

# ECR forum on future colliders- Introduction

4<sup>th</sup> November 2022

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Cristiano Sebastiani (Liverpool), Michaela Queitsch-Maitland (Manchester)

# Introduction

We hope today will provide a respectful and inclusive environment to discuss the future. Please respect the [CERN code of conduct](#)

- We hope that today will provide a forum for the UK Early Career Researcher (ECR) community to discuss the landscape for future colliders beyond the (High-Luminosity-) LHC.
- 2020 update to the European Strategy for Particle Physics and the recent Snowmass process in the US have brought together members of the HEP community to discuss the future priorities of our field.
- Today we will discuss the challenges and opportunities associated with the possible future roadmaps with the aim to both further inform the UK ECR community and gauge the views and concerns of those present/connected.



**Welcome to Cambridge!**

# What should come after the HL-LHC?

In the aftermath of the Higgs discovery, lots of discussion on what machine should follow the LHC...



What should come after the LHC?

$e^+e^-$  machine?

Linear collider?

CLIC (CERN?)

ILC (Japan?)

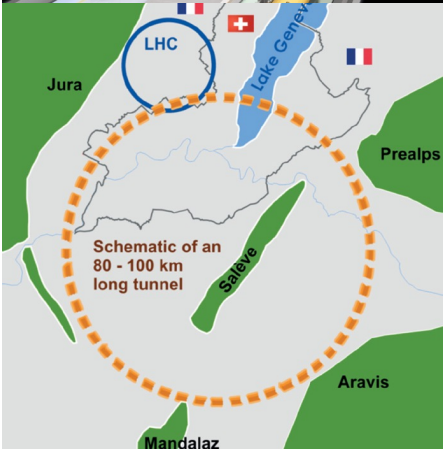
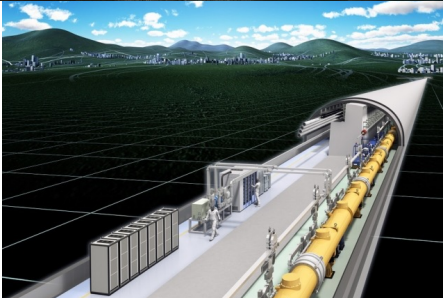
Circular collider?

CepC (China)

FCC-ee/hh (CERN)

Hadron collider?

Muon collider? (see later)



How might Europe fit into the global context?

# 2020 European strategy update

1. Full exploitation of the LHC and HL-LHC upgrade remains the top priority.
2. *"An electron-positron Higgs factory is the highest priority next collider"*
3. Investigate the technical and financial feasibility of a 100 TeV hadron collider at CERN

**Consensus gathering for this update, and its implementation, was/ will be overseen by the European Committee for Future Accelerators (ECFA)**





# What is ECFA?



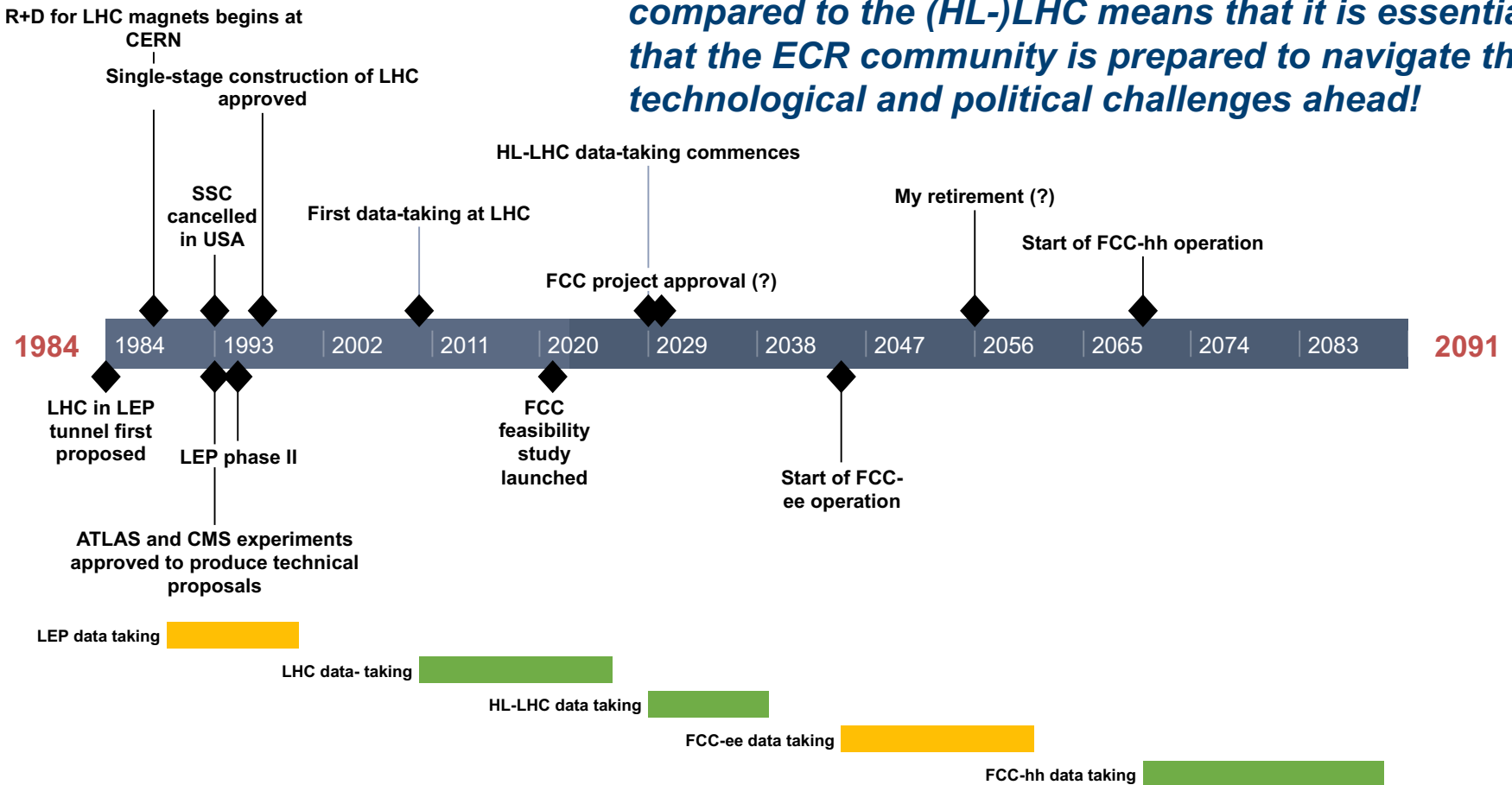
- All countries (and CERN) elect representatives to sit on “plenary” ECFA as well as having one representative on “restricted” ECFA. There are also invited representatives from other large national laboratories and organisations.
- Since 2020, there has also been an “Early Career Researcher” (ECR) panel on ECFA, that also has representatives in PECFA and RECFA.
- This was formed following the recommendations of a debate (and report) providing ECR input on the 2020 European Strategy update: <https://arxiv.org/abs/2002.02837>

Prof. Aidan Robson  
Prof. Phil Burrows  
Prof. Max Klein  
Prof. Daniela Bortoletto  
Prof. Sinead Farrington  
Prof. Matthew Wing

**Above: the UK’s PECFA delegation  
+ Dave Newbold (STFC)**

# Reflections on timescales

*The longer timescales associated with future projects compared to the (HL-)LHC means that it is essential that the ECR community is prepared to navigate the technological and political challenges ahead!*



# Previous meeting

<https://indico.cern.ch/event/1145735/>

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

- This event follows an 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.
- Attendees appreciated the ECR-only format, and that lots of time was allocated for Q+A/discussion- today's event aims to follow this and invitations have been extended to all UK ECRs across both the experimental and theory communities.



# Today's agenda

- 5 'plenary' sessions with short talk + time for Q+A/discussion.
- Breakout sessions to discuss individual views on a list of recommended questions.
- Panel discussion with senior academics in UK community.
  - Biographies available on the agenda.
  - Please submit questions on [slido](#).

	West Hub, Cambridge	09:30 - 10:00
10:00	<b>Welcome/introduction: Welcome/introduction</b> West Hub, Cambridge	Sarah Louise Williams 10:00 - 10:15
	<b>Physics landscape: Physics landscape</b> West Hub, Cambridge	Matthew William Kenzie 10:15 - 11:00
11:00	<b>Accelerator technologies and challenges: Accelerator technologies and challenges</b> West Hub, Cambridge	Michaela Queitsch-Maitland 11:00 - 11:45
12:00	<b>Detector technologies and challenges: Detector technologies and challenges</b> West Hub, Cambridge	Cristiano Sebastian 11:45 - 12:30
13:00	<b>Lunch</b> West Hub, Cambridge	12:30 - 13:30
14:00	<b>Theoretical perspectives and challenges: Theoretical perspectives and challenges</b> West Hub, Cambridge	Andrew Stephen Chisholm 13:30 - 14:15
15:00	<b>Software+ computing: challenges and opportunities</b> West Hub, Cambridge	Sarah Louise Williams 14:15 - 15:00
15:00	<b>Breakout discussions: ECR views on future collider prospects: Breakout discussions: ECR views on future collider prospects</b> West Hub, Cambridge	15:00 - 15:45
16:00	<b>Coffee</b> West Hub, Cambridge	15:45 - 16:00
16:00	<b>Breakout discussions: ECR views on future collider prospects: Reports from breakout discussions</b> West Hub, Cambridge	16:00 - 16:30
17:00	<b>Panel discussion: Q+A about UK future collider landscape: Q+A</b> Andrew Pilkington, Prof. Dave Newbold, Guy Wilkinson, Matthew David Needham, Michael Spannowsky, Monica D'Onofrio, Sinead Farrington West Hub, Cambridge	16:30 - 17:15
	<b>Close-out: Close-out</b> West Hub, Cambridge	17:15 - 17:30



# Providing feedback

- We hope to produce a report on the event, and impressions of ECR views towards future colliders (no-one will be quoted directly) and provide recommendations for the future.
  - This report will be circulated around participants for comments before being made available more broadly.
- To gather further quantitative input (and feedback on the day) please make time to fill out the survey before you leave:  
[https://docs.google.com/forms/d/e/1FAIpQLSf8nPSiAqCvkLV1OBZEoKcJYI-twnQKLjsb1vUBCSrQ8PqzvA/viewform?usp=sf\\_link](https://docs.google.com/forms/d/e/1FAIpQLSf8nPSiAqCvkLV1OBZEoKcJYI-twnQKLjsb1vUBCSrQ8PqzvA/viewform?usp=sf_link)
- Also feel free to reach out to the organisers if you have further thoughts/input for the future.

# ...thanks...

- ...to the Institute for Particle Physics Phenomenology (IPPP) and the Particle Physics Department (PPD) at STFC for their support of this event, and to the Cavendish Laboratory and West Hub for hosting.
- ...to our panellists for this afternoons discussion: Sinead Farrington, Monica D'Onofrio, Andy Pilkington, Guy Wilkinson, Matt Needham, Michael Spannowsky, Dave Newbold.
- ... to our speakers in todays sessions: Nicholas Wardle, Daniel Hynds, Tessa Charles, Tevong You and Josh McFayden.
- ... to all of you for coming/participating!

**We hope you all have an enjoyable and interesting day and look forward to lots of fruitful discussion!**