

# ECR activities in the UK

22<sup>nd</sup> September 2022

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# Introduction

- This is a very broad title, but I will be focusing mainly on recent efforts in the UK to engage early career researchers (ECRs) in discussions on future colliders. In particular:
  - Initial ECR forum in Birmingham on 25<sup>th</sup> April:  
<https://indico.cern.ch/event/1145735/>
  - Planned follow-up in Cambridge on 4<sup>th</sup> November:  
<https://indico.cern.ch/event/1196259/>
- these activities have received a lot of (positive) attention in the European community and there's hope that similar initiatives can be organized elsewhere
- Reminder: There is now an [ECR panel in ECFA](#), and the UK has 3 representatives (myself, Bryn Roberts, Abbey Waldron) which is now coming to the end of its first two years.

# What is an ECR?

**Key point: it is VERY difficult to provide a clear definition of an ECR, and we need to be sensitive that the boundaries are often blurred...**

- The ECFA ECR panel mandate states *“Members are, in general, PhD students and postdocs, either with a non-permanent contract or with up to 8 years after obtaining the PhD”*
- For our meeting on 4<sup>th</sup> July, broadly said PhD or 10 years experience post-PhD but we are eager to be inclusive.
- The nature of some fellowships also makes it difficult to identify when an individual transitions out of being an ECR.

**We should be careful not to see our community as two distinct groups and instead support ECRs to integrate and thrive!**

# ECR forum in Birmingham

Thanks to the Institute of Advanced Study (IAS) for hosting the meeting

- In-person meeting organized following the initiative of Prof. Eliezer Rabinovici who was visiting the UK and wanted to understand further the views of the ECR community on future colliders beyond the LHC.
- A slight focus (on request) on FCC, but many discussions were related to the future roadmap in general. FCC-related matters discussed at the June FCC week.








# Guiding principles for the meeting

- Organising committee: Andy Chisholm (Birmingham), Matt Kenzie (Warwick), Michaela Queitsch-Maitland (Manchester), Cristiano Sebastiani (Liverpool), Sarah Williams (Cambridge)
- Most ECRs are not currently engaged in work on future colliders- this was an opportunity to further inform the community and promote further discussion.
- Tried to avoid emphasis on technical details and instead focus on 'bigger picture' discussions.
- Where possible, invited speakers were within the ECR community, with the exception of Prof. Andy Parker who was invited to give perspectives on building collaborations and the funding landscape associated with the LHC.

# Overview of the meeting



4 sessions of 1 hour each, with all talks ~ 15 minutes and remaining time for discussion

11:00 → 11:05	<b>Welcome and Introduction</b> <b>Convener:</b> Andrew Stephen Chisholm (University of Birmingham (GB))	
11:05 → 12:00	<b>Physics Opportunities and Existing Anomalies</b> <b>Convener:</b> Matthew William Kenzie (University of Warwick (GB))	
11:05	<b>Review of Physics Landscape</b> <b>Speaker:</b> Mika Anton Vesterinen (University of Warwick (GB))  Birmingham_ECR_Fu...	⌚ 15m 
11:20	<b>Discussion Session</b> <ul style="list-style-type: none"><li>■ We do not want to discuss the details of current physics results.</li><li>■ Given a blank cheque and assuming appropriate technology, what would we build first?</li><li>■ Do we agree with the priorities of the current / nominal road map (Euro Strategy Doc)?</li><li>■ What future physics scenarios could we find ourselves in, in the next 5, 10, 20 years and what does this mean for the best approach to future colliders?</li><li>■ What do we build if we see nothing BSM anywhere?</li></ul>	⌚ 40m 

## Discussion points raised:

- Avoid physics case for future colliders relying on current anomalies.
- Can we come up with a new “no-lose” theorem for the next future colliders ?
- Several comments and questions in favour of staged option for FCC, but the importance of smaller, lower budget experiments was also highlighted.

# Overview of the meeting

12:00 → 13:00	<b>Accelerator and Detector Technologies</b> Convener: Michaela Queitsch-Maitland (University of Manchester (GB))
12:00	<b>Accelerators Talk</b> Speaker: Laurie Nevay (Royal Holloway University of London)  2022-05-25-nevay-fu...
12:15	<b>Accelerators Urgent Questions</b>
12:20	<b>Detectors Talk</b> Speaker: Jens Dopke (Science and Technology Facilities Council STFC (GB))  Slides
12:35	<b>Detectors Urgent Questions</b>
12:40	<b>Technologies Discussion</b> <ul style="list-style-type: none"><li>▪ We do not want to discuss details of current technology issues.</li><li>▪ What collider options are there and what weighting do people give them in terms of importance - FCC (ee+eh+hh?), linear collider, muon collider - are there others?</li><li>▪ What technology advances are critical to achieve the scenarios agreed above? ECFA R&amp;D Roadmap (<a href="https://cds.cern.ch/record/2784893">https://cds.cern.ch/record/2784893</a>).</li><li>▪ What particular R&amp;D areas is the UK community best placed to make progress on (we cannot do everything)?</li><li>▪ What is the likelihood of technology advances being realised on an appropriate time scale?</li><li>▪ How much R&amp;D - both in terms of FTE and funding is required to achieve this?</li><li>▪ Are there other prohibiting factors aside from financial?</li></ul>

## Discussion points:

- ECRs wanted to understand more the challenges associated with the magnets for FCC-hh, and the potential logistics of a staged approach for future machines (as was first proposed for the LHC)

⌚ 5m 

⌚ 20m 

- Muon colliders also discussed extensively though the technology is further away.
- Concerns about **energy budget and implications for climate change** were raised- important to factor these considerations into decision making and planning.

# Overview of the meeting

14:00 → 15:00	<b>Facilitating a Future Collider</b> Convener: Sarah Louise Williams (University of Cambridge (GB))	
14:00	<b>Lessons from the LHC and the Funding Landscape</b> Speaker: Andy Parker (University of Cambridge (GB)) 	⌚ 15m 
14:15	<b>Funding landscape discussion</b> <ul style="list-style-type: none"><li>▪ How do we build a competitive funding model that does not directly take resources from other essential STFC activities?</li><li>▪ What are the differences in the field / funding landscape / CERN budget between the LHC development and now?</li><li>▪ How do we secure funding and ensure sufficient variety / diversity / importance that it is hard to cut in the future?</li><li>▪ What can be learnt from previous successes (e.g. LHC) and challenges (e.g. ILC)?</li><li>▪ How are collaborations built and is this model still suitable in the future?</li></ul>	⌚ 45m 

- Emphasised the significance of re-using the LEP tunnel as a key selling point for the LHC (very relevant for the integrated FCC plan).
- Sticking to a realistic budget envelope is important. Recruiting associate members to CERN was an effective way to manage this for the LHC.
- The importance of convincing the scientific community (outside HEP) of the importance of our programme.



# Overview of the meeting

15:00 → 16:00 **Opportunities and Challenges for ECRs**

**Convener:** Cristiano Sebastiani (University of Liverpool (GB))




15:00 **Perspective from ECR working on R&D**

**Speaker:** Craig Sawyer (Science and Technology Facilities Council STFC (GB))

🕒 15m



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15:15 **Career Prospects Discussion**

🕒 45m



- How sustainable is it to do small fractions of time on future R&D?
- How risky is it to commit to a career in future R&D?
- What is the best strategy as a community (many people giving small fractions of time - fewer people giving larger fractions) and as an individual (how do I get a permanent position)?
- How straightforward is it to start performing R&D / transition from data analysis?

## Session focused on challenges/opportunities for ECRs to work in detector R+D for future colliders...

- Concerning lack of ECRs involved in R+D was noted- not entirely surprising based on the lack of funding for R+D. Are there also barriers for career progression?
- Open questions of how to balance current project delivery with future R+D, the sustainability of spending small amounts of time on R+D, and potential risks

# A note on instrumentation

- In response to an invitation to speak at the ECFA detector R+D roadmap symposium on “Training in Instrumentation (TF9)”- <https://indico.cern.ch/event/1001747/> - a town hall meeting and survey was organized by the ECFA ECR detector R+D working group that is documented here: <https://arxiv.org/pdf/2107.05739.pdf>
- Key message was that there’s a lot of interest and enthusiasm in the ECR community for instrumentation work but also barriers including lack of availability of training/networking opportunities and concerns about recognition and career progression

**The UK community was quick to respond here in terms of training (Advanced UK Instrumentation Training: <https://indico.cern.ch/event/1129266/> ), but it would be great to discuss how we can further improve training and networking and increase recognition for instrumentation in the UK.**

# Follow-ups

- In the closeout discussion, many appreciated the format of the meeting, which allocated most of the available time to discussions.
- It was suggestion that further representation from the theory and accelerator communities would be beneficial for future meetings.
- Participants unanimously shared the sentiment that they were excited by the physics and technology opportunities offered by future colliders.

**Due to constraints on the timing and venue of the meeting, this event was a small invite-only meeting. It was well-received by the participants and the organisers are now planning a follow-on event that would be open to the UK ECR community more broadly.**

- This is now scheduled for 4<sup>th</sup> November in Cambridge- please encourage and support ECRs in your group **to attend or participate remotely**

# Agenda for next ECR forum

09:30 → 10:00 Welcome coffee

10:00 → 10:15 Welcome/introduction

10:15 → 11:00 Physics landscape

11:00 → 11:45 Accelerator technologies and challenges

11:45 → 12:30 Detector technologies and challenges

12:30 → 13:30 Lunch

13:30 → 14:15 Theoretical perspectives and challenges

14:15 → 15:00 Software+ computing: challenges and opportunities

15:00 → 15:45 Breakout discussions: ECR views on future collider prospects

15:45 → 16:00 Coffee

16:00 → 16:30 Breakout discussions: ECR views on future collider prospects: Reports from breakout discussions

16:30 → 17:15 Panel discussion: Q+A about UK future collider landscape: Q+A

17:15 → 17:30 Close-out

- Generous support from PPD and IPPP to provide overnight accommodation on 3<sup>rd</sup> November and catering.
- Plenary parts will follow similar structure to before – short talks then time for Q+A discussion.
- Afternoon will include time for structured break-out discussion to get ECR input on future colliders and panel discussion to discuss prospects with senior UK academics.

# Can we (as a community) do more?

## Thanks to those who have already helped/supported our initiatives!

- For group/institute leaders- please encourage/support your ECRs to participate in events.
- Let us know if there are specific questions/areas where you would like ECR input (the Cambridge meeting is an opportunity to gather input).
- One obvious comment- organizing events/ initiatives is time-consuming so spreading the load in future will make a big difference.
- Whilst ECR-only activities have clear benefits in some situations, ensuring the community remains connected and coherent will be key going forward.

# Conclusion

- We have an exciting landscape ahead of us. There is a lot of activity and energy in the UK ECR community to discuss the future of our field.
- Whilst our recent discussions have avoided discussing some more sociological/political matters including funding/career progression these concerns represent barriers for ECRs that can limit participation in future projects.

**Thanks for listening- I am happy to take questions**

