

A word from the Early Career Scientists in the LHC experiments

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Early Career Scientists (ECSs) make up a large fraction of the High Energy Physics community and contribute to the scientific programmes across all projects and activities. In the experiments at the Large Hadron Collider, students alone compose about half of the scientific authors. All four large experiments—ALICE, ATLAS, CMS and LHCb—recognize the importance of the well-being and general satisfaction of the young researchers and its correlation with the performance of the collaboration as a whole. In recent years, boards representing ECSs were formed in each of the four collaborations. These boards consist of a diverse group of young scientists who meet regularly among themselves, gather feedback from the entire early-career community, advise the management in the best interests of the young physicists in the collaboration, and organize social events. This talk overviews the history of the LHC early-career boards, their recent activities, the feedback of the young communities, and the plans for the future.

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1. Introduction

Early Career Scientists (ECSs) make up a large fraction of the High Energy Physics community and contribute to the scientific programmes across all projects and activities. The definition of ECSs varies across Collaborations, however, authors are generally considered as ECS if they do not have a permanent contract or if they are untenured. The four largest LHC Collaborations have all performed demographic studies, similar to the one from the ATLAS Collaboration [1], and concluded that about 50% of scientific authors are indeed at early stages of their career. Managements of all four Collaborations identified the importance of well-being and satisfaction of ECSs as paramount and highly correlated to the performance of the entire Collaboration. One proactive step that all Collaborations took was to form boards that represent ECSs to the management. The structure and organization of the boards are different across Collaborations, however, the mandate of the four boards is similar. Generally, the mandate is to:

- represent common interests of ECSs;
- advise the management and the Collaboration Board on ECS matters;
- gather feedback from ECSs and statistics on early-career matters;
- provide a forum to gather and discuss topics relevant to the early-career community;
- implement and suggest new initiatives and improve the life of ECSs.

Among the four Collaborations, such a board was first formed in ALICE in 2010, called the ALICE Juniors Committee. The CMS Collaboration was next by forming the CMS Young Scientist Committee (YSC) in 2013, followed by LHCb where the Early Career, Gender and Diversity Office (ECGD) was formed in 2014. Next, the ATLAS Early Career Scientist Board (ECSB) came into existence in 2017 in the ATLAS Collaboration. The four boards independently organize similar internal events in the corresponding Collaborations and they also work together on CERN-wide topics. The contact information of the boards is outlined in the presentation.

2. Structure and organization of the four early-career boards

The boards have similar mandates and goals, however, the structure of the boards is quite different.

The ALICE Juniors Committee consists of three members and they are in charge of organizing events, meetings, as well as conducting surveys. Furthermore, the ALICE Juniors Committee is in charge of organizing elections for the ALICE Juniors' Representatives. Representatives are a separate group of three elected members and their main role is to represent the junior community to the ALICE Collaboration Board. They actively take part in the discussions in the Collaboration Board and Management Board and they have three votes in the Collaboration Board's decisions. Moreover, most member states in ALICE have an ambassador which serves as a contact person for ECSs in different countries. Their role is to forward issues, opinions, and suggestions to the representatives so that they can be discussed during the Juniors' meetings.

The other three boards have a simpler structure; they all have one board responsible for all activities and, as opposed to the ALICE Collaboration, they do not vote in the Collaboration Boards. The ATLAS ECSB has seven active members with staggering two-year terms. The ATLAS Collaboration Board chairs elect three to four new members once per year via nominations from the members of the Collaboration to succeed the outgoing members. The ECSB does not have a permanent chair and their decisions are as much as possible consensus driven. The CMS YSC has (by the time of the talk) 17 active members and six advisers. The terms are voluntary and have no time limit. The board has a dedicated chair, a deputy chair, and a secretary. Lastly, the LHCb ECGD has two appointed officers, one man, and one woman, and since 2015, ECGD officers are invited to attend the Collaboration Board meetings [2]. The mandate of the ECGD does not include only ECS matters, but also diversity and gender-discrimination related issues.

In all four boards except the ECGD, the members themselves are ECSs from different career stages: Ph.D. candidates, post-docs, and untenured faculty. In ECGD, the two officers are senior physicists due to non-ECS parts of their mandate. Moreover, early-career boards are diverse in gender and institute representation to ensure a well balanced set of studied topics.

3. Events organized by the early-career boards

Boards organize various events aimed at ECSs with the ultimate goal of improving their lives in the Collaborations. These events stimulate social networking among ECSs and between ECSs and senior members, introduce newcomers to the Collaboration and aim to improve their technical skills, familiarize ECSs with later career-stages and give them advice on how to build a successful career. The amount and variety of these events are truly astounding and, for the sake of brevity, this talk outlines only some of the most notable ones.

All four boards recognize the importance of ‘induction/tutorial’-type events. ATLAS and CMS boards organize induction days two to three times per year. Induction days introduce the complex structure of Collaborations to the newcomers through talks by members of the managements and leaders of the main groups: detector, DAQ, computing, physics/performance, outreach. These events bring newcomers up-to-date with the activities in the Collaborations and inform them about the bureaucratic aspects and policies (e.g. about how the conference talks are distributed among the authors). Moreover, induction days have enough free time between the talks to allow interactions between attendees and speakers and welcome drinks and snacks are served after the talks to further stimulate socialization. ALICE Junior Committee organizes a similar event, a software tutorial, which provides information about various tools used in analyses, from which both junior and senior members benefit. In ATLAS, CMS, and LHCb software tutorial events are organized by other groups. They are endorsed by the early-career boards and attendance of these events is recommended to ECSs. If possible, early-career boards also organize visits to the detector cavern during induction or software events which allows many newcomers to see their detector for the first time.

Assistance in career progression in academia and outside academia is offered by the four boards through events like the *Career Networking Events*. These events are supported by all four Collaborations and organized also by some members of early-career boards. They started in 2016

and they are hosted once per year¹. The events offer an insight into career opportunities outside of academia. Various former members of the LHC Collaborations give presentations and are invited to be part of a panel discussion and elaborate on their experience in companies in a diverse range of fields (e.g. industry, finance, IT). Events offer opportunities to ask questions during the panel discussion, the break, and after the event. Refreshments and light snacks are served after the event to continue the discussions. A similar CERN-wide event was hosted by the ATLAS ECSB in 2018, the *Career Path Q&A*². Here, senior scientists from several countries have been invited to discuss, according to their experience, what selection boards look for in candidates for tenure-track jobs (or the equivalent). The format of the event was a Q&A taking pre-submitted questions and questions from the audience. Similarly, to other events, snacks were served to encourage socialization and boost the attendance.

Furthermore, getting ECSs familiarized with topics beyond their current work is a goal for all four boards. Considering this, the ATLAS ECSB organized an event in 2017 which revolves around physics and machine challenges at future colliders, called the *Future Colliders for Fresh Physicists*. A similar event was hosted in 2018 jointly by all four early-career boards, the *A fresh look at the Universe: a conversation over ice cream*³. These are evening events that start with served ice-cream, followed by an introductory talk from a member of the CERN management. After the introductory talk, three to four topical talks are given by invited speakers. The discussion revolves around future challenges and topics other than the current LHC physics to help junior scientists become aware of topics other than their current work. The four boards deem this is crucial for the future of our field because junior scientists make up most of our community.

Other notable events hosted by the early-career boards are: spokesperson candidates debate for the young community in CMS, Junior's day during the ALICE week, a plenary session for ECSs at every LHCb week, regular get-togethers for CMS young scientists, journal club in ALICE, and 'meet-and-greet' events in ATLAS and LHCb, where individual ECSs are paired with senior scientists and invited to have lunch together. These serve for breaking the barrier between ECSs and senior scientists and give junior members an opportunity to ask very experienced senior scientists for advice.

4. Activities within the Collaborations

Main areas of the boards' work apart from hosting events include gathering statistics and feedback and advise the managements in the best interests of ECSs. Because the nature of this work is internal, only a few particular implementations or ideas are presented in the talk.

A particular solution proposed by early-career boards that deserves discussion in this talk is the 'mentoring scheme'. The general idea is to pair students and post-docs (or later career stages) from different institutes in a semi-official way. Such pairing already occurs naturally, however,

¹The 2016 and 2017 Career Networking Events can be found at <https://indico.cern.ch/event/561880/> and <https://indico.cern.ch/event/661424/>.

²The public Indico page of the Career Path Q&A can be found at <https://indico.cern.ch/event/716741/>.

³The events can be found at <https://indico.cern.ch/event/650584/> and <https://indico.cern.ch/event/737196/>.

more encouragement can be beneficial for the Collaboration and making the pairing more official ensures fairness for all ECSs. This scheme is already active in LHCb and is in early stages in ATLAS. Students sometime either stay at CERN without a regular supervision or they need technical expertise which may not be available at their home institutes. A list of ‘mentors’ can, therefore, be maintained with a brief description of mentors’ expertise and students may together with their supervisors contact the expert and initiate the relationship. It is important to note that the education and supervision of a student should always remain the responsibility of the supervisor and the home institute in this scheme. The mentors are not meant to assist the student only in a specific task but also offer them guidance through their current career level.

Another topic common to all four early-career boards is recognition of ECSs within and outside the Collaborations. They identified that the recognition of ECSs could be improved. Currently, most of the ECSs’ recognition comes from talks at international conferences, Ph.D. awards, and talks at important internal meetings. These are all relatively limited and the four boards create additional opportunities for ECS to present their work (e.g. dedicated sessions at Collaboration weeks, short talks at Weekly Collaboration meetings). Furthermore, both in ATLAS and CMS task-forces were formed, composed of ECS board members and members of the management, aiming to improve the recognition.

Gathering feedback through polls is a common way of gaining information and identifying areas that need focused attention for the early-career boards. These polls are usually internal and only a few examples are presented in the talk. Both the ALICE journal club and the software tutorial are very well perceived in the ALICE Collaboration. The vast majority of polled members find the events useful and healthy for the Collaboration. Similarly, the first ATLAS ‘meet-and-greet’ event received an overwhelmingly positive response: 93% of attendees (about 70 attended the event) rated the conversation as a pleasant experience, 100% would recommend it and 98% would meet again. In general, the early-career boards are perceived as very useful and beneficial for the Collaboration both by senior and junior scientists.

5. Summary and outlook

The four early-career boards in the largest LHC Collaborations are groups with similar purpose and mandates. Despite different structures, they achieve the same goals and improve the efficiency of the entire Collaborations by making the day-to-day life of ECSs better. Main areas of work include gathering statistics and feedback from ECSs, collaborating with the managements in the early-career matters, and independently organizing events and other initiatives aimed at ECSs. The four boards are in contact with one another and occasionally host CERN-wide events together.

One issue that they encountered is the difficulty to reach the young community and get their attention or interest. It is tackled in various ways; by initiating dedicated mailing lists for announcements regarding the ECS community, advertising the organized events in a broad spectrum of media (e.g. printed posters, Collaboration meetings, social-media), and by presenting their activities in international conference talks.

The early-career boards have now become an important part of the Collaborations and their members organize crucial events such as induction days or software tutorials. From years of combined experience we learn that it is indeed beneficial for Collaborations to have such dedicated

boards that represent the ECS community and implement various initiatives aimed at ECSs. Cooperation between these boards from different Collaborations already exists and future communication and exchange of ideas can only be more beneficial.

References

- [1] ATLAS collaboration, *Studies related to gender and geographic diversity in the ATLAS Collaboration*, Tech. Rep. ATL-GEN-PUB-2016-001, CERN, Geneva, Jul, 2016.
- [2] LHCb collaboration, J. Rademacker and B. Sciascia, *The early career, gender, and diversity actions within the LHCb Collaboration*, *PoS ICHEP2016* (2017) 318.