WG: Communicating The Importance of Particle Physics

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Contributors

Thank you to everyone who joined our WG meetings and shared their time and input

- Armin Ilg (exp. Physics, FCC, University of Zürich)
- Emanuela Musumeci (Pheno/exp., Future colliders+MoEDAL, IFIC, Valencia)
- Abdelhamid Haddad (ATLAS experiment, exotics, LPCA)
- Hanae Tilquin (LHCb, Imperial College London)
- Laura Huhta (University of Jyvaskyla)
- Fan Henry (ATLAS, Glasgow)
- Alexis Maloizel (FCC/ATLAS, APC)
- Jan Klamka (University of Warsaw)
- Francesco P. Ucci (Pheno/Th, INFN Pavia, University of Pavia)
- Louis Portales (CEA Paris-Saclay / IRFU, CMS/FCC)
- **Hopefully more, Maybe you ?!**

We welcome all of you to join the effort 🙂

Disclaimer

- **Everything is open for discussion:** The WG name, scope, topics raised, and proposals presented so far are all subject to further review and re-discussion.

- We had to prioritize certain topics, but additional ideas and material have been set aside for later consideration. (Backup)

- The goal is to provide a clear summary of what we've discussed in previous meetings and, hopefully, inspire you to collaborate with us moving forward, or at least to trigger further discussion.

Motivations

- **ECRs are expected to excel in various areas**, from math and theory to instrumentation, computer science, and communication—yet, **we often lack formal training in these skills**.

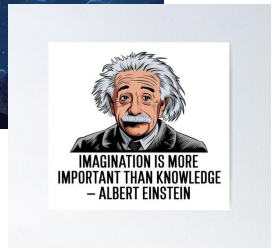
- **Communication skills are highly valued** in our field, **not just technical abilities**. Clear communication enables collaboration, sharing of technical perspectives, and visibility.

- **Effective communication**, both internal and external, is **crucial** for raising awareness about our work and future plans across experiments and collaborations.

With Whom Do We Communicate? And How ?

High school students

- Spark curiosity about science, nature, and its importance.
- Share what we do, why, and how?
- Highlight that our science is meaningful and positive: e.g. "science for peace," CERN as a success story!



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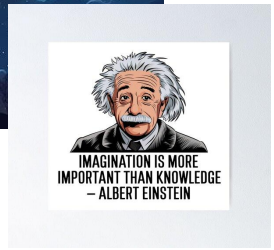

Simplifying Complex Concepts: ECRs may struggle to distill advanced scientific ideas into simpler, accessible language.

Engaging Interest: It can be difficult to make physics feel relevant and exciting to students who may not yet see its real-world impact.

Maintaining Attention: The vast range of topics in physics can overwhelm students, making it hard to keep them engaged.

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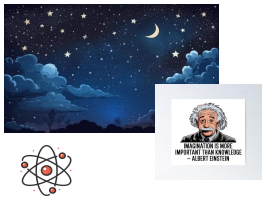
Undergraduate students

- Inspire questioning and exploration of new scientific ideas.
- Make science exciting by connecting it to broader challenges.
- Offer guidance and hands-on project experience.
- Show how physics leads to diverse roles and contributions.



Simplifying Complex Concepts
Engaging Interest
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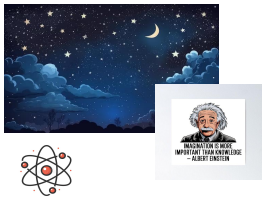

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Guidance and Support: ECRs often lack experience in mentoring undergraduates, which can hinder their ability to provide clear, structured advice.

Balancing Mentorship and Personal Research: ECRs may struggle with dividing time between their own work and the need to mentor undergraduates effectively.

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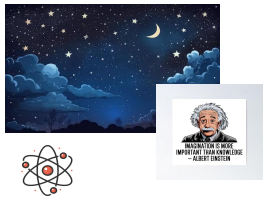

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Guidance and Support
Balancing Mentorship and Personal Research

Outreach

Recognition: Outreach efforts often aren't formally recognized in academia assessments or career advancements. It might be seen as less critical than publishing papers or presenting at conferences.

Time and support: It can be time-consuming, and there may not be sufficient institutional support for outreach efforts.

Lack of Mentorship in Outreach: ECRs may not have sufficient guidance on how to effectively communicate their science to the public, especially to younger audiences, making it harder to navigate and engage in outreach.

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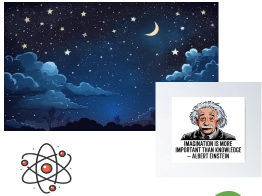
Other ECRs

- Boost networking, knowledge-sharing, and growth among ECRs.
- Encourage informal communication for idea exchange and guidance.
- Remind that physics is challenging, but collaboration makes it doable.
- Help ECRs see the impact of their work in the broader scientific context.



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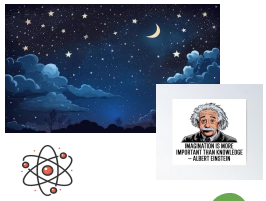

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Balancing life and work: Heavy workloads can prevent ECRs from finding time for informal discussions, making it harder to engage in productive communication.

Isolation: Without sufficient networking or informal communication opportunities, ECRs may feel isolated, lacking the space for casual, open exchanges of ideas.

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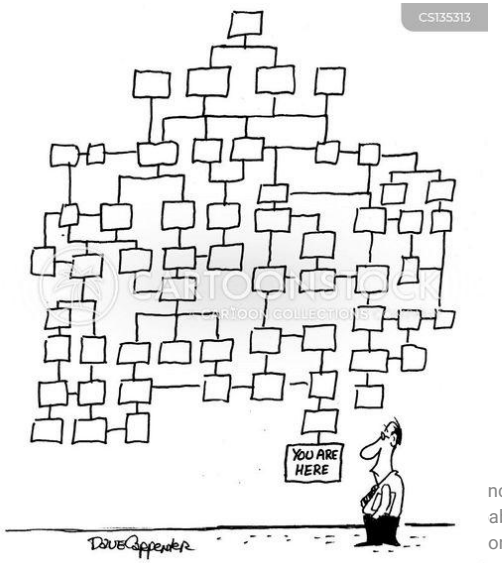

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Seniors

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- Facilitate knowledge transfer to foster collaboration and career growth.
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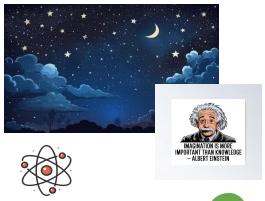

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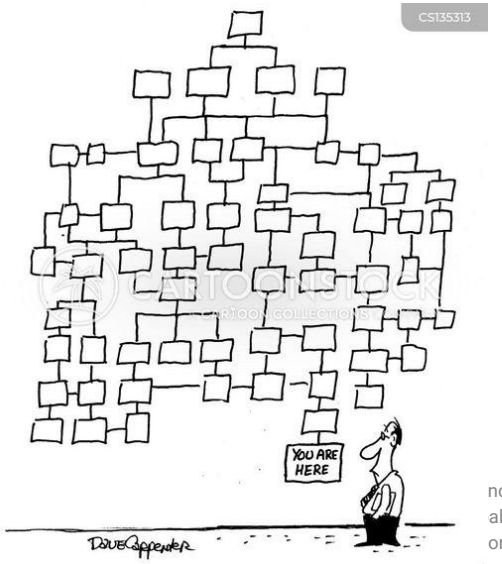

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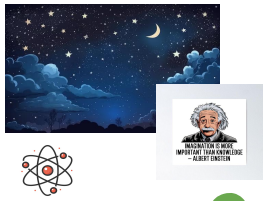

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Building Peer Networks: Difficulties establishing strong, supportive networks with peers in other institutions or fields, limiting their access to new ideas and future projects.

Balancing Mentorship with Independence: ECRs may feel constrained by senior researchers' input, leading to difficulties in developing independent thinking while still seeking guidance.

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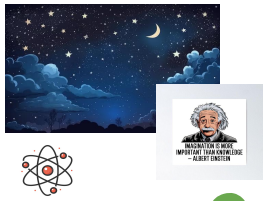

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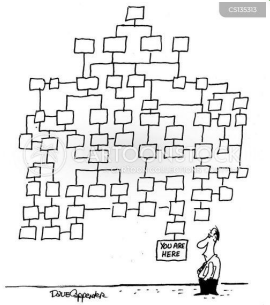

Building Peer Networks
Balancing Mentorship with Independence

A Few Proposals

(More in backup)

- A few-pages summary on "**The Importance of Particle Physics**," covering its scientific value and global collaboration.
- A few-page summary on '**The Day-to-Day Life of an ECR**,' aimed at inspiring future researchers.
- Establish a **mentorship program** from senior researchers down-to high school students to encourage knowledge transfer and ongoing support across levels and ensures continuous support.
- **Outreach** from university-level students to general public audience:
  - Opportunities to learn about the field / what people actually do day-to-day https://www.instagram.com/lhcb_uk_students/?hl=en, https://physicsmasterclasses.org/*
- ECR **non-technical support**:
  - CERN actual support : https://hse.cern/content/mental-health-support
  - Create a platform for ECRs to connect, share experiences, and stay informed. (**ECR Forum**)
  - **A dedicated mailing list** ecr-help@cern.ch (does not exist yet!)
  - **An anonymous chat support**.

Summary

- These slides **summarize (not all) key points** from our initial brainstorming meeting. They may still be **incomplete** or **inaccurate**, and **we welcome your input to help shape the working group's direction** and its impact on the future of particle physics.

  - There's still **a lot to do**. We **need to define and complete our tasks**, and **time is limited** before the **first draft in mid-December** (only 3 bi-weekly meetings left).

- **How to Get Involved ?**

  - Raise your hand, grab the mic, and **share your opinion**.
  - Short on time or feeling shy? Take a moment to fill out the survey. (5 questions)
  - Want to dive deeper? Join our afternoon Zoom session at 3 p.m.
  - Not enough? Fill in the poll so we can choose a time for next week meeting.
  - Overall: Join us on Mattermost (after joining the e-group).

- **I'm not an expert, and I may not have all the answers, but together, we can create something truly impactful !**

BACKUP

Links to “Career prospects and ECR leadership” WG

Communication as a Career Skill

- Presenting complex research clearly can make a strong impression in interviews and networking.

Communication as a Transferable Skill

- Emphasise that communication is as essential as technical skills, benefiting careers inside and outside academia.

Establishing as a Thought Leader

- For ECRs, confidently presenting ideas fosters recognition and opens leadership roles.

Building Collaboration and Partnerships

- Good communication builds cross-institution networks and partnerships, supporting career growth.

Inspiring and Mentoring

- Articulating scientific ideas helps inspire future scientists and supports mentorship.

Links to “Interplay with neighboring fields” WG

Expanding Research Horizons:

- Engaging with experts from fields like ML enhances techniques and innovation in particle physics analysis.

Accelerating Progress:

- Interest from other fields fosters cross-disciplinary collaboration, driving new insights and techniques in particle physics.

Incorporating Diverse Perspectives:

- Collaborating with different fields broadens approaches and helps solve complex challenges in physics through shared expertise.

Boosting Innovation:

- Adopting methods from fields such as ML, data science, or engineering accelerates advancements in particle physics research and technology

Strengthening Communication within the Scientific Community

- **Importance of Particle Physics**:
  - One-page perspective: “The importance of particle physics”, highlighting its role from curiosity-driven research to global collaboration.
  - Letters aimed at inspiring future ECRs and advocating to CERN, funding agencies, and society to stress the value of continuous support for the field.
- **Highlight the need for communication among young researchers** to share insights about their work and upcoming projects.
  - Encourage discussions on current and future research initiatives to create an informed and active network of young researchers.
    - *Example:* In large collaborations, such as those at the LHC, some people may not be well-informed about developments in future projects
- **Advocacy for Communication Recognition**:
  - Push for the formal acknowledgment of outreach and effective communication efforts within research institutions and collaborations.

Strengthening Communication within the Scientific Community

- **Mentorship Programs as a Communication Tool**:
  - **Structured Mentorship Initiatives**: Establish a multi-level mentorship structure to facilitate knowledge transfer and guidance:
    - **Seniors to PhD Students**: Senior researchers provide advanced insights, share career advice
    - **PhD Students to Undergraduate Students**: PhD mentors can introduce undergraduates to the research process, provide project guidance and inspire continued study in particle physics.
    - **Undergraduate Students to High School Students**: Undergraduate mentors connect with high school students through simple explanations and hands-on activities to spark early interest in physics.

    These mentorship layers create a chain of communication that ensures continuous support, growth and knowledge flow across all academic levels.

- **ECR non-technical support**:
  - CERN actual support : https://hse.cern/content/mental-health-support
  - Create a platform for ECRs to connect, share experiences, and stay informed.
  - A dedicated mailing list ecr-help@cern.ch
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Outreach: goals

- Need to explain what we do day-to-day as well as what the field is about
  - Our experiments usually take a very long time to be created / run / lead to results ⇒ need to emphasize importance of our work in a world that's increasingly faster

- Outreach to **wider public** in addition to communicating within scientific community
  - Public funds are used to finance particle physics experiment ⇒ need support from society
  - E.g. **scientific popularisation articles / podcasts**

- Outreach to **high-school / university-level students**
  - Few people actually know / understand what we do
    - Not many particle physics courses even at university level
    - Few other opportunities to learn about the field / what people actually do day-to-day
      - https://www.instagram.com/lhcb_uk_students/?hl=en, https://physicsmasterclasses.org/
  - Need students to become enthusiastic about the field as some of them are the ECRs of tomorrow!
  - E.g. **talking about our work in schools, evening seminars in universities, mentorship, more informal chats with younger students, short videos or 'day with me' on social networks**, etc.

Outreach: barriers

- Outreach is not always considered part of “normal“ duties ⇒ sometimes needs to be done in own time (so less people are likely to do it)
  - **All the suggestions in the previous slide are easily implementable with a better recognition of outreach work**
- Outreach requires **good communication skills**
  - Communication skills also required in other areas of our work (e.g. scientific discussions, paper writing) and even beyond academia
  - (More) **training required from institutions**

Target(s): Scientific

1. Why Mentorship Matters:

- **Bridges Generational Knowledge**: Connects experienced researchers with early-career physicists, passing down expertise and lessons learned.
- **Supports Career Growth**: Provides personalized guidance on research, skill development, and navigating career paths both inside and outside academia.

2. Mentorship as Communication:

- **Demystifies Complex Topics**: Helps mentees understand challenging physics concepts through simplified explanations and real-world examples.
- **Promotes Outreach Skills**: Encourages young researchers to develop communication skills essential for public engagement and scientific presentations.

3. Building a Supportive Community:

- **Peer Learning and Networking**: Fosters a collaborative environment where knowledge and resources are shared among researchers.
- **Advocacy for Outreach and Diversity**: Mentors inspire mentees to engage in outreach and highlight the importance of inclusive practices in research communities.

4. Preparing for Diverse Careers:

- **Transferable Skills**: Mentorship highlights how skills like data analysis and problem-solving are valuable in industry, government, and beyond.
- **Real-World Applications**: Demonstrates the relevance of physics skills in broader contexts, preparing mentees for various career transitions.