

INFN ECR: Input for the European Strategy Update

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Milano Bicocca – February 4, 2025

- 1 Introduction on the ECFA ECR Panel
- 2 ECFA ECR White Paper Process
- 3 Summary of ECR National Events in Italy
- 4 Italian process outcome: ECR input for the INFN

A group of Early-Career Researchers (ECRs) has been given a mandate from the European Committee for Future Accelerators (ECFA) to debate the topics of the current the topics of the current European Strategy Update (ESU) for Particle Physics and to summarise the outcome in a brief document

- from [ECFA-ECR Input](#) (ESPP Update 2020)

- This input led to the formation of the **ECFA ECR Panel in 2021**
- Key points: human aspects, sustainability of our research
- ECFA-ECR panel plans to submit an input also for the upcoming update
- The input was created after a one-day debate + survey

ECFA ECR Panel Composition

Members are, in general, **PhD students and postdocs, either with a non-permanent contract or with up to 8 years after obtaining the PhD.** Up to three members can be nominated by each ECFA country and each major laboratory represented in ECFA for a mandate of 2 years, extendable with another 2 years. In general, the delegation from each ECFA country should have at least one PhD student and at least one postdoc. Nominations are to be endorsed by Plenary ECFA. Members are nominated by and assigned to the quota of the country they are hired at the moment they become member of the panel.

– ECFA-ECR Mandate

Italian representatives

ITALY	Cecilia	BORCA	PhD student	CMS	01.2023 - 12.2026
	Nicolo	JACAZIO	Junior Assistant Professor	ALICE	01.2025 - 12.2026
	Elisabetta	SPADARO NORELLA	Postdoc	LHCb	01.2023 - 12.2026
ITALY/INFN-LNGS	Miriam	OLMI	Junior Staff	Neutrino / Computing	01.2024 - 12.2025
ITALY/INFN-LNF	Matteo	GIOVANNETTI	Postdoc	LHCb	01.2024 - 12.2025

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.

- ECFA-ECR Mandate

- **ECFA ECR panel is tightly linked with the Update of the European Strategy**
- ECR White Paper input to EPPSU will be sent for this Strategy Update
- Focus: **topics relevant to ECRs**, not covered in topical working groups of the Physics Preparatory Group (PPG)

The ESG should review and update the Strategy and add other items identified as relevant to the field, including accelerator, detector and computing R&D, the theory frontier, actions to minimise the environmental impact and to improve the sustainability of accelerator-based particle physics, **the strategy and initiatives to attract, train and retain the young generations**, public engagement and outreach.

- Remit of the ESG (approved in June 2024)

How to achieve this goal?

➤ 8 October 2024

ECR Session @ 3rd ECFA Workshop on ee Higs/Top/EW Factories

- ▶ Definition of main topics to address to from dedicated WGs

➤ 14 November 2024

ECR Workshop @CERN – 14 November 2024

- ▶ Final definition of the WGs

➤ 20 February 2025

Symposium on the ECR White Paper Input to EPPSU

- ▶ Event for all ECRs to discuss the draft of the ECR White Paper input to the European Particle Physics Strategy Update (EPPSU)

Working groups:

- Career prospects and ECR leadership
- Communicating the importance of particle physics
- Future colliders - sustainability priorities, timeline
- Interplay of particle physics with neighbouring fields
- Future particle physics experiments beyond colliders
- Diversity inclusion and mental health

A **survey** was also launched among European ECRs and Italy is the most represented country!

ECR National Events

- Spring 2024: ECFA ECR Panel invited national representatives to organize events to engage and inform ECRs about topics related to future colliders
- Many aspects relevant for ECRs are country-dependent
- In Italy two events were organised @ LNF with the aim of informing, creating a network, promoting discussion



- Pilot event to start building a network of ECRs from various INFN Sections
- 1/2 representatives requested per section through the network of Directors and Researchers Representatives
- Around 70 participants (about 10 online)
- Talks on future colliders [info](#)
- Presentations by ECRs on the activities of their respective sections [network](#)
- Plenary discussion ECR-only [discussion](#)

10:00	Introduction from the Italian ECFA ECR Panel members Auditorium B. Touschek	Cecilia Borca et al.	10:00 - 10:08
	Summary of ECFA-wide event, and of the previous activity of the ECFA ECR Panel Auditorium B. Touschek	Emanuele Angelo Bagriacchi	10:08 - 10:15
	ECR involvement in the INFN strategy effort Auditorium B. Touschek	Alvando Nassif	10:15 - 10:20
	The FCC project Auditorium B. Touschek	Andrea Cianna	10:20 - 10:25
11:00	The EuPRAXIA project Auditorium B. Touschek	Livio Verre	10:55 - 11:30
	Group Picture Auditorium B. Touschek		11:30 - 11:40
	Coffee break Auditorium B. Touschek		11:40 - 11:50
12:00	The EIC project Auditorium B. Touschek	Annalisa D'Angelo	11:50 - 12:25
	The physics landscape of future colliders Auditorium B. Touschek	Roberto Franceschini	12:25 - 13:15

- Second event focused on EPPSU
- Event open to all interested ECRs
- Participation similar to the first event
- Talk on future colliders, with contributions also from non-FC [info](#)
- Poster session [network/discussion](#)
- Town-hall discussion ECR-only [discussion](#)
- Available [recordings](#) of the talks

14:00	Welcome + Logistics	Matteo Giovannetti
	Aula B. Touschek, Laboratori Nazionali di Frascati (Rome), Italy	14:00 - 14:15
	ECR presentation & summary previous INFN ECR event	Nicolo' Jacazio
	Aula B. Touschek, Laboratori Nazionali di Frascati (Rome), Italy	14:15 - 14:30
	ECR+ESPP	Cecilia Borca
	Aula B. Touschek, Laboratori Nazionali di Frascati (Rome), Italy	14:30 - 14:45
	Current physics landscape: motivations and future collider projects	Fierluigi Campana
15:00		
	Aula B. Touschek, Laboratori Nazionali di Frascati (Rome), Italy	14:45 - 15:30
	Accelerator technology for next generation colliders: challenges and opportunities	Prof. Lucio Rossi
	Aula B. Touschek, Laboratori Nazionali di Frascati (Rome), Italy	15:30 - 16:00
16:00	Break and group picture	
	Aula B. Touschek, Laboratori Nazionali di Frascati (Rome), Italy	16:00 - 16:15
	Detector Tech. Challenges	Gabriella Casadio
	Aula B. Touschek, Laboratori Nazionali di Frascati (Rome), Italy	16:15 - 16:45
	A theory perspective on future colliders: is it worth it or not?	Roberto Franceschini
17:00	Aula B. Touschek, Laboratori Nazionali di Frascati (Rome), Italy	16:45 - 17:15
	Review CSN2	Giovanni Mazzetti
	Aula B. Touschek, Laboratori Nazionali di Frascati (Rome), Italy	17:15 - 17:45
	Review CSN3	Rosario Nania
18:00	Aula B. Touschek, Laboratori Nazionali di Frascati (Rome), Italy	17:45 - 18:15
	Poster session: presentation	
19:00	Aula B. Touschek, Laboratori Nazionali di Frascati (Rome), Italy	18:30 - 19:30

From 30 September event welcome presentation:

Proposal for the Italian ECR Community

Our proposal	How you can contribute
<ul style="list-style-type: none">- Produce an Italian ECR input for the INFN (short document)- Starting from<ul style="list-style-type: none">- ECR-INFN Meetings- Survey- Any ideas?	<ul style="list-style-type: none">- Participating to this meeting :)- Contributing to the discussion- Filling the survey- Reaching other ECRs in your Sezione/University- Becoming an editor of the document

How did it go?

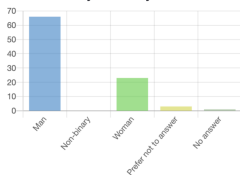
- ✓ Interesting inputs collected during the discussion
- ✓ Survey responses collected among participants
- ✓ Some ECRs volunteered to become editors

Survey 1/3

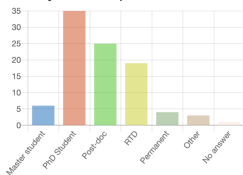
- Survey launched during the second event
- CERN Limesurvey platform
- Inspired by ECFA-ECR events surveys
- Nearly a hundred responses received in total (of which about thirty partial)

Questions on general background

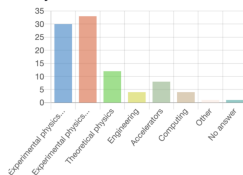
Gender: how do you identify?



Which is your current position?

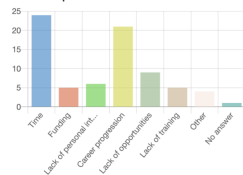


What is your area of interest?

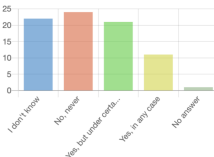


Questions on general career and FC-career relationship

The biggest barrier to my working (more) on the roadmap towards future colliders is

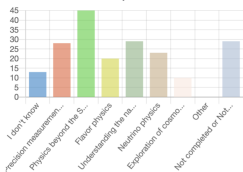


Would you accept to work nearly full time on a project connected to a future collider, while the decision on the next machine is still pending?

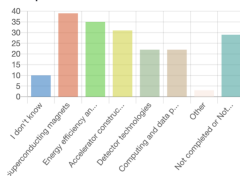


Questions on technical-scientific interests

Which physics areas should be prioritised by future colliders in Europe?

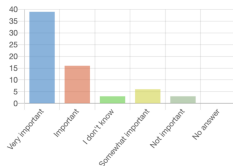


What technological challenges do you think are the most critical for future colliders development?

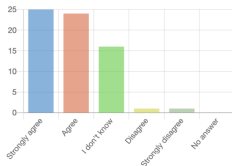


Questions on socio-economic aspects

How important do you think public engagement and outreach are for justifying the construction of future colliders?

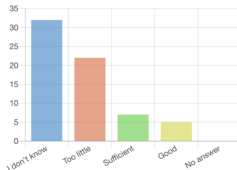


Do you believe that building a future collider in Europe would provide significant long-term economic and societal benefits?



Questions on ECR involvement

What do you think of the level of involvement of the ECR community in the process that will lead to the decision of which accelerator will be built?



- Discussions, combined with the data collected in the survey, were condensed in a short document
- This input is addressed the INFN
- Italy's contribution will converge in the European ECR Strategy Input

The full final draft can be found in the Agenda, attached to this contribution

INFN ECR Input for the European Strategy for Particle Physics

January 24, 2025

Preliminary draft

Contact

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Main Outcomes and Recommendations

- **General feeling of distance** and disillusionment regarding the decision-making process was gathered, due to **uncertainties** and long time-scales
 - ▶ Clear decisions as soon as possible: while there is no overwhelming preference for a specific collider, the importance of making **timely decisions** is strongly emphasized to preserve expertise
- **Perceived negative impact on their career** (after “lack of time”) is the main factor keeping ECRs away from FC projects
 - ▶ aim to involve ECRs working in HEP through part-time projects to take advantage of the training and career development opportunities offered by active large-scale collaborations (above all, HL-LHC)
- **Greater ECR involvement** at the national level is essential for FC projects to retain and attract new generations
 - ▶ Establish official communication channels and initiatives focused on information-sharing, discussion, and networking among ECRs, promoting a structured ECR organization at national level to organize and coordinate such initiatives

Thanks!

- To the INFN and in particular to Aleandro Nisati and Sandra Malvezzi for the huge support
- To all ECFA ECR representatives and to the editors and reviewers who volunteered: Chiara Aime' (Pisa), Stefano Moneta (Perugia), Raul Ciancarella (Roma Tre) and Simone Calzaferri (Pavia)

BACKUP

FC and career ECRs agree on the importance of FC for career development, though they express concerns about limited opportunities outside major collaborations, career stability, and the timeline for decisions.

Scientific and technological aspects of FC The ECR community recognizes the potential of FC in advancing fundamental physics and is aware of the critical challenges that need to be addressed. While there is no overwhelming preference for a specific collider, the importance of making timely decisions is strongly emphasized to preserve expertise and ensure the continuity of progress in the field.

Sociological, economical and political impact of FC ECRs support the construction of the new flagship accelerator in Europe, but concern about shifts in leadership. Challenges like industry competition, geopolitical instability, and climate change were also acknowledged, together with the need of public engagement and technology transfer.

ECR involvement Greater ECR involvement at the national level is essential for projects related to FC. Suggested measures include establishing official spaces and channels of communication, organizing seminars to raise awareness, and creating national panels to coordinate activities and strengthen representation within the institutions involved.

6 Conclusion

In conclusion, a structured involvement of ECRs in future collider projects and decision-making processes, as well as ensuring their widespread inclusion and information, is crucial. The main barriers preventing their participation are uncertainty and career progression concerns. Early involvement, even on a part-time basis, would provide benefits to the entire roadmap and to the scientists of tomorrow.

Based on this, the following key recommendations are presented:

- A decision should be taken as soon as possible
- In the initial phases, while major LHC experiments are still ongoing, aim to involve ECRs working in HEP through part-time projects to take advantage of the training and career development opportunities offered by active large-scale collaborations, which R&D alone cannot provide
- Establish official communication channels and initiatives focused on information-sharing, discussion, and networking among ECRs
- Promote a structured ECR organization at national level to organize and coordinate such initiatives

Dear CERN Council,

In the 70 years since its founding, CERN has not only established itself as the global centre of particle physics research but as a powerful symbol of international collaboration and scientific excellence. This would never have been possible without the unfaltering support offered by the CERN member states.

As a community, we feel immense pride and gratitude that we are part of this journey of scientific exploration and opportunity which CERN has pioneered. While the High-Luminosity LHC constitutes a much-anticipated and necessary advance in the LHC program, a clear path beyond it for our future in the field must be cemented with as little delay as possible. For the field to sustain the population, expertise, and enthusiasm required to overcome the challenges of what CERN's next major project/accelerator will present, the ECR community needs certainty without delay that High Energy Physics has an immediate future beyond HL-LHC, and that funding and positions required to realise our future will grow rapidly.

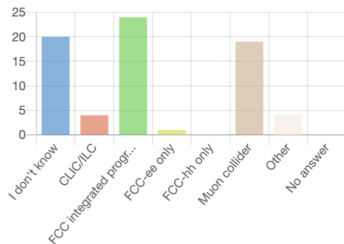
We, the ECFA Early-Career Researchers Panel, on behalf of the ECR community, would like to strongly urge the Council to make every effort to ensure that the process of evaluating, selecting and implementing potential future projects, which will define this century of High Energy Physics for Europe and the World, proceed with as quick a pace as possible, accelerating its time frame to start the European strategy process as early as possible and conclude by early 2026. This will go some way in helping further secure CERN's unique position in science, technology and international cooperation for the next 70 years and beyond.

Kind regards,

The ECFA Early-Career Researchers panel

EPPSU started earlier than originally anticipated! ECR input has impact

The future collider option I would like to see built next is



The decision regarding the next collider is complex, and the ECR community does not display a strong preference for one type of collider over another. Around 35% of respondents expressed interest in the FCC-integrated program, while approximately 25% favoured the Muon Collider. Roughly 30% of participants did not specify a preference for which collider should be prioritized, and the remaining 10% are interested in other potential options. It has to be remarked the strong correlation between the FC project in which the respondents are currently involved and their actual preferences.