECR white paper survey

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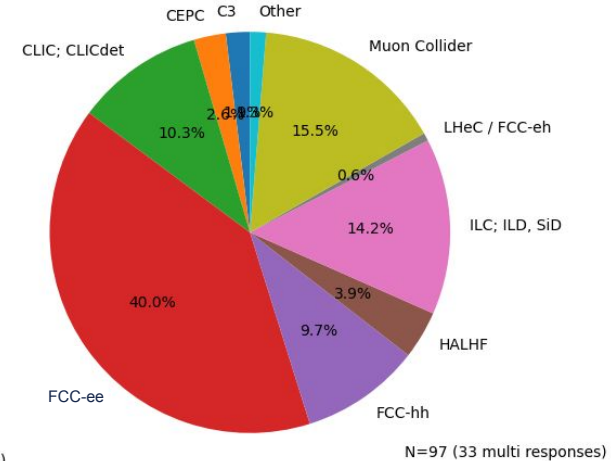
What is your field of research / work?



If applicable, what experiment are you working on?



Which future collider project are you working on?

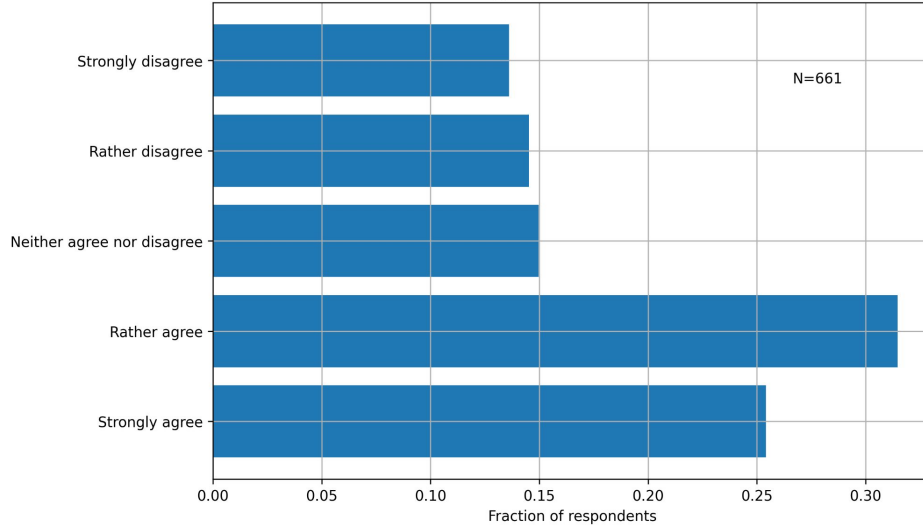


Field of work: 53% collider experiments, 20% beyond-collider experiments, 27% non-experiment specific

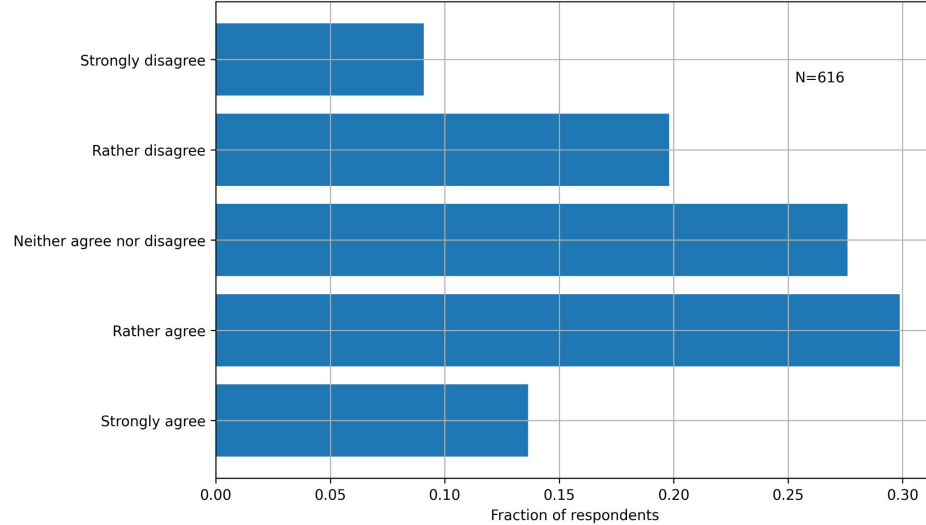
Wellbeing & DEI

Selection of results - refer to [arXiv:2503.19862](https://arxiv.org/abs/2503.19862) for full context

I have struggled/ I have been struggling with mental health during my research career.



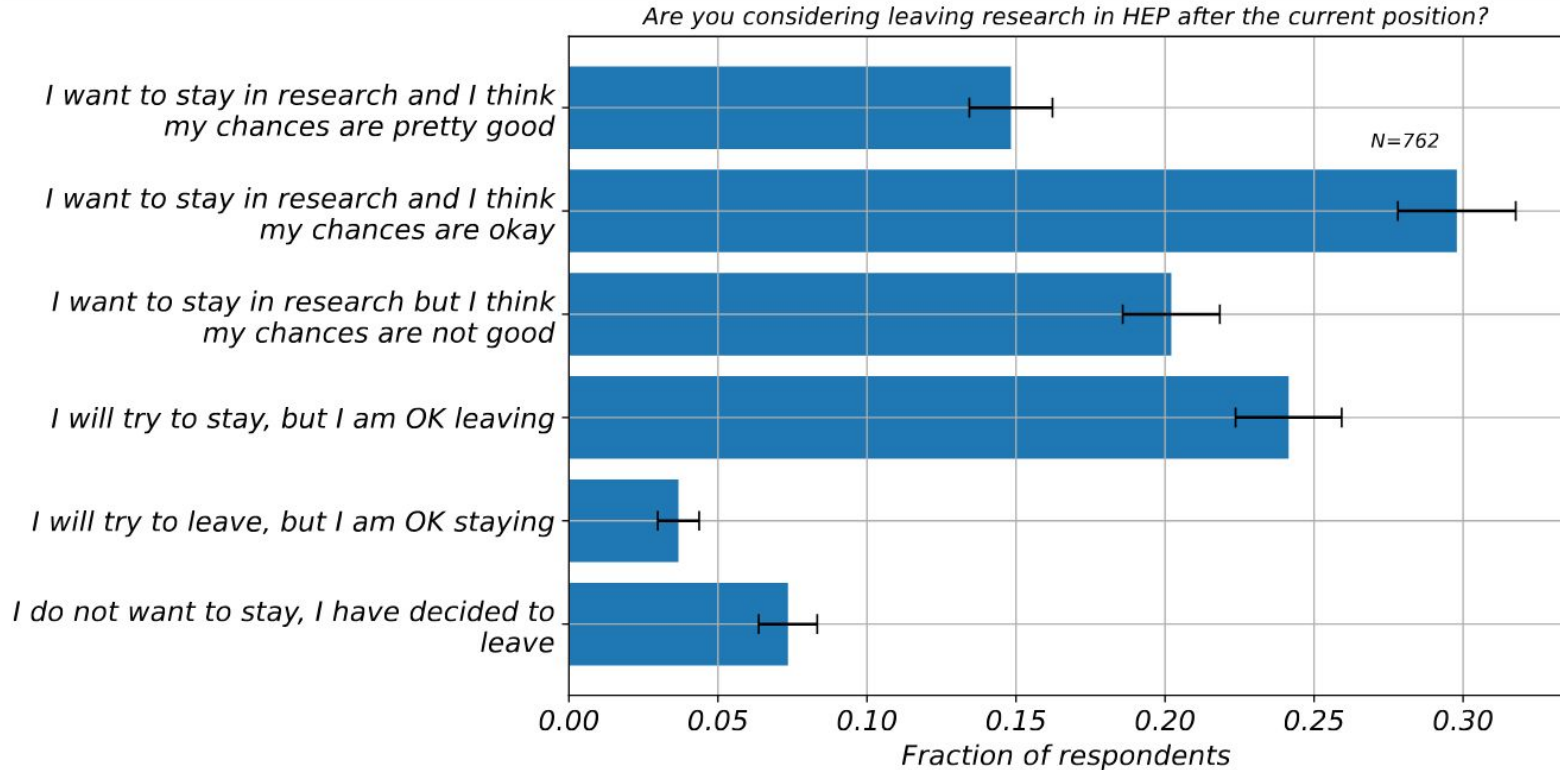
I was/am being given adequate support by my (main) institution.



Related paper: [Assessing the mental health of LHC scientists](#)

Careers

Selection of results - refer to [arXiv:2503.19862](https://arxiv.org/abs/2503.19862) for full context



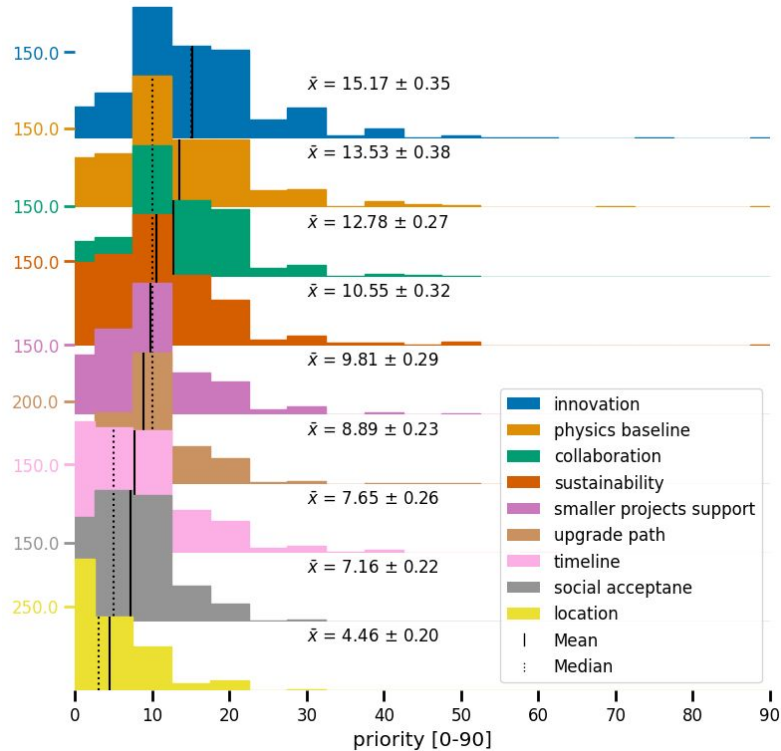
Outreach

Selection of results - refer to [arXiv:2503.19862](https://arxiv.org/abs/2503.19862) for full context

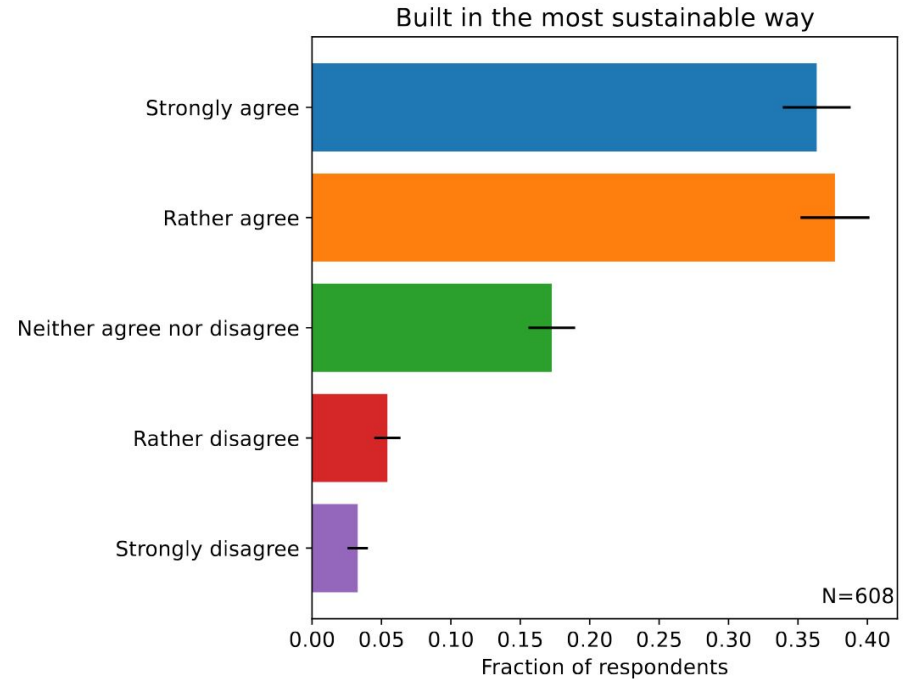
Question	Yes	No
Are you motivated to engage with the public on topics of future project in particle physics?		
- <i>all respondents</i>	614	105
- <i>respondents for whom it is important to have a future flagship project</i>	488	65
- <i>respondents who plan to stay in the field after their current position</i>	546	68
Do you feel adequately prepared (trained) to engage with the public on topics of particle physics?		
- <i>all respondents</i>	440	303
Are you participating in outreach activities?		
- <i>all respondents</i>	442	309
- <i>respondents who are motivated for outreach</i>	387	208
- <i>respondents who are motivated for outreach and plan to stay in the field</i>	349	178

85% of respondents are motivated but only 59% are participating

Future colliders



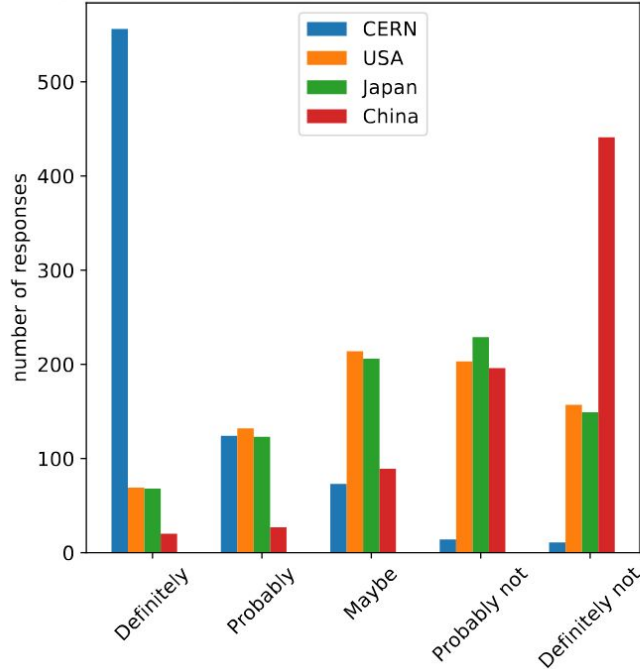
Selection of results - refer to [arXiv:2503.19862](https://arxiv.org/abs/2503.19862) for full context



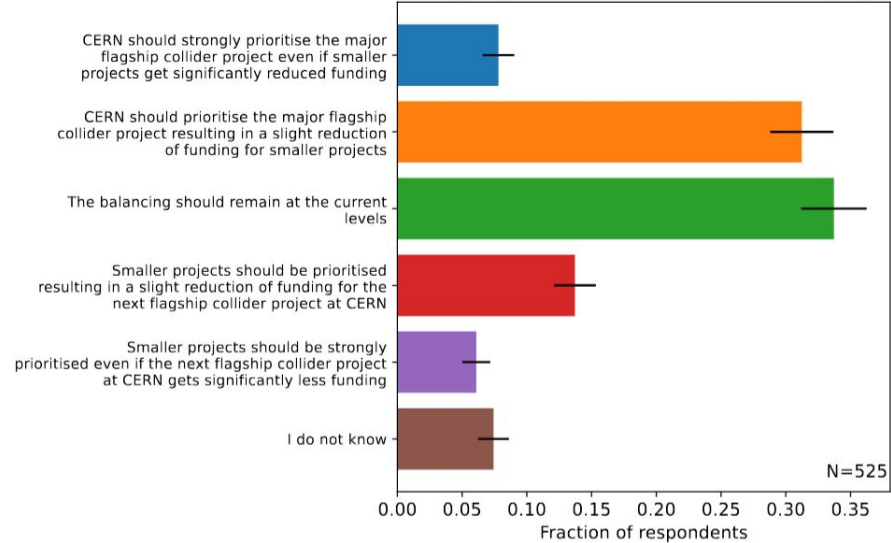
Future colliders

Selection of results - refer to [arXiv:2503.19862](https://arxiv.org/abs/2503.19862) for full context

Would you move to the place specified below to work on a future collider?



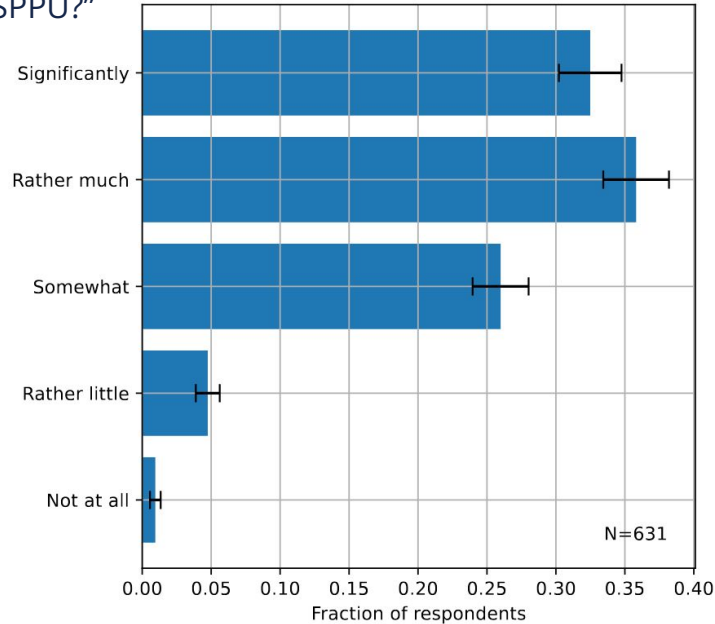
Assuming that the total amount of money available for particle physics is preserved, what is your opinion on the balancing of the funding between the potential next major flagship collider at CERN and smaller projects?



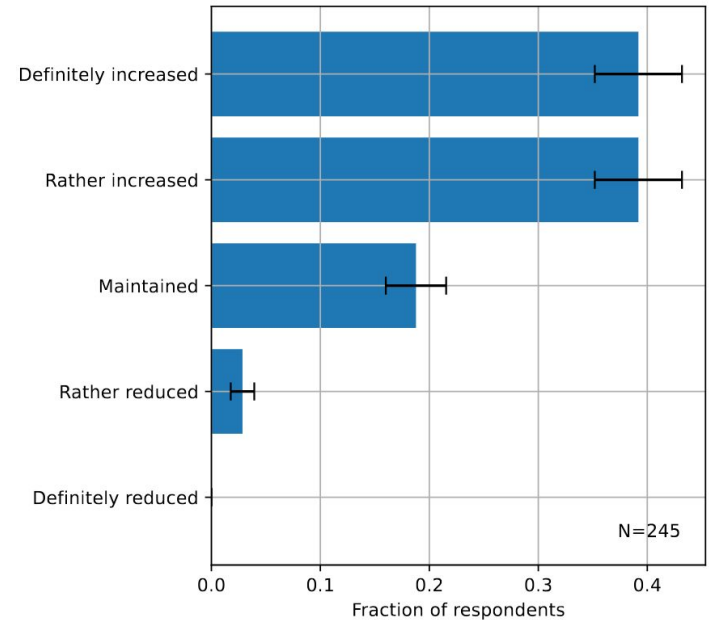
Beyond colliders

Selection of results - refer to [arXiv:2503.19862](https://arxiv.org/abs/2503.19862) for full context

“In your view, how much would beyond-collider particle physics experiments in Europe benefit from concrete recommendations for beyond-collider physics in the ESPPU?”



“To what extent should CERN participate in beyond-collider physics. Compared to the current level, the activity should be:”





Questions



Get involved

What do **YOU** think is important to discuss on April 28th?

This will be your opportunity to suggest anything you think is missing from the UK input

- [Registration](#) in person should be done in advance (also on Zoom), closes on 14th!
- Add discussion points in advance to this [ECR Google form](#)

Subscribe to the mailing list for UK ECRs in particle physics [PHYS-ECR UK](#)

Subscribe to the esppu-ecr@cern.ch e-group

- Follow the [Venice Open Symposium](#) 23 - 27 June



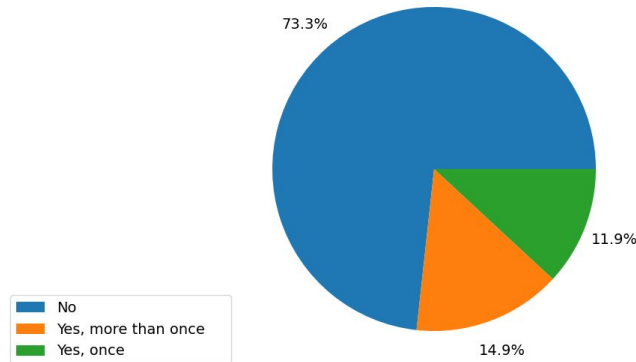
Backup

UK: discrimination and harassment

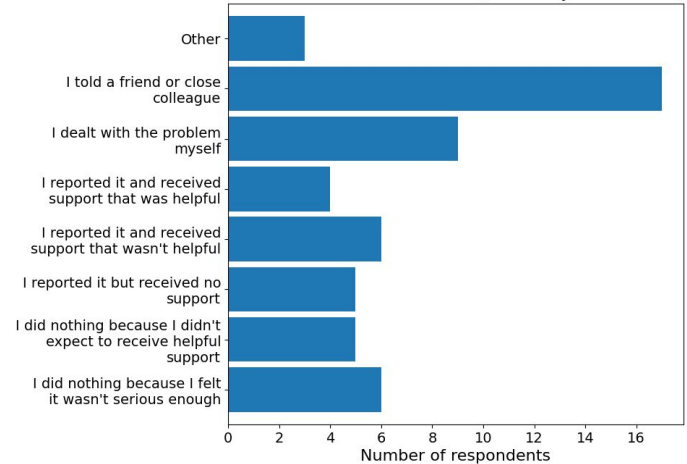
[More details](#)

- 25% of ECRs have experienced, 32% witnessed.
- Lack of faith that reporting a problem is helpful.
 - Most people told a trusted person or dealt with it themselves, instead of receiving 'official' support from work.
- Main categories: Bullying, gender discrim.

Have you encountered discrimination or abusive treatment in your Institute/Collaboration/Research group? [Personally experienced] (101 answers)



What did you do about the discrimination or abusive treatment you encountered? [Personally encountered]



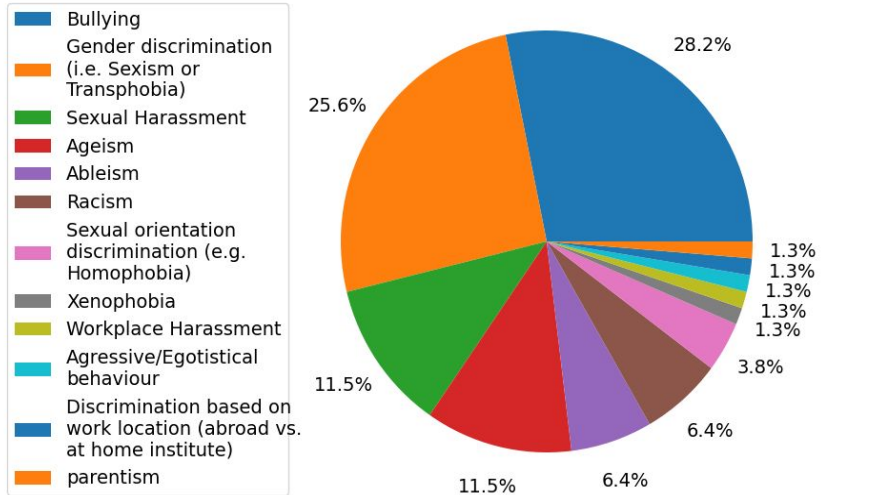
Full details of mental health and wellbeing will be published in a full report on arXiv shortly

UK: discrimination and harassment

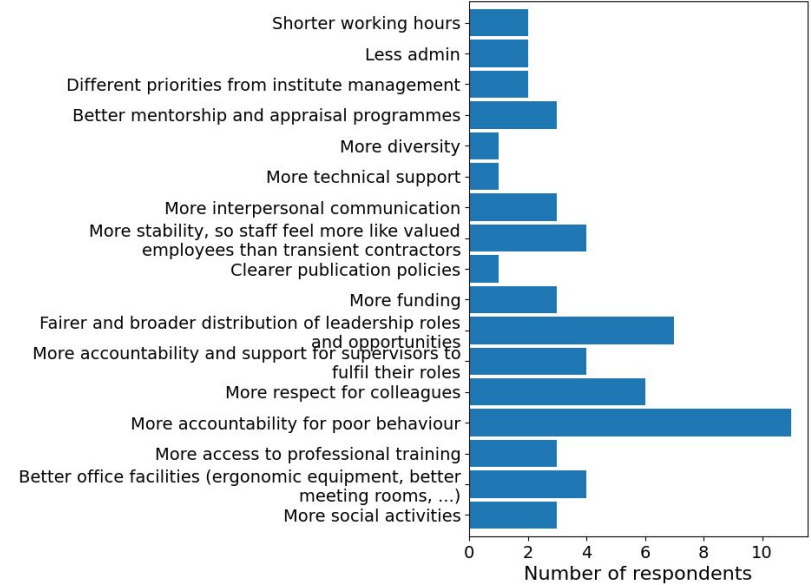
[More details](#)

Full details of mental health and wellbeing will be published in a full report on arXiv shortly.

What kind of discrimination or abusive treatment did you encounter?
(78 answers)



My work environment/culture could be most significantly improved by...



European: discrimination and harassment

“Have you or someone you know experienced harassment or other discriminatory behaviour in the research environment?”

