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# The ECFA Early-Career Researchers Panel

113th Plenary ECFA, 16. November 2023

Armin Ilg  
On behalf of the  
ECFA Early-Career Researchers Panel

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**ECFA**

European Committee for Future Accelerators



# ECFA ECR Panel composition and activities

*Members are, in general, **PhD students and postdocs, either with a non-permanent contract or with up to eight years after obtaining the PhD.** Up to **three members** (+1 for countries with LDG lab), among them at least one PhD student and one postdoc, can be nominated **by each ECFA country** represented in ECFA for a **mandate of two years, extendable for another two years.** Nominations are to be endorsed by Plenary ECFA. Members act as individuals, but should be able to represent the views of early-career researchers in particle physics in the nominating country.*

- From PhD students to young assistant professors
- Theoreticians, phenomenologists, experimentalists, ...  
→ Diversity in cultural background, career and research, try to represent the community
- 3-4 panel meetings per year, handled by *Organization Committee*
  - Jan-Hendrik Arling, Holly Ann Pacey, Marko Pesut, Valentina Zaccolo
- 5 ECR delegates in Plenary ECFA
  - Lydia Brenner, A.I., outgoing: Henning Kirschenmann, Eleonora Diociaiuti
  - Endorsed today: Andrea García Alonso, Holly Ann Pacey, Patrick Dougan (starting in 2024)
- 1 delegate in Restricted ECFA: Lydia Brenner

Actual work is done in **working groups** that are flexible

# Activities in 2023

First large overhaul of members in 2023 (end of first two year term)

See [arXiv:2212.11238](https://arxiv.org/abs/2212.11238) for a complete summary of 2021-2022 activities

# Career Prospects and Diversity in Physics programme WGs

# Career Prospects and Diversity in Physics Programme WGs

Designed a survey to collect information about...

- What is the impact of the collaboration size on ECRs?
- Assess the career prospects of ECRs, how can our panel help, what are the main problems?
- What do ECRs think is needed for a successful career versus what is actually needed?

Circulated to ECR community (760 responses!)

Analysed all questions [[pdf](#)], still to-do correlation studies.

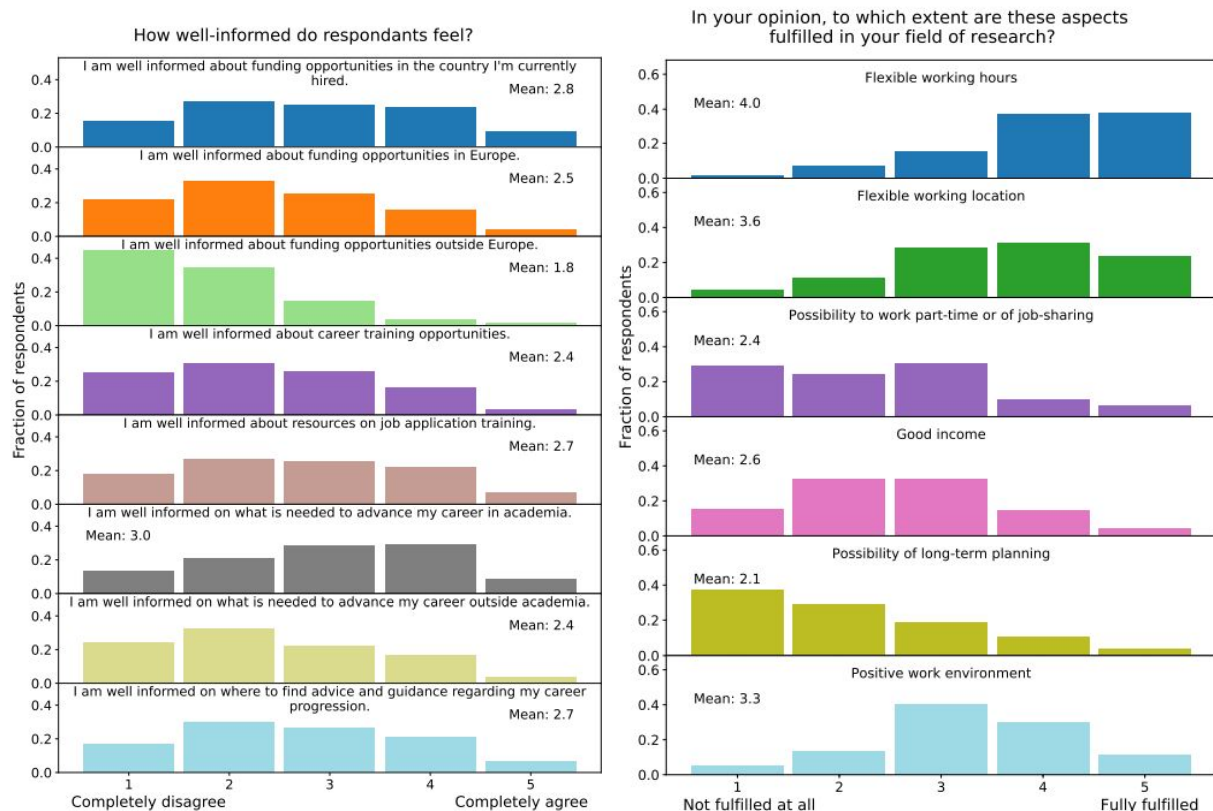
## Structure of the survey

- ☐ Personal data
- ☐ Field of work
- ☐ Collaboration and working group
- ☐ Diversity of Physics
- ☐ Career perspective and planning
- ☐ Work-life balance
- ☐ Leaving academia
- ☐ Recognition and visibility
- ☐ Final questions, feedback and remarks

[Status update](#) (J. Allen, A. Lelek, H. Pacey, G. Pietrzyk, G. Räuber)

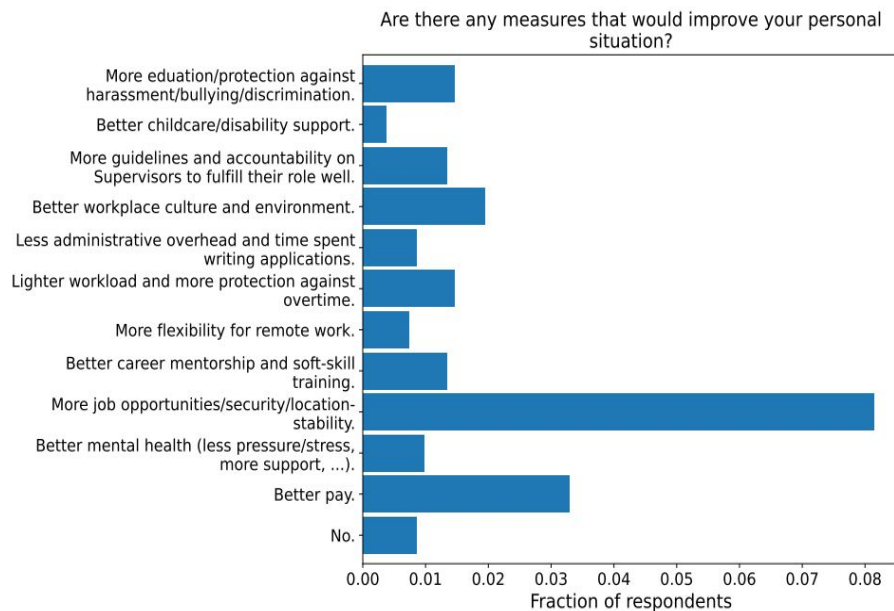
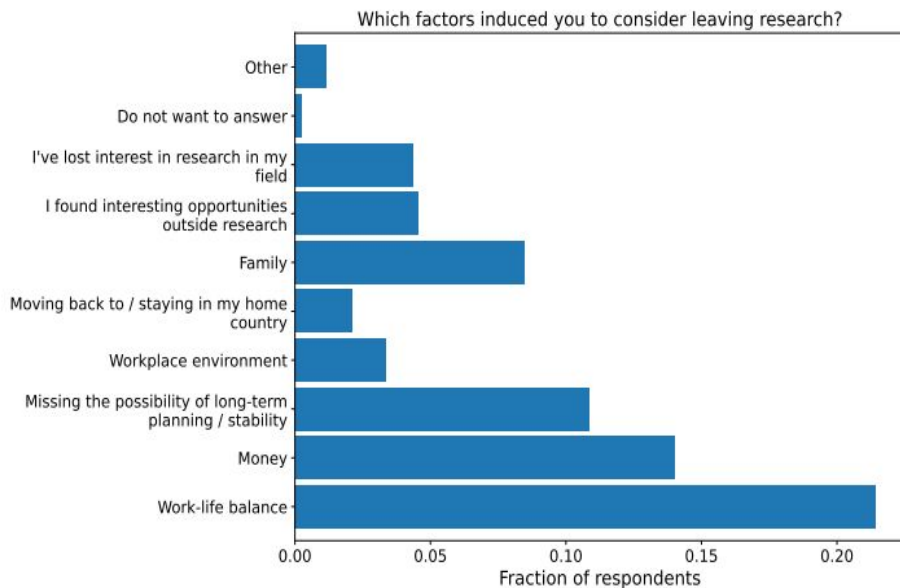
# Career Prospects and Diversity in Physics Programme WGs: First result

- ECRs not as well-informed about training / opportunities as they could be.
- ECRs feel some aspects important to work-life balance are unfulfilled.



# Career Prospects and Diversity in Physics Programme WGs: First result

- Consistent conclusion that lack of job stability and poor work-life balance are the biggest challenge for ECRs and the main cause of them considering leaving research.



# Future Colliders WG



# Role of ECRs for future colliders

*The future is ours* - Eliezer Rabinovici

Long time scales of future collider proposals mean that most researchers in charge of decisions now will not be around anymore to build and operate the experiments and analyse their data.

ECRs have to shape their own vision of the future of our field

So which future collider do we want?

# Future colliders WG

Goal: Inform ECRs about future collider options and development, enabling them to shape their own vision on future colliders

## *Future colliders for early-career researchers*, 27th of September 2023

Short presentations on prospects, lots of time for discussions. Can serve as reference information for ECRs.

→ Almost one hundred in-person participants, > 100 on Zoom



# The agenda

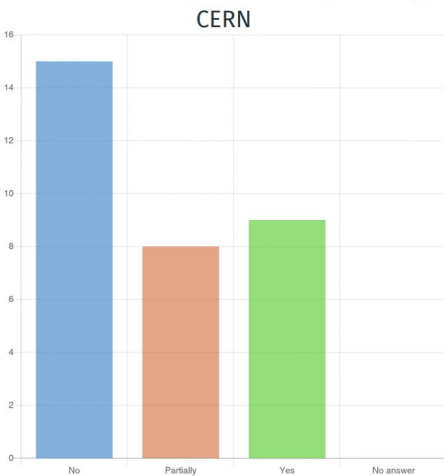
09:00	<b>Welcome to the event</b> <i>Emanuele Angelo Bagnaschi</i> <a href="#">🔗</a> 222/R-001, CERN 09:00 - 09:05
	<b>Towards the future of particle physics</b> <i>Jorgen D'Hondt</i> <a href="#">🔗</a> 222/R-001, CERN 09:05 - 09:25
	<b>The future collider landscape</b> <i>Tatsuya Nakada</i> <a href="#">🔗</a> 222/R-001, CERN 09:25 - 10:00
10:00	<b>Coffee</b> 222/R-001, CERN 10:10 - 10:30
	<b>Input from accelerator physicists</b> <i>Daniel Schulte et al.</i> <a href="#">🔗</a> 222/R-001, CERN 10:30 - 10:45
11:00	<b>Detector technologies and challenges</b> <i>Mogens Dam et al.</i> <a href="#">🔗</a> 222/R-001, CERN 11:00 - 11:15
	<b>Theory challenges: Precision calculations</b> <i>Federico Buccioni</i> <a href="#">🔗</a> 222/R-001, CERN 11:30 - 11:45
12:00	<b>Lunch including poster session</b> 222/R-001, CERN 12:00 - 12:55

13:00	<b>Software tools for future colliders</b> <i>Enrico Bothmann</i> <a href="#">🔗</a> 222/R-001, CERN 13:00 - 13:15
	<b>Theory perspective</b> <i>Anke Biekötter</i> <a href="#">🔗</a> 222/R-001, CERN 13:30 - 13:45
14:00	<b>View point of low-energy physics</b> <i>Giovanni Dal Maso</i> <a href="#">🔗</a> 222/R-001, CERN 13:55 - 14:10
	<b>Cosmic/astro</b> <i>Mauro Pieroni</i> <a href="#">🔗</a> 222/R-001, CERN 14:20 - 14:35
	<b>Beam dump experiments</b> <i>Iaroslava Bezshyiko</i> <a href="#">🔗</a> 222/R-001, CERN 14:45 - 15:00
15:00	<b>Heavy ion (link to EIC)</b> <i>Ivan Vorobyev</i> <a href="#">🔗</a> 222/R-001, CERN 15:10 - 15:25

16:00	<b>Discussion on time scale impact on ECRs</b> <i>Richard Hawkings</i> <a href="#">🔗</a> 222/R-001, CERN 16:00 - 16:20
	<b>The View from the Cern Council and ECRs</b> <i>Eliezer Rabinovici</i> <a href="#">🔗</a> 222/R-001, CERN 16:35 - 16:50
17:00	<b>Socio-Economic Impact</b> <i>Francesco Giffoni et al.</i> <a href="#">🔗</a> 222/R-001, CERN 17:05 - 17:20
	<b>Sustainability of FCs</b> <i>Roberto Losito</i> <a href="#">🔗</a> 222/R-001, CERN 17:35 - 17:50
18:00	<b>Future colliders survey: Presentation of first results and live survey</b> <i>Emanuele Angelo Bagnaschi et al.</i> <a href="#">🔗</a> 222/R-001, CERN 18:00 - 18:15
	<b>Concluding remarks</b> <i>Armin Ilg et al.</i> <a href="#">🔗</a> 222/R-001, CERN 18:15 - 18:30

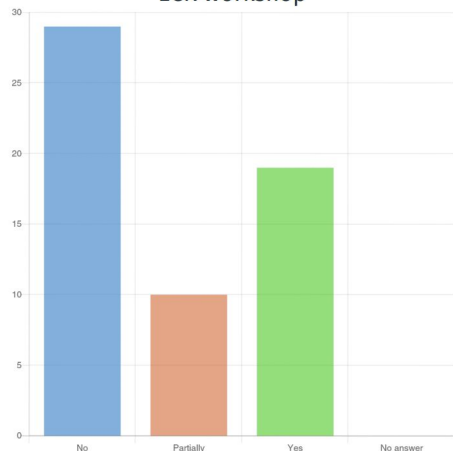
# CERN and ECR Workshop survey (full presentation [here](#))

- Are you currently working on projects connected to future colliders?



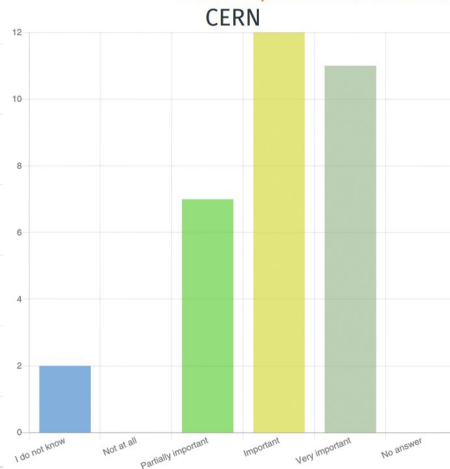
- Majority already working (partially or fully) on future collider projects

ECR workshop



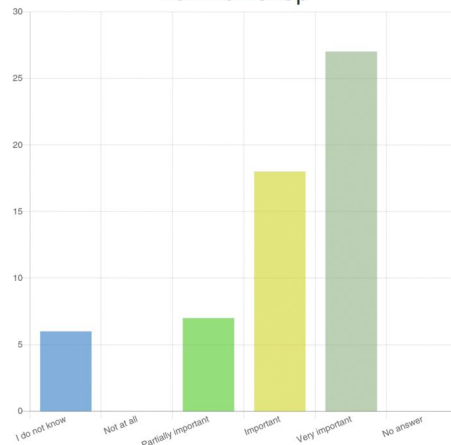
- Majority already working (partially or fully) on future collider projects

- How important is the future collider programme for your career?



- A future collider program is considered important by (almost) everyone

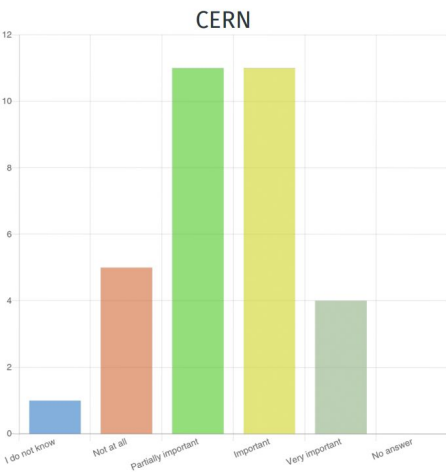
ECR workshop



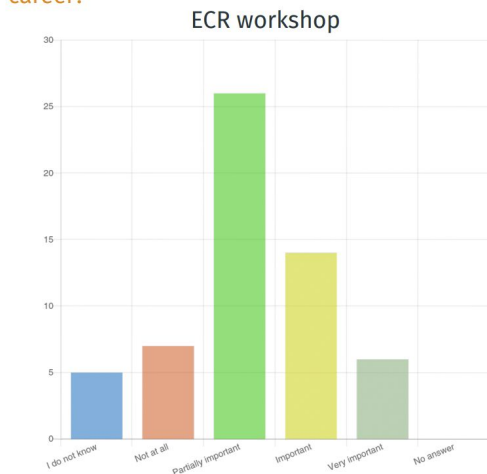
- A future collider program is considered important by (almost) everyone

# CERN and ECR Workshop survey (full presentation [here](#))

- Is the choice of a specific future collider over another important for your career?

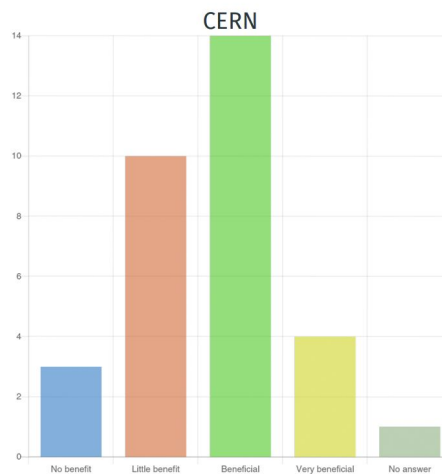


- The choice of the collider seems to matter, in part or completely

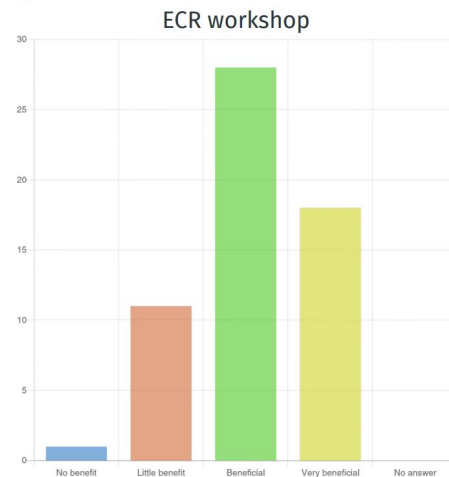


- The choice of the collider seems to matter, in part or completely

- Do you consider including future-collider related projects in your activities as beneficial to your career?



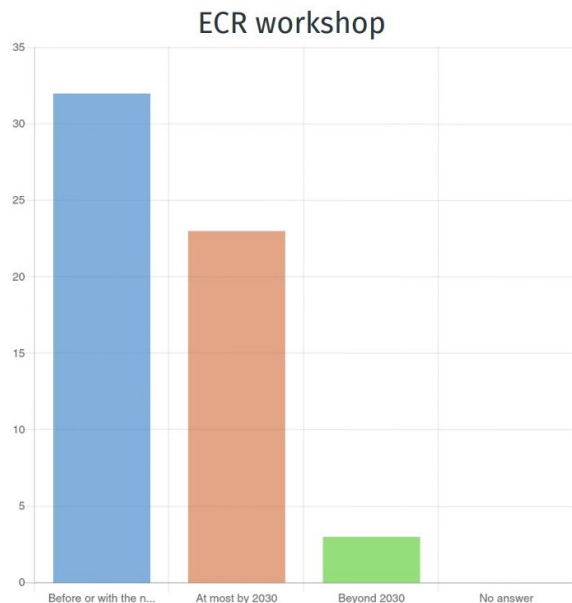
- Sizable 'little benefit' choice



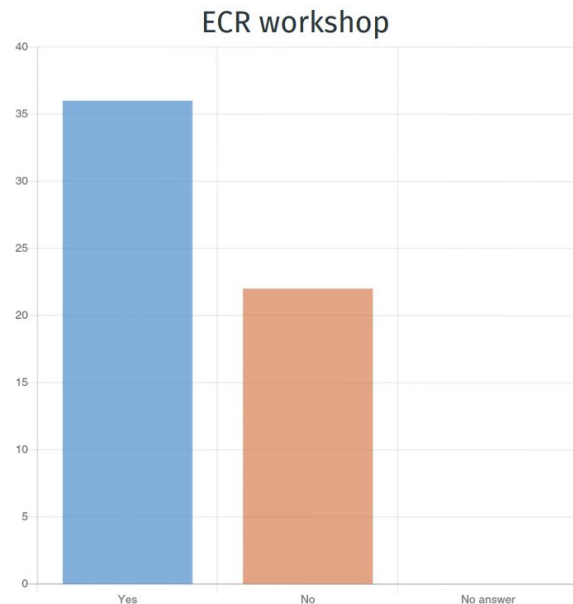
- More positive outlook

# CERN and ECR Workshop survey (full presentation [here](#))

In light of your career prospects, how long do you think it is acceptable to wait before the decision of which machine to build is made



Would you accept to work nearly full time on a project connected to a future collider, while the decision on the next machine is still pending? If yes, under which conditions



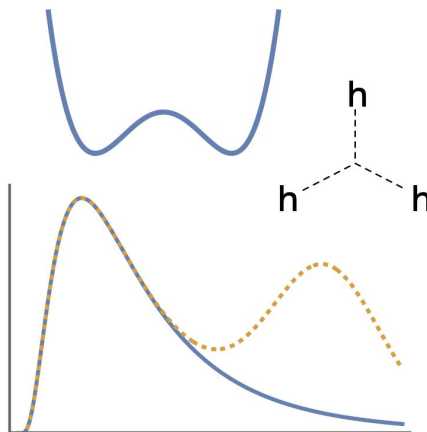
# Key message 1: Communicating need for future colliders

## Summary

### Exciting times ahead if a future collider is built!

- Guaranteed deliverables:
  - Precision measurements
  - Higgs self-coupling
- Potential direct discoveries

Anke Biekoetter



There are guaranteed discoveries!

- Learn how to communicate importance of precision

Future colliders are worth it

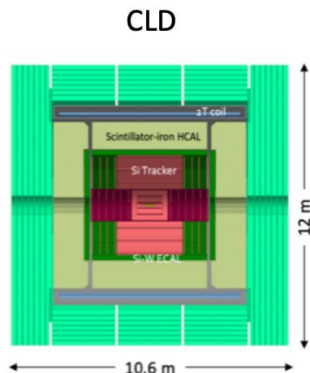
- For science and society

See sustainability not as a concern but as a challenge

- To develop technologies relevant for society

# Key message 2: Knowledge transfer and collaboration

<https://arxiv.org/abs/1911.12230>  
and FCC CDS vol. 2



Well established design

ILC -> CLIC detector -> CLD

Full Si vtx + tracker, CALICE like calorimetry;  
large coil, muon system

Engineering and R&D needed for

- reduction of tracker material budget
- operation with continuous beam (no power pulsing: cooling of Si sensors for tracking + calorimetry)

Possible detector optimizations

- Improved  $\sigma_p/p$ ,  $\sigma_E/E$
- PID: timing and/or RICH?

- Had participants from all future collider communities at our workshop
  - Open and creative exchange of ideas beyond various borders
- Future collider R&D is highly transferable from one collider proposal to another (and beyond)
  - Good ideas will survive a collider or two...

Good reasons for everyone to work on future colliders!

And even muon collider now!



# Key message 3: Enabling careers on future colliders

It's a long time until any future collider is operational

- Take future collider decision as early as possible
  - To give ECRs a concrete goal and timeline
  - To ease applying for grants
- Long-term R&D projects and support for careers in instrumentation
  - DRD Collaborations look very promising!
- Important for ECRs to broaden their horizon
  - Projects such as ECN3 very attractive to complement future collider work

# What are the considerations for choosing the next step

What do **WE** (the ECR community) find most important in the considerations for a next collider

We will not pick the next collider today, but we ask the questions that need answering

- What are the **physics questions** we want answered?
- How can we make sure that the probable physics is **diverse** enough?
  - Are several smaller colliders preferable over one large collider for the diversity of the achieved physics program?
- What are the **upgrade possibilities** of proposed projects?
- **How precise** can we get, taking realistic improvements in theory predictions into account?
- How can we make sure the **collaboration** with other energy range experiment is ensured?
- **Is the future collider programme compatible with ECR careers considering possible large time gaps after HL-LHC runtime?**
  - Would/could muon colliders make it in time to follow the HL-LHC?
- **Can we bridge the gap between HL-LHC and a large future collider with enough attractive projects?**
- How can we make a next collider is **sustainable** in terms of energy use?
- **At what time-scale should the ECR community dedicate itself to one particular proposal?**
- **How can ECRs make the impact they desire on the decision making process?**

# What's next?

## Spread the word

- A.I presented the workshop outcome at the [CALICE ECR meeting](#)
- Emanuele Bagnaschi presented the workshop outcome at the [Second  \$e^+e^-\$  Higgs/EW/top factory in Paestum](#), incl. [ECR panel discussion](#)
- Will write a short arXiv paper about the event

## From ECFA to the national communities

- Goal is to follow-up the ECFA-wide event with national, in-person events on future colliders, directing discussions into the ECFA countries as some issues are country dependent

# Software and Machine Learning for Instrumentation

# Main goals of the group

- Analysis of problems and challenges faced by early career researcher (connected to their software and machine learning work)
- Providing mechanisms to create a more friendly environment in which scientists receive substantive support in their self-development

To get to know the community better and its current problems, a survey is being prepared

# Long-term goal of the group

- Organise school/workshop dedicated in software training/development for instrumentation work. The program would focus on:
  - training in Open Source Software, Data Acquisition Systems, Detector Control Systems
  - presentation of currently working groups related to software for future colliders

The program would be selected according to the survey results

# Concluding words

## Young panel with young people

- Panel has self-organised and is active with several working groups
- Just had our first large member renewal

## Keep in touch with us

- [Our webpage](#) to find your country ECR representative
- [ecfa-ecr-organisers@cern.ch](mailto:ecfa-ecr-organisers@cern.ch)
- [Subscribe](#) to ecfa-ecr-announcements e-group to get notified about our activities!

We will summarise our 2023 activities in an arXiv paper, updates in the PECFA meetings and ECFA newsletter!

# Thanks!