

# Recognition of Individuals in Large Collaborations

## Summary Report

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APPEC-ECFA-NuPECC (JENAS) working group

Djamel Boumediene, Emmanuel Gangler, Nasser Kalantar, Karl-Heinz Kampert,  
Bogna Kubik, Marcel Merk, Gerda Neyens, Eberhard Widmann

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# 1. Introduction

This report is the result of a joint ECFA-NuPECC-APPEC working group addressing the topic of recognition of scientific contributions of individuals in large collaborations. The working group met for the first time during the JENAS meeting in 2019 in Orsay and has since interacted with representatives of large collaborations, mainly in Europe. With the current document the working group reports back to JENAS concluding a two year study.

Our main finding is that a large number of collaborations have already given a lot of thought to “best practices” and that the aggregation of all best practices already in place provides a rich panorama. We thus encourage the community to carefully consider best practices that are in use elsewhere in the field.

Therefore, we organized this document as follows: in section 2, we recollect the motivations for this study, in section 3 we report on the methodology that was followed. The most relevant best practices are presented in section 4, while the appendices present the full list of best practices that were reported by the collaborations of each of the ECFA-NuPECC-APPEC communities. In section 5, conclusions present existing best practices to advocate, and finally make our recommendations for consideration by our scientific fields.

## 2. History and Task description

With the emergence of Big Science projects, involving collaborations of hundreds or even thousands of researchers, the scientific achievements of individual physicists deserves attention. The role of individuals in large collaborations was placed on the agenda of the Restricted ECFA in 1992, when they performed a first survey of PhD students active in LEP or HERA, initiated by a worry that working in large collaborations may not be as attractive as doing research in smaller collaborations. The survey<sup>1</sup> signaled a number of issues, including a need for more guidance and support by seniors, a request to have clearly defined research projects and an advice to make improvements in the management structure of the collaborations. However, overall the chances of obtaining a PhD and making a career were judged at the time to be the same as in smaller experiments, resulting in an overall positive conclusion. On the other hand, the report also stated that the issue may become worrisome for even larger future (LHC) collaborations and made a suggestion that those collaborations should perhaps be organised in sub-collaborations.

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<sup>1</sup> ECFA/RC/92/205 "The ECFA 1992 Survey of PhD Students in LEP or HERA Experiments".

Later on in 2015, a joint ECFA/HEPP-EPS study was published<sup>2</sup> addressing in particular the difficulties for panel members from other fields to properly evaluate the contributions of particle physicists. The study at the time noted that evaluation procedures within the community were satisfactory, but that evaluations and comparisons with peer scientists outside the community, competing for the same positions, was problematic. A main item identified was the fact that particle physics publications were authored by the full collaboration, and as a result it is difficult for a panelist to assess the importance of individual contribution within the collaborative work. Also that the issue was not unique for particle physics, but relevant for the organisation of big science experiments in large collaborations. The document further provided information to evaluators outside HEP as well as advice for individuals applying for a position.

More recently, the question was asked whether the environment of large collaborations is still attracting the talent from the next generation of scientists. In preparing the update of the European Strategy for Particle Physics, the ECFA initiated in early 2018 a working group on "Recognition of Individual achievements in collaborations". The leaders of 29 CERN-recognized experiments were contacted who recognized the importance of the topic and valued further investigation of the topic, which was summarized by statements: "Concerning the ease of recognizing individual and qualitative achievements, some phase-transition is observed from medium-sized to large collaborations" and "Recognition of Technical contributions (hardware and software) is a challenge".

Based on these results, a community-wide survey (1355 participants) addressing a broad spectrum of questions, was launched by the ECFA in October 2018. In the Survey, the respondents gave feedback on a broad scale of statements reflecting their view on recognition in a broad sense. The responses generally showed a broad spectrum varying from "unhappy" to "happy". Significant unhappiness was found in the largest collaborations and in particular among early career scientists. The outcome was presented and discussed in the Plenary ECFA session of Nov 2018 and was also used to make a dedicated recommendation for the update of the European strategy: "Additional measures should be taken in large collaborations to increase the recognition of individuals developing and maintaining experiments, computing and software."<sup>3</sup> As a follow-up, a joint ECFA-NuPECC-APPEC working group was installed in July 2019 at the EPS conference in Ghent to address the recognition issue in the broader area of the three corresponding research fields, with first activities started at the JENAS meeting in Oct of that year, in Orsay. The group includes Karl-Heinz Kampert and Emmanuel Gangler for APPEC, Bogna Kubik, Djamel Boumediene and Marcel Merk for ECFA, and Eberhard Widmann, Gerda Neyens and Nasser Kalantar for NuPECC. The specific goals of this working group included to raise awareness of the issue and the existence of a JENAS-wide reflexion, to exchange and discuss best practices with the collaborations, to reflect on alternative and/or additional procedures, if needed to conduct a second

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<sup>2</sup> ECFA/15/291, "Memorandum on the evaluation of Experimental Particle Physicists", Joint ECFA/HEPP-EPS Document

<sup>3</sup> ["2020 update of the European strategy for Particle Physics. by the European Strategy group"](#)

survey to monitor progress on the topic, and to report back to the ECFA-NuPECC-APPEC community. It was understood from the beginning that the collaborations themselves remain responsible for implementing any recommendations.

### 3. Procedure

The working group started by compiling a list of large collaborations and contact persons for further communications. As a criterion, a minimum of 40 collaborators was applied. From the full list of 81 collaborations that were contacted, 64 responded and participated in (part of) the discussions. This list is given in [Appendix D](#). To be able to hold round-table discussions, plenary meetings with 81 persons were considered impractical and the working group decided to hold discussions independently with each of the three communities (APPEC, ECFA and NuPECC).

A list of questions for discussion was prepared and contact persons of the collaborations were invited to be present in two meetings; an initial explanatory meeting with an immediate feedback discussion, and a second meeting during which the collaboration representatives would provide feedback after having consulted within their respective collaborations. The collaborations representatives were encouraged to organise these consulting discussions in their respective collaborations including discussions with junior scientists. Several of the largest collaborations organised this in dedicated sessions in a collaboration week meeting.

Due to the very large number of collaborations involved, the APPEC community had a slightly different procedure, where the two meetings were held with different collaborations based on their availability, but each meeting addressed the full list of topics above. After the meetings, all collaborations were invited to submit a written response to the questionnaire. Most collaborations participated actively and the list of questions and responses were compiled and summarized by each of the APPEC, ECFA, NuPECC subcommunities independently. This raw material is given in the appendices, for full reference. The answers to the questions include a spectrum of feedback from the collaborations but also show the opinion of a majority. It is noteworthy to stress that the responses exhibited very similar patterns within JENAS communities, and the major driver for differences seemed to relate not to the field, but rather to the size and the stage of completion of the collaborations. It was established that the larger the collaboration is, the more challenging this issue becomes. Large collaborations have been paying attention to various mitigation practices, some of which are either already in place or are being implemented. We address in the next section practices that can be considered by each community of JENAS.

## 4. Discussion with Collaborations

### a. Stating the issues

In our discussions with collaborations several issues were identified that are felt as a downside of working in a large collaboration. As a general rule we observe that the awareness of the recognition issue and efforts to mitigate are mostly present in the largest collaborations. Despite these efforts, we note that the lack of recognition is clearly still most strongly felt in these very large collaborations and that it remains urgent to improve upon the situation. The following issues are reported:

- There is a difficulty in building a CV highlighting individual scientific achievements for further employment, promotions, or fundraising.
- This makes the evaluation of individuals difficult for referees. This is already an issue for referees inside our field, but particularly problematic for outside referees who are unaccustomed to papers with very long authorlists, as well as to shared research contributions that are common in large collaborations.
- A physics measurement is based on large efforts of preparatory work. However, there generally is a lack of attention to technical, software and/or data preparation work that is preparatory work to final physics analysis. This particular work often is not part of journal publications and remains hidden in internal notes. In particular this causes a lack of reward for junior scientists: PhD students and postdocs.
- Timescales involved in collaboration reviewing processes of analyses prior to their publication are taking longer and longer times, and as such often overrun the timescale of a hiring contract of a PhD or postdoc.
- Individuals are not able to take part, or have a too small voice, in decision making processes in the collaboration.
- There is sometimes limited room for individual scientific creativity in the collaboration as a consequence of predefined procedures that were developed by previous analysts. In addition, repetition of existing analysis procedures makes it difficult to show scientific innovation.
- In some collaborations, authors feel insufficient freedom to exploit creativity in presenting (written, oral) science results since a presenter often represents the collaboration's views.

### b. Best Practices

One of the main aims of this working group is to identify practices that enhance individual recognition, which are currently implemented in some collaborations of the JENAS community and which aim to alleviate perceived issues. It would be our recommendation to other collaborations to consider these practices and to

evaluate their applicability within their collaborations. We summarize the most noteworthy or promising here; more specific examples can be found in the feedback from collaborations within the JENAS community as given in the appendices.

- Publications

It is important to stress that every collaboration has given careful thought into its publication rules, and seems satisfied with its own policies which reflect a consensus within the community.

The use of full alphabetical author lists is a widespread practice for very large collaborations. It comes from a long-established tradition to recognize all stages of work within the publication, and to make sure that people involved in the technical work or early stages of an analysis chain get proper recognition.

However, this system makes it difficult for evaluators outside of the collaboration to assess an individual's contribution. Some collaborations have successfully implemented or considered the following promising variants:

- Several collaborations appoint, as corresponding author, a person representing the analysis team. This can be used by the person in question on their CV as a proof of their leadership.
- Some other collaborations allow their publication board to provide a statement as evidence for key-contributors of papers.
- Collaboration-wide publications can include references to theses of the PhD students participating in the published work. The reference could be; "XXX thesis, Univ of YYY".
- For specialized or technical topics, a restricted author list is often used, including only the persons contributing to that specific work.

- Talks & conferences

Talks and conferences are a natural venue for raising individuals' exposure to the scientific community. It is therefore important that the talk attribution reflects some fairness principles, especially in communities for which the number of conferences or results to be presented is scarce. The need to control the communication with respect to some important results has led some collaborations to standardize their talks, especially the very large collaborations. While understandable, this has two drawbacks: this leads to a dissatisfaction of the speakers with respect to the freedom of defining their talk, and for the audience where the standardized content is detrimental to the interest of the talks, and thus diminishes the speaker's exposure.

- Some collaborations reported that they assign talks as much as possible to the individuals doing the actual work. Furthermore, conference invitations are preferably handed over to junior colleagues. Some (smaller) collaborations stimulate juniors to present their own work.
- One practice is to use a ranking method according to that person's contributions to the experiment.
- To mitigate the dissatisfaction of freedom in giving talks, speakers may be given more flexibility and time to explain the physics analysis and methods, instead of presenting a large number of physics results in a limited time of a talk. Smaller collaborations tend to give more freedom to the speakers to define the contents of their talks.
- Various collaborations report the possibility that individuals can pro-actively volunteer/apply for giving talks at conferences.

- **Analysis procedures**

An issue identified especially for juniors and fixed-term contract researchers is that the length of an analysis review, including the internal rules for publication, can lead the publication to be issued significantly later than the end of the contract, which is detrimental for the search of a next academic job. Time planning of internal review procedures should be taken seriously. Prompt internal review feedback should be implemented to avoid unnecessary delays.

- Smaller collaborations sometimes use the time planning of a PhD thesis or postdoc contract as a guide for the planning of the analysis and internal review procedure. This could perhaps be considered as well by relevant committees or responsible persons in large collaborations.
- Results not yet published/unpublished in peer reviewed papers are allowed by some collaborations to be included in PhD theses, which can subsequently be shown at national meetings and schools.

- **Providing information about individuals**

The information about the actual contribution of individuals is usually only available from within the restricted area of collaboration documentation. This often results in precluding external evaluators to correctly assess their contribution. Moreover, the relevant information is not always available in a synthetic form, which engenders difficulties in writing recommendation letters by a senior person from the collaboration.

- One large collaboration reported to have an internal database of individual contributions to technical work, software algorithms, analysis work as well as collaboration tasks, which can be accessed by senior persons writing recommendation letters. This can be considered as a useful practice for large collaborations.
- Alternatively, some collaborations allow applicants to share internal documentation with selection committees for job applications or grant proposals.

- Promoting juniors

Juniors often constitute an important workforce within a collaboration, and the recognition of their work is important for their future careers, in academia or in the industry. Collaborations have tools to promote juniors visibility, networking abilities, and leadership skills. All this should lead to better employability.

- Many collaborations report to give convenorships to postdocs. This is considered as a good practice to recognize their work internally and to let them have an impact in the life of the collaboration. Although not all committees recognize such positions as achievements in science, they can be used to explain that these individuals are selected by the collaboration for visible and leading positions. A good practice is to have the list of convenors publicly available, as well as the scope of their convenorship.
- At the same time, the collaborations should ensure that senior scientists maintain their presence in the working groups, since they need to witness the performance of individual (younger) members.
- Some collaborations have a mentorship program. At this time, we lack feedback to provide further guidance, even if it appears to be a good practice.

- Recognition of technical/software work

Most very large collaborations report that technical or software work is not sufficiently recognized by the community. This issue is paramount for academic careers, where technical/software work is often much less valued than analysis work. The specific recognition of technical/software work is also important for technical careers, and for diversity of professional profiles within collaborations. Even though the large collaborations are aware of the problem, recognition of this issue remains

one of the most urgent issues to improve on. Current mitigation practices include the following:

- Technical/Software papers are generally allowed to be published with shorter author lists, allowing for clear evidence of individual contributions.
- Dedicated prizes for technical/software work are sometimes given, which, if publicly available, can be used to demonstrate achievements.
- A further possibility could be to give more room at conferences for technical/software contributions presented by the specialists.

## ● Governance and Decision making

As the collaborations are responsible for their own policies, the governance is a central place where the recognition of individuals can be addressed.

- A friendly, inclusive and diverse environment is considered important to make sure that every voice is heard.
- One aspect reported by various collaborations is to have early career scientists in important positions including the political collaboration board.
- In addition, some collaborations report to have procedures specifically including junior representation in decision-making processes. In particular procedures to appoint leadership positions in the organisation.

## ● Prizes and awards

Collaborations have many opportunities to reward individuals for their contributions.

In our view, there are two separate categories in this aspect: *rewards*, that should be accessible to any individual who has provided a certain amount of contribution, and *awards*, like prizes, which aim at distinguishing few outstanding individuals.

Not all collaborations see awards as a good practice, as it may induce unnecessary competition among their members, even if awards are an objective sign of recognition for outside evaluators.

- Various prizes and awards are implemented in collaborations and symposia in JENAS communities. When care is taken to ensure a transparent organisation, they are generally well appreciated and the organisation around them, typically involving very senior members in the field, is well received. Popular categories are the "thesis prize", "young scientist prize", and a "technical award". It is

helpful if the prize is announced on a public page (like the webpage of the collaboration) for future reference of the laureate.

- Some collaborations are combining their prizes within a given field, with the advantage of increased exposures of awardees within the field.
- A particularly interesting implementation in one collaboration was a “reverse” junior prize: a junior committee awarding the best senior contribution to the collaboration.

Contrary to awards, rewards are accessible to many individuals. Common rewards can include being scheduled for talks at a conference, being part of the author list; these awards are discussed in the corresponding section of this document.

- In addition, some collaborations have implemented a “builder” or alike status to recognize important infrastructure work. In our nomenclature, this is more a reward than an award.

### c. Controversial items and daring thoughts

While the section above reports and discusses what appears to be good practices already implemented by some collaborations, some ideas raised during the discussion did not reach a consensus, or did not seem broadly or easily applicable by all collaborations. We acknowledge that the proposals described in this section might not be needed for smaller collaborations, while their implementation may raise issues in larger collaborations. We still think that the underlying issues are worth being mitigated, and we present them for consideration by the community.

- Internal documentation

A specific topic that was debated is the publication of internal documentation supporting publications, often referred to as analysis notes. On the one hand, these documents contain a wealth of information as well as details on individual contributions; on the other hand, collaborations report valid reasons for not wanting to publish them. Reported issues are that they are less well prepared texts prone to include some mistakes, they allow competing experiments to “scoop” them, and perhaps most importantly may lead to internal competition to be able to write these notes. One large collaboration performed a dedicated study of publishing limited authorship papers, but concluded, after an open forum discussion, that the collaboration did not support the idea.

During the discussions it was noted by one collaboration that the concept of keeping information internal can be considered in tension with the policy of open science. It was mentioned that the research is done with publicly funded research infrastructure. There is a tendency to make technical instrumentation documentation public and recently also (reconstruction) software code, however for analyses there are strong hesitations by almost all collaborations.

- Conference talks

At conferences, speakers represent their collaboration and as a consequence the contents of their talks require approval by the collaboration (usually by the corresponding working group followed by a collaboration-wide possibility to comment). Some speakers complain about the lack of freedom to define the contents of their talk, which often are requested to be densely populated with new results of the working group and leave little time for explanations. In large collaborations, there tends to be a cultural issue of a fear of presenting wrong results, which makes them more conservative in their announcements.

A recent, and praiseworthy, initiative is that dedicated sessions are organized to specifically give visibility to young scientists, but this does not solve the “contents” issue. The main issue remains and that is that the speakers “represent” their collaboration.

We invite the community to consider that conference talks not only serve to represent the collaboration and report, but also to present individual context of scientific results. We therefore propose an option to differentiate between talks at conferences: in addition to the normal “Speaker XXX representing collaboration YYY”, two new types of presentations could be added, both of which could be of interest for young speakers. The proposal includes the following options:

- “Speaker presenting work based on data from the YYY experiment”, including personal work and interpretations
- “Explanatory talk on the measurement of XXX”
- In addition, collaborations can encourage individuals to give talks at institutes/universities outside the usual conferences. As they occur locally, there is more freedom for the speaker to determine the contents.

- Publications

The publication lists remains the most difficult aspect to make a comparison between individuals of large and small collaborations; in particular if the reviewing committee consists of people outside the field of the applicant. Often papers with many hundreds of authors are simply not considered. It would be beneficial to individuals to have proof of written work that is reviewed by others. Currently this wealth of information exists in the form of, often extensively-documented but not carefully-formulated, analysis notes. We recognize the hesitation of collaborations to publish these notes. Moreover, review procedures in collaborations are already lengthy and should not be further extended. Alternatively, we regret seeing a wealth of information that is not shared with the public, an issue that may also be in contradiction with the concept of open data. We recommend the community to continue discussions around the topic of publishing, perhaps only digitally, backup information of more detailed work in the form of short author lists.

Technical papers on technology used in subsystems of large experiments are often published by sub-collaborations. More recently, this is also the case for computing and software algorithms used in the experiments. This is not in contradiction with the policy of most collaborations where end-of-chain physics results are published by the whole collaborations.

## 5. Conclusions

The difficulty of recognizing individual scientific contributions in large collaborations has increased over time together with the growth in size of these collaborations. A leading problem is the evaluation of individuals for positions or promotions, in particular by committees outside our own communities, although similar problems are present even within our respective communities.

In this report discussions with a large number of collaborations resulted in various currently-existing “best practices” that can be considered for implementation by individual collaborations, according to their needs or desires. However, we strongly feel that the problem has become sufficiently widespread and urgent that more drastic measures and even a change of culture may be required. Some of those are mentioned in the discussions above.

We encourage the community, in particular the management of the larger collaborations, to carefully consider best practices that are in use elsewhere in the field and evaluate their applicability in their own collaboration. In particular we hope that some practices mentioned above may be implemented to alleviate the recognition issue.

Conference organizers also have a role to play to implement best practices that can help the recognition of individuals, as they are a natural venue especially for younger people to broaden their scientific network and to get known by the larger community beyond their current collaboration.

We encourage the community, when confronted with external evaluation, to keep explaining what are the tracers of recognition within the JENAS community, and what long author lists mean.

Finally, we hope that this document will also help other communities to understand how evaluation is performed in our field.

# Appendices

## Appendix A: Summary of APPEC survey

### Introduction

This report is a summary of the answers received to a survey conducted from December 2020 to February 2021 by the APPEC steering committee of the JENAS working group about recognition of individual achievements in large collaborations. The answers from the survey are supplemented with notes from the live discussion we held with collaboration delegates in July 2020.

Given the open nature of questions, this summary report is by no means meant to be quantitative, but the goal is rather to enumerate the various approaches, without taking sides. Specific recommendations will be the subject of the final joint JENAS working group report.

From the 40 collaborations initially identified as relevant for the issue, 30 have expressed an interest in participating in the APPEC working group of recognition of individuals in large collaboration, 27 have participated in the discussions and 25 have answered the questionnaire. This spans almost all subfields covered by APPEC, with the exception of gravitational waves, totalling more than 6000 collaboration members. In addition, we have partial information from 4 more large collaborations who sent delegates to our meeting in July, representing more than 3000 individuals. Getting answers from larger collaborations proved to be more challenging than for smaller ones.

The collaborations who answered were quite diverse in size, ranging from 60 to 1000 members, and also represented a diversity in development stages, from experiments still in their early phases up to completed experiments. They also represented the diversity of APPEC scientific fields and spanned different practices with respect to publications. They also ranged a diversity of types of answers, from personal answers - which were also called for - up to a full discussion within the collaborations.

We would like to warmly thank the collaboration delegates for their precious feedback, we received very detailed answers which proved to be a wealth of resources for comparing the internals of collaboration practices.

## General Feedback

### 1. Is there a potential problem with recognition of individuals in your collaboration?

Almost all collaborations recognize this is a hot topic, even if a small half of them don't identify specific issues today within their own collaboration.

A way of paying attention to the issue is to conduct climate surveys within the collaboration, which can be very instructive for the management. For the few who reported internal and not always representative surveys, about 50% of the respondents are satisfied with the current situation, while the other 50% express concerns.

The consensus is that within the collaboration themselves, there are little to no issue and many practices to mitigate them:

- Regular meetings help people to know the contributions and commitment of the individuals
- Promoting the work of juniors can be organized at a collaboration level and highlighted during collaboration events
- Senior national representatives can ensure that important but less visible work is known from the executive committees
- Some attention has to be given during teleconferences to ensure everyone can contribute.

However, strong concerns are expressed for the recognition of individuals outside the collaboration. While there is a variety of career paths and needs, concerns are expressed especially in two main areas: technical work, and early stage careers. Turning the internal recognition into external currency is a true challenge.

A specific concern was raised for communities with a mix of astronomers and HEP physicists, related to the recognition of their members within the other community or even in their home institutions. For instance, some universities require first author papers to allow the PhD thesis defence, or some academic systems rely heavily on the ranking within the list of authors.

### 2. Does your collaboration consider it an important/urgent topic to be discussed and addressed ?

Almost all collaborations consider this topic being important, the only exception being either smaller collaborations, or collaboration near their end lifetime. It is highlighted that senior PIs have a role to play to ensure the topic is addressed within their collaborations.

Outside the collaborations, junior researchers associations can also be a forum where these topics are discussed.

### 3. Do you already have a forum to discuss this?

Despite recognizing the importance of this issue, a majority of collaborations have no dedicated forum to discuss this, the executive instances being the natural place to raise general issues, including this one.

Some collaborations have started early career forums, this is a recent trend. Some of them have also elected representatives of juniors who are invited to management meetings.

Diversity Equity and Inclusion forums are also being developed and can address these issues.

Finally, there are also dedicated sessions about this issue during collaboration meetings.

### 4. Can you provide feedback on "best practices" that you already have implemented to give visibility and recognition to the members of your collaboration.

Here we report best practices that do not fall into other categories in this questionnaire. Other good practices reported by the collaborations will be detailed in the following sections.

Healthy governance is one of the keys for good practices.

- Some governance policies explicitly call for paying attention to the recognition and visibility of individual collaboration members.
- Active early career researcher organization within collaboration and ensuring that juniors are appointed in important committees. More and more collaborations are developing such forums.
- Promoting a friendly, inclusive and diverse environment. Two tools are being deployed: written code of conducts, and DEI working groups.
- Pay attention to internal communication, especially within very large consortia.

## Specific Feedback:

### 1. What does your collaboration think about the conclusions of the ECFA report ?

The consensus is that the report was very well received and appreciated by people familiar with it. Such a report raises awareness of the issue of recognition. The conclusions derived for the ECFA community seem also to be valid within APPEC, especially for the largest collaborations, even if the survey was not widespread in this community. Many collaborations would be in favor of a second survey including them: a critical analysis review between fields could have been instructive.

### 2. Were some important issues perhaps not addressed ?

Most collaborations have found the report quite exhaustive, even if many haven't answered this question or have found it difficult to answer as a collaboration since the report was not widely circulated.

A few salients suggestions are:

- Include free fields in order to allow free expression, especially from juniors who may raise other important issues not anticipated by the organizing committee.
- Provide also other breakdowns of statistics, for instance construction phase vs. analysis, or the role of the fraction of non-permanent people.
- The issue of recognition from funding agencies (for instance when applying for grants) was not addressed.

### 3. Which system do you use for author lists (alphabetical, opt-in, opt-out, other)? Is it generally appreciated?

All but one collaboration use alphabetical order for their publications. This comes with many different flavors.

Some collaborations use exclusively alphabetical order, while some others have a 2 tier publication system, with collaboration papers using alphabetical order, and specialized or technical or R&D papers which use a different system. The latter can be a set or primary authors followed by the full list, or a restricted list of authors. What constitutes a collaboration paper is also subject to internal policies, and can range from all analysis papers to only a handful of key papers.

Opt-in, opt-out, inclusion of approved additional authors, set list of "collaboration architects", incentivization of young people to opt in are also common practices.

Regarding the corresponding author, the majority of collaborations prefer a generic address, linked to the spokesperson. Some collaborations set the corresponding author as the one who had the most direct contribution.

One issue for some collaborations is the reduced total number of papers. This does not warrant everyone having adequate visibility. This is especially true in the early stages of a collaboration, but can also be the case when collaborations only publish final results.

Another identified issue is that a purely alphabetical author list or a single corresponding author hides the exact contributions of non-corresponding authors. In some cases, there may also be more than 1 working group which proves to be essential to a paper.

As a mitigation, in some collaborations, authors have to state their individual contribution within a paper, the publication committee maintains the list of the particular work linked to publications.

It is striking that despite the wide variety of practices, all collaborations state that their own system is well appreciated within the collaboration, apart from a few cases where a minority disagrees with their collaboration policy.

Reported good practices:<sup>4</sup>

- The collaborations consider good practice to take into account the active contributions to select corresponding authors, when not the spokesperson.
- Tracking individuals' contribution within publications helps for recognition. This can be done either providing dedicated acknowledgement lines or maintaining a list of contributions within the collaboration, that can be used to address enquiries or published on a website.
- Having a restricted number of authors for some topical papers helps to increase the visibility of the authors.

#### 4. Feedback on conference talks

##### a. Which system do you use for assigning conference talks?

All collaborations have or are implementing a Speaker's committee or equivalent. In some collaborations the Speaker's committee has a responsibility for being proactive in obtaining conference talks and posters on behalf of the collaboration. Interaction with conference organizers can also help to promote plenary talks by younger researchers. When it applies, the working group conveners are solicited to define which are the key results to be presented.

The attribution of talks varies widely depending on the collaboration. In some collaborations, the pressure is low, and people applying for talks is sufficient, with little or no conflicts. When priorities have to be set, there is a tradeoff between preference to expertise and amount of personal work, and fairness criteria, including age, gender, institute balance and/or rotation of

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<sup>4</sup> This comes from the answers of question 4 from the general questions.

talks. Other common criteria include giving priority depending on job situation, or priority to early career.

Regarding invited talks, practices vary also : in some collaborations, it is expected that invited speakers defer their invitation to the Speaker's committee. Generally, invited talks are allocated to more experienced researchers, or recognized young researchers.

Reported good practices:

- In attributing talks, collaborations consider good practice to give priority to young people for presenting at conferences, especially when they play an active role. This should also include higher profile talks, even if some organizing committees would prefer talks by seniors.
- Also, rotation rules for speakers as well as transparent procedures are deemed important.

#### b. How are talks prepared within the collaboration?

A large majority of collaborations have put in place some level of vetting for the presentations. In a large fraction of cases, the process involves the speaker preparing their slides, which are then subject to review by a collaboration body. This can be the Speaker's committee or some management authority, the working group, or in many cases the full collaboration. Some collaborations also require rehearsals, especially for the most important talks.

Many collaborations have a repository of approved plots and past talks, and any new result should be approved before being presented.

#### c. Do people feel there is enough freedom to determine the contents of their talk?

Apart from one collaboration which had very strict rules for official talks, there is no report of discontent, the rules seem to be very well accepted (one collaboration conducted a survey which led to a 80% of yes in this criteria) and people feel free when preparing their talks.

## 5. Feedback on analysis notes

### a. How do you handle analysis notes ?

The level of information entering the analysis note category can vary from material in a wiki page to a fully-fledged pdf. While a few collaborations do not have analysis notes in order to encourage focussing on publications, many of them require analysis notes as the basis for future publications. These analysis notes contain all needed material for internal review, and are strictly internal to the collaborations.

One identified issue with analysis notes is that many are started, but only a few are finished as it is more rewarding to work directly in preparing publications.

b. What do you think of making analysis notes (limited author list of analysis proponents) open to the public (e.g. via Arxiv)?

A large majority of collaborations are against opening their analysis notes publicly. Some collaborations are not against, but all highlight that this would require a lot of care. One possible solution could be to release specific documents upon request after review by collaboration instances.

One collaboration advertises the author list only.

c. What are the pros and cons of doing that?

Pros:

- Helps the visibility of individuals' contributions. In particular for younger scientists when publications procedures are long with respect to people's contracts durations.
- Make supporting material for an analysis available once the main publication is out.
- May help in the areas where it is particularly difficult to publish.

Cons:

- Results in analysis notes are often in preliminary form, not reviewed by the collaboration, and can be misleading for the outside.
- They also contain a high level of technicalities or collaboration jargon or material unsuited for public diffusion.
- This would require collaboration work that would be better employed for publishing papers than analysis notes.
- This can only be viable with a low reviewing threshold.
- Some collaborations already have a mechanism in place to publish technical papers.
- This would conflict with collaboration publication rules.
- This is not deemed necessary to improve individual recognition.

d. Would you object to a system where statistics can be collected for the proponents of ana-notes?

On this question, we received mixed answers, ranging from enthusiasm to strong objections.

Important considerations points were raised:

- Gathering statistics may lead to biased comparisons between different collaborations due to different practices regarding analysis notes.
- This would incentivize people to focus on writing a multiplication of analysis notes rather than doing the actual work. Statistics may thus be biased with respect to the actual quality of the work.
- This would require some level of collaboration-wide endorsement and quality control of analysis notes.

Reported good practices:

- Maintaining an indexed collection of internal analysis notes with individual's contributions
- Publish on collaboration's public website information related to internal reports

e. Would it be useful to introduce a JENAS wide system?

Without more precision about the specifics of the system, most collaborations do not provide a firm answer. This is related also to the list of Cons listed above.

## 6. Feedback on Prizes and Awards

a. What is your opinion of prizes and awards?

Some collaborations have prize systems, some collaborations are still in their preparatory phase, and have not yet made their policies on this topic, some collaborations after circulating the idea decided to not implement them.

The neutrino astronomy community has organized a Global Neutrino Network prize, awarded in common between experiments. This is seen as a good way to broaden the scope of prizes within a community.

The most usual prize categories are: PhD student prizes, outstanding junior researcher prizes, or prizes for technical achievements. One collaboration has also a reverse senior prize, awarded by the juniors. One collaboration awards low-level prizes for internal use only : poster prizes or data challenge prizes. They are meant to incentivize people rather than recognizing "the best".

In general, awarding prizes is considered good for the recognition of individuals outside their collaboration. Some caveats have also been expressed:

- Prizes have to be well organized in order to avoid tensions:
  - There is a danger of singling out individuals in an otherwise team effort. This may disrupt the sense of overall good.

- Prizes may be subject to lobbying.
- They are not seen as so useful in small collaborations.
- The selectivity of internal prizes is not clear from the outside.
- Their impact is not clear when it comes to job applications.

About external prizes, those ones do not seem useful: there are not so many of them, and they tend to go to people who already have achieved recognition.

Reported good practices:

When awarding outstanding technical work awards or junior prizes, the results have to be made public.

- b. Do you differentiate between awards (a prize for “the best”) and “rewards” (a prize for “an achievement” – no selection).

While many collaborations understand the difference, few implement it in practice. The difference between these categories is not always clear, and one should pay attention to definitions. The nomenclature award vs reward itself is confusing, and what we define here as rewards is sometimes called award by collaborations, and never reward.

Collaborations who express a preference prefer rewards that are based on absolute achievements rather than the competitive approach (called awards here).

Infrastructure rewards are not always made public to the outside.

Reported good practices:

Having “rewards” to recognize infrastructure work : called “construction effort award”, “project scientist”, “builder status”, “impact award for service-related contribution”...

## 7. One way to recognize achievement is appointing people to responsible positions (board member, conveners, reviewer etc.).

- a. How does that work in practice in your collaboration?

Procedures vary widely between collaborations. The two main models are the closed one, where the spokesperson or the institutional board carry out their searches to fill positions, and the open one, where there is a broad call issued to the collaboration. The latter is welcomed by early career scientists.

For working group or task leadership, many collaborations point out that the primary purpose is to fill in a role, and that recognition is a side effect of it. For these appointments, previous recognition is still one criteria which is considered, along with others (for instance gender /

country balance / scientific background / expertise/ career needs...). Juniors may be appointed at these positions, one collaboration practices a co-chair system with a pair junior/senior. The effective appointment at these positions is never voted by the collaboration at large, and subject to spokesperson or executive body decisions.

Collaboration board and spokesperson nomination practices vary too, and are set by collaboration rules. Some collaborations go for a full voting model, while for others the institutional board is set by countries, and the spokesperson is only voted by the institutional board. Many models are seen between those two extremes.

One caveat about appointing juniors in these positions is that they can be a burden and time demanding, which may not be completely helpful for their careers.

Finally, some collaboration points out the importance of rotation in positions of responsibility. One caveat is that agencies tend to prefer longer term appointed positions.

Reported good practices:

- Appoint responsibilities according to expertise and real work done
- Give responsibilities to juniors scientists at their level of expertise (level2 convener positions, subtask leadership, co-chairs)
- Have Early Career Scientists representatives in the governance of the collaboration.

b. Does it have a political aspect e.g. equal share between countries?

While the vast majority of respondents acknowledge the presence of a political aspect, this is generally not seen as an impediment when it comes to the quality of the actual nominations.

The higher political bodies of the collaboration have usually set rules about country balances. For the convener positions, the dominant attitude is to appoint skilled people, while at the same time paying attention to representativity. It seems like a satisfactory model. One collaboration points out the role of their EDI committee to survey the diversity and representativeness at various positions and committees.

8. Analysis reviews are sometimes lengthy procedures that take longer than the job contract of individuals doing the analysis, such that papers are not ready to be published or event results unblinded before graduation or end of contract. Is this an issue? If so, is there a mechanism to deal with that?

The long delays for publications is a problem recognized by the collaborations. This is especially unavoidable when there are only a few papers or long publication processes to ensure the quality of results.

Mitigation strategies include:

- Researchers remain members of the collaboration for a typical duration of time of 1 year after leaving. This may be made longer in some cases, for instance for significant contributions, or to allow for the completion of a given analysis.
- They will still be authors of the publication they initiated, even after the 1 year period or if they leave the field. Double affiliation with the new institution is welcomed.
- Be strict about internal reviews deadlines. Start early-on analysis reviews.
- Continuity of work is essential: this can be the responsibility of the PI to ensure that someone else can take up the work after the junior has left. Some collaborations impose that the work is fully documented early on.
- Ensure juniors have publications: make sure every PhD can publish something as part of their thesis, even if it is not their major contribution. Make sure that major papers are accompanied by smaller technically focussed papers.
- Use conferences to acknowledge the work done.

9. Do you have specific policies or practices to promote the work of juniors?

Many practices like awards or convener positions have been discussed before. Other practices include (with some of them coming from the Good Practices question):

- Encourage juniors to apply for conference talks and give them priority ; provide them support for the preparation.
- Support them for being 1st or corresponding authors in publication, give them responsibilities for analysis or hardware tasks.
- Give them the opportunity to present at collaboration meetings, including plenary talks. Give them credit when citing their work. Organize lightning talks.
- Have juniors participating in the collaboration governance: junior representatives in the executive board, have an early career committee and EDI committee, and/or appoint them in committees whenever possible.

- Have them give collaboration-wide training courses in their field of expertise. This is also beneficial to juniors attendees.
- Organize mentorship within the collaboration. PhD students naturally have mentors, this is not always the case for postdocs.
- Highlight their contributions to outreach.
- Include junior statements and interviews for press releases.
- Feature PHD students defending their thesis on social media.
- Support them with recommendation letters.

## 10. Do you have something in place for recognition of work on technical issues?

Some collaborations have no specific mechanism to recognize the work on technical issues.

For recognition within the collaboration the approaches followed are:

- Discuss technical work at collaboration meetings, and give credit to people doing technical work.
- Have technical notes.
- Ensure rotation of responsibilities.

Recognition outside the collaboration is made through:

- Different publication rules for technical papers: shorter author lists, allowing for 1st authors
- Ensuring that the technical team signs all collaboration-wide publications.
- Have a dedicated prize, or allow giving collaboration prizes to technical work.
- Write recommendation letters.

## 11. What do you put in place to help the recognition of individuals by members external to the collaboration (for instance for their career advancement) ?

Helping the recognition with the traditional academic markers that are publications, conferences, talks, prizes, and giving responsibilities has been discussed before.

In addition, providing detailed recommendation letters with relevant achievements and skills is essential. An interesting reported possibility could be to have a group of seniors which provide answers to inquiries, this would help to tailor the answers to the actual needs of the position to be filled.

Some care should be given to promote bright people and not only people with more social abilities.

Reported good practices:

The spokesperson is writing the recommendation letter, certifying the work contributed to the collaboration. Task leaders have to answer requests for information.

Mentioning formal roles in the collaboration website, sometimes accompanied by a full listing of conference talk assignments.

## 12. Is there a way for an external referee to assess what a convenership entails ?

While the majority of collaboration still resort to letters of recommendation or enquiries to spokesperson or group leaders, an increasing number of them put detailed information in their website, or are considering it.

## 13. Are specific measures in place to include an individual's opinion in decision making processes?

Only a few collaborations don't have measures to seek for individuals' opinions beyond the circle of senior management.

In some collaborations, the discussions are preferentially conducted through institutional board representatives or through major management bodies, which are responsible for voicing questions and concerns arising from their communities.

A majority of collaboration welcome more open processes, encouraging continuous discussion through one or more of the following:

- Holding open meetings or general calls on important issues before taking decisions.
- Organizing collaboration-wide surveys
- Setting up anonymous feedback channels to spokesperson or collaboration ombudspersons
- Having regular interactions between early career representatives and management

In some collaborations, the spokespersons or even the collaboration council positions are filled after a vote by the entire collaboration.

## Appendix B: Summary of ECFA survey

A total of 14 collaborations were invited to participate in the discussions on recognition for individuals in large collaborations. A few smaller collaborations took part in the initial discussion rounds, but stepped out later on in the process after they had indicated that there was no major issue in their collaboration. Ten collaborations participated in the full process including providing feedback after consulting within their respective collaborations. The feedback is collected from material provided by the collaborations, as well as from two lively discussion sessions. The answers described below respect a consensus or include the spectrum of differences.

The following general observations were made:

- a) Apart from one exception all collaborations admitted the importance of the recognition topic and were pleased that it was addressed. Many expressed an interest to learn about the outcome of the considerations and asked to be kept in the loop for any coordinated actions.
- b) There is a general awareness of the issue of individual recognition, and it seems to be mainly affecting the larger collaborations. The detail of the participation in the discussion and the detail of the feedback provided was also largest in these large collaborations. Although the reported issue seems to scale with the size of the collaboration, it is interesting to observe that the amount of measures put in place to mitigate the problem is also larger for the largest collaborations.
- c) A general worry for large collaborations is related to the fact that research includes a long collaborative chain of work, of which the final analysis at the end of the chain is most visible. Initiatives to stimulate recognition that may lead to increased internal competition should be avoided. In particular there is a fear for less recognition of technical work; the largest collaborations fear and want to prevent the perception of a two-tiered system of physicists.
- d) Whereas most urgency for recognition seems to be for early career scientists (PhD, postdoc) the same issue often holds for furthering the career of junior academics.

### General Feedback

1. Is there a potential problem with recognition of individuals in your collaboration?

Yes, there are many challenges associated with large collaborations related to both recognition internally in the experiment, as well as externally to the physics community at large. In particular, technical work (software, detector work) is frequently mentioned as problematic. In this respect the label "service work" used by collaborations is already indicative of the problem.

Generally, the relevance of the recognition issue scales with the size of the collaboration. Interestingly, the amount of discussion and detail of the feedback received, which we interpret as the attention given to find solutions, was also roughly proportional to the size of the collaboration. Smaller collaborations report that the aspect of recognition of individuals is often approached pragmatically: no formal measures. An example is that one relatively small collaboration reported that the timescale of physics analyses is matched to the timescale of PhD theses, rather than having the individual analyst adapt to the collaboration.

2. Does your collaboration consider it an important/urgent topic to be discussed and addressed ?

Yes, there is a rising awareness. Although various measures have been implemented the topic requires ongoing attention. In particular early career persons and technical contributions are mentioned repeatedly by most collaborations. For smaller size collaborations individual recognition is reported to be less problematic.

3. Do you already have a forum to discuss this?

Apart from one exception there are no forums specifically dedicated to recognition, however the larger collaborations have an early career scientist board, which typically advises the collaboration management. Meetings and events of early career forums are organised and surveys are being done. In these forums attention is paid to the interests of early career scientists as well as to the subject of inclusion.

4. Can you provide feedback on "best practices" that you already have implemented to give visibility and recognition to the members of your collaboration?

A number of practices are being considered and several have already been put in place. Noteworthy examples of individual collaborations are:

- a) Creating a dedicated task force on the topic of recognition,
- b) Detailing contributions of individual authors in internal notes or database,
- c) Maintaining reconstruction software in a public repository,
- d) Evaluating an initiative to consider limited author Monte Carlo based publications.

Furthermore, there are initiatives to help early career scientists in particular. Examples that were reported are:

- a) Giving a prominent role to young scientists in weekly plenary collaboration meetings, both in contributing to them as wells as organising them,

- b) Creating awards (thesis award, early career award, achievement award, etc). Interestingly, a warning was expressed to the naming of these awards may be important as detector related awards may be perceived as "second-tier" by the community,
- c) Requesting senior (management) scientists to authenticate contributions of individuals and write recommendation letters detailing those contributions,
- d) Reviewing procedures of analysis, publication processes and talk allocation processes. Analyses and review procedures in large collaborations are lengthy and presentations have (too) closely prescribed contents.

## Specific Feedback

### 1. What does your collaboration think about the conclusions of the ECFA report ?

As a general remark the collaborations were happy the recognition issue is addressed. The results were concerning but perhaps not surprising to many.

A particular worry was the dissatisfaction that was expressed for lack of opportunity to show creativity and innovation in conference talks. Some collaborations report to look into that.

A further noteworthy worry is the difficulty of providing sufficient information to non-HEP committees to have individual scientific work assessed. It was felt that a mechanism needs to be put in place for this purpose, eg. to explain to the non-HEP community what it means to be a convenor, how author lists are formed, etc.

In some experiments the ECFA report triggered a review on the talk allocation process and in one collaboration an initiative to consider limited authorship papers.

### 2. Were some important issues perhaps not addressed ?

The main item reported as not being addressed was transparency of appointment processes. While these are usually transparent for the top collaboration-positions with an election procedure, they remain less clear for (sub-) convenorship positions. Some worry was felt that various non-scientific biases may be present in the appointment procedures.

3. Which system do you use for author lists (alphabetical, opt-in, opt-out, other)? Is it generally appreciated?

Physics papers are published using alphabetical ordering. The motivation is that all scientific results are based on a long collaborative chain of human endeavor including construction, installation, calibration of detectors, development of computing and software methods to reconstruct detector information into physics objects, and performing the offline physics analyses and interpretation. All members are considered equal shareholders of the data. Generally the full alphabetical author list is considered a strength and asset of the field and there is no desire to change it. There are possibilities for opt-in (special contributions) or opt-out, in case it is desired.

One collaboration evaluated the idea of limited authorship of papers using simulated data. Although benefits of allowing such papers were recognized, the study group advised against the implementation for collaborative reasons; mainly being a potential disruption of the collaborative spirit. Other collaborations have implemented publication of technical papers with limited author lists, perhaps making use of partial data sets or Monte Carlo data.

4. Feedback on conference talks

a. Which system do you use for assigning conference talks?

Large collaborations tend to use ranking systems. A participatory approach using a volunteering system is put in place in various collaborations, combining the talk-request of candidates with the information of a ranking system. The decision to appoint a speaker is often made by a dedicated committee considering additional input from project leaders, activity coordinators and institute leaders. Furthermore, the need for exposure and particular technical expertise of specific speakers is considered by such a committee.

It is noted that in smaller collaborations there seem to be relatively more opportunities for presenters to report at conferences. For them, often more than one presentation per year is possible.

b. How are talks prepared within the collaboration?

In the largest collaborations speakers are requested to follow guidelines and the talks are prepared in close collaboration with experts. Speakers have the flexibility to construct the flow of the talk, but plots and results must be approved by the expert or the collaboration. Rehearsals are mandatory and slides with modifications required by the collaboration should be posted before the conference.

The smaller collaborations tend to allow more freedom. Talks are prepared freely by individuals and in the case of PhD students the role of expert is filled in by the supervisor of the student.

- c. Do people feel there is enough freedom to determine the contents of their talk?

There is a balance between freedom of the speaker (eg to select topics) and the recognition of significant work made by colleagues. For talks with submitted abstract the contents is more or less fixed before the speaker is selected.

Some collaborations report that further feedback from their collaboration community is required to evaluate whether there actually is unhappiness about this topic.

It is also noted that conferences ask for a lot of information to be compressed in limited time. This leads to dense presentations with little room for explanations.

## 5. Feedback on analysis notes

- a. How do you handle analysis notes ?

Analysis notes are understood to be the extensive and complete internal documentation supporting the much shorter publications. They have a limited list of authors doing the analysis and are used in internal review procedures. As such, these analysis notes potentially could be used as a source for crediting individual work.

- b. What do you think of making analysis notes (limited author list of analysis proponents) open to the public (e.g. via Arxiv)?

Although a few collaborations allow publication of analysis notes with a limited authorlist, most collaborations are not in favour.

- c. What are the pros and cons of doing that?

Pro's:

- It would provide the outside community a more detailed view of the work,
- It would give the authors more visibility,
- It would lead to better written internal documentation.

Con's:

- Mistakes would be out in the open,

- It would allow competition to “scoop” physics results,
- It would lead to internal competition between people doing analysis and people working on the detector, since the latter would not get similar visibility.

d. Would you object to a system where statistics can be collected for the proponents of ana-notes?

Various collaborations differ in their opinions. The reason against collecting statistics is mainly the feeling that internal notes should not be used for this purpose. The recognition can be obtained in other ways: conference talks, the role of ‘corresponding author’, recommendation letters etc. Similar arguments play a role as in the discussion of limited author papers.

However, most collaborations would support the idea of collecting statistics under the provision that the collaboration remains in charge on which information is collected and shared.

e. Would it be useful to introduce a JENAS wide system?

The collaborations that are open to the idea state that this should be preceded by a pilot project getting “real-world” experience.

## 6. Feedback on Prizes and Awards

a. What is your opinion of prizes and awards?

The largest (LHC) collaborations all have schemes in place for awarding prizes. The majority of the prizes are aimed at young scientists typically including a thesis prize, outstanding contributions, early career prize, etc. They also have prizes dedicated to technical work, as it is felt that recognition is urgently needed.

Alternatively, smaller collaborations tend to not have prizes, where their main argument is that they want to prevent internal competition. The collaborations that have a procedure in place are generally happy with the procedure followed to select the winner.

Some collaborations pointed out that giving a person a responsible position in the collaboration should also be seen as an award.

- b. Do you differentiate between awards (a prize for “the best”) and “rewards” (a prize for “an achievement” – no selection).

There were no reports of collaborations differentiating between awards and rewards. The issue has not been considered. On the other hand, some collaborations give prizes to multiple candidates or small teams of researchers.

7. One way to recognize achievement is appointing people to responsible positions (board member, conveners, reviewer etc.).

- a. How does that work in practice in your collaboration?

The procedures in use for appointing leadership positions in collaborations vary. A few collaborations reported that their procedures are currently being evaluated.

Generally speaking, the following procedures are followed:

- a) Spokesperson, Collab Board chair, Physics coordinator: a search committee produces a shortlist after consulting the collaboration, which is followed by an election in the collaboration or the Collab Board.
- b) Detector project nominations are made in consultation with the institutes represented in the relevant project community, followed by ratification in the Collaboration Boards.
- c) Appointments for activity conveners are done by nominations from the collaboration followed by a proposal by relevant coordinator and a ratification in Collaboration Boards.

- b. Does it have a political aspect e.g. equal share between countries?

Diversity and inclusion indeed play a role as statistics are reviewed in Collaboration Board meetings. In addition, there is a strong incentive to take demographic considerations into account, in particular for the appointments of analysis conveners.

8. Analysis reviews are sometimes lengthy procedures that take longer than the job contract of individuals doing the analysis, such that papers are not ready to be published or event results unblinded before graduation or end of contract. Is this an issue? If so, is there a mechanism to deal with that?

The issue seems to be dealt with “naturally” in small collaborations and indeed is often recognized as problematic by large collaborations. Several collaborations report that they have their publication procedure under constant evaluation aiming to achieve a

higher efficiency (i.e. a faster procedure) while maintaining high scientific standards. There are various possibilities to help persons towards the end of their contract:

- a) Papers can be converted to conference notes at an intermediate state of the analysis,
- b) Smaller publications (i.e. partial results) are sometimes encouraged,
- c) Unpublished results can be included in PhD theses, which consequently can be shown at national conferences and schools,
- d) Members remain on the authors list for some time after they leave the collaboration and can even be invited to give a conference talk on the topic.
- e) Rise awareness in analysis groups that prompt reviewing feedback is important.

## 9. Do you have specific policies or practices to promote the work of juniors?

Work of juniors is being promoted in various ways:

- a) Organizing young scientist sessions in the weekly plenary collaboration meetings, in particular encouraging technical topics,
- b) Organizing internal poster sessions including physics analysis as well technical work, final results as well as intermediate, not yet published work,
- c) Dedicated early career sessions in collaboration weeks and conferences,
- d) Technical talks do not go at the cost of “points” in the Speakers Committees before receiving an invitation for a physics talk. This gives improved visibility for (early career) persons working on technical or performance related subjects,
- e) Advising of junior scientists by senior colleagues in a Career Committee,
- f) Direct contact between Spokespersons and a Young Scientist forum.

## 10. Do you have something in place for recognition of work on technical issues?

Collaborations report several practices in place:

- a) First and foremost in large detector projects, the sub-detector papers are often published with a reduced author list, i.e. the “members” of that sub-detector group. However, the number of authors on these papers is usually still too high to reflect individual contributions.
- b) Awards for technical or detector work are in place.
- c) Having code in a public repository allows contributors to point out their work to outsiders,
- d) The existence of an internal appointments/accomplishments database that can be consulted to write recommendation letters,

- e) The appointment for a conference talk by the Speakers Committee often requires a certain amount of technical work done ('service task') or a speaker has a ranking priority proportional to the amount of technical work that is done.
- f) Collaborations report an increasing amount of attention given to technical work in their internal collaboration weeks/meetings.

11. What do you put in place to help the recognition of individuals by members external to the collaboration (for instance for their career advancement) ?

The collaborations recognize that certain roles within the collaboration are not clear or insufficiently appreciated by an outside referee. Seniors asked for a recommendation letter should be aware of that and should carefully explain the tasks or responsibilities arising from the given role. It is however recognized as an important issue to be improved upon. Sometimes collaborations offer advice in the form of guidance/instructions on 'how to write recommendation letters'. One collaboration reported an internal information database from which facts on individual contributions can be obtained to help senior persons to help writing recommendation letters.

12. Is there a way for an external referee to assess what a convenership entails ?

None of the collaborations report to have any procedure in place for this, see also the answer to the previous question. External referees typically have to rely on the information they are offered by the candidate, the recommendation letters or by other committee members during the application process.

13. Are specific measures in place to include an individual's opinion in decision making processes?

Related to appointments and elections the large collaborations all have mechanisms in place that include nomination and election procedures. Some collaborations offer sessions such as "collaboration matters", "open mike", idea-boxes or brainstorming which can include considerations on upcoming policy decisions or topical discussions. Furthermore, surveys are occasionally sent out in collaboration to judge opinions of the collaboration on human aspects of collaboration life.

## Appendix C: Summary of NuPPEC survey

In total 32 collaborations from NuPECC were initially contacted, out of which 22 joined the working group. The questionnaire was answered by 9 collaborations, these answers form the basis of the following analysis.

The nuclear physics landscape in Europe represented within NuPECC consists of two communities, Hadron Physics (HP) and Nuclear Physics (NP) dealing with different levels of structure created by the strong interaction. In general, the feedback received was stronger from Hadron Physics collaborations (ALICE, BM@N, CBM, CLAS, PANDA). From the Nuclear Physics community only 2 smaller collaborations from ISOLDE and the n\_TOF collaboration from CERN, as well as a small collaboration within NUSTAR@FAIR returned a questionnaire. The size of collaborations in HP ranges from 200 to 1000 members, in NP from 50 to 250.

From the answers of the NP collaborations, it seems that the low number of returned questionnaires originates from the fact that the questions are of little relevance to those collaborations that may have a large number of members, but actually consist of a collection of small groups that run individual experiments with their own spokespersons, publishing separately. HP collaborations are more similar to those in particle physics where the collaborations build and run one large detector system with all collaboration partners usually signing all publications. The answers to the questionnaire are therefore divided into two groups.

### General Feedback

1. Is there a potential problem with recognition of individuals in your collaboration?
  - a. HP: Four collaborations agree that it is a problem or a “source of concern” as formulated by two collaborations. One of the collaborations is in the preparation phase and does not yet consider it important.
  - b. NP: the general opinion is that this problem does not exist for the smaller sub-collaborations who answered.
  
2. Does your collaboration consider it an important/urgent topic to be discussed and addressed ?
  - a. HP: Three collaborations see it as urgent, one disagrees but has asked the postdoc and student group for comments; none were communicated to us. The fifth collaboration has many measures in place and is not aware of complaints, hence it does not consider it an urgent problem.
  - b. NP: even though the collaborations think they do not have this problem, they consider it urgent to stay aware and to act proactively to avoid the problem appearing.

### 3. Do you already have a forum to discuss this?

- a. HP: 3 out of 5 collaborations have a junior forum.
- b. NP: no collaboration has a forum at the moment, one stated that they encourage informal discussions.

### 4. Can you provide feedback on "best practices" that you already have implemented to give visibility and recognition to the members of your collaboration?

Several practices are reported for both communities

#### a. Hadron Physics

- i. Presentations at conferences are assigned on the basis of direct contributions of individual collaborators, in one the speakers committee promotes young speakers whenever possible and keeps statistics on young vs. senior speakers.
- ii. One collaboration attests individual contributions officially on request.
- iii. Three collaborations have 1st authorship on conference proceedings. One collaboration also gives 1st authorship of papers to students if it is based on a thesis. Technical publications can have selected authorship for a minority only.
- iv. Internal prizes and awards as well as travel grants are used as a means of recognizing individuals.
- v. Highlight talks during collaboration meetings are awarded as recognition.

#### b. Nuclear Physics

- i. Presentations at conferences are preferentially given to young scientists, supervisors should help young postdocs to get invited talks at conferences, a young speaker award is given at internal meetings and sometimes also at major conferences.
- ii. 1st authorship on papers and proposals for experiments are a common practice among the collaborations, also the possibility to defend proposals in front of committees.

## Specific Feedback

### 1. What does the collaboration think about the conclusions of the ECFA report

- a. HP: in general the report is known by the collaborations and is considered an important input. This is because several of the large collaborations were included in the ECFA survey.

- b. NP: The report was previously not known. All groups answering made the same point as below regarding a lack of consequences.

## 2. Were some important issues perhaps not addressed ?

- a. HP: In general the answer was no.
- b. NP: all collaborations noted one issue that was missed in their opinion: the fact that no consequences, actions or conclusions were presented. The opinion was expressed that the survey is not applicable to small collaborations. Specifically an answer on how to assure the visibility of individuals outside of particle/nuclear physics was found to be missing.

The answers showed that some collaborations did not fully understand the current process, i.e. that the ECFA survey acted as a data collection phase and that our working groups aims at exactly taking the missing 2nd step, analyzing the results and proposing actions.

## 3. Which system do you use for author lists (alphabetical, opt-in, opt-out, other)? Is it generally appreciated?

- a. HP: Most collaborations use alphabetical authorship, one a variant where authorship is alphabetic by institution, within the institution alphabetic by authors. Two collaborations have an opt-in and opt-out scheme, one allows opt-in of past collaborators active during the data taking period. Only one uses a system with max. 4 main authors, afterwards alphabetic ordering.
- b. NP: Here always the first author(s) is(are) the PhD student(s) and/or post-doc researcher(s) who led the experiment and/or analysis, then alphabetic ordering is used. Some collaborations use more than one main author followed by an alphabetic list. One collaboration has an opt-out scheme but not opt-in, although they consider it desirable.

## 4. Feedback on conference talks

- a. Which system do you use for assigning conference talks?
  - i. HP: speakers at conferences are assigned by the management or a dedicated speakers committee, mostly after an internal call for volunteers. Only one collaboration assigns talks based on expertise, number of talks already given, and “age” in order to promote young scientists.
  - ii. NP: assigned within groups, Postdocs and PhD students are encouraged to submit oral presentations.

- b. How are talks prepared within the collaboration?
  - i. HP: Drafts are prepared by the speaker, circulated within the working group or the whole collaboration, and rehearsals take place at least for major conferences.
  - ii. NP: Talks are prepared by the speaker, discussion inside the groups, sometimes rehearsals take place.
- c. Do people feel there is enough freedom to determine the contents of their talk?

Both communities agree that the answer is generally yes. In Hadron Physics only plots approved by the collaboration can be shown. In Nuclear Physics there is an implicit control of the content of talks, usually by the supervisor.

## 5. Feedback on analysis notes

- a. How do you handle analysis notes ?

This question was not explicitly posed to NuPECC collaborations.

- b. What do you think of making analysis notes (limited author list of analysis proponents) open to the public (e.g. via Arxiv)?
  - i. HP: Three collaborations are against this, in one it is under discussion. Some report opposing opinions within the collaboration. One is in favour and has already done it in a few cases.
  - ii. NP: majority of the collaborations do not use analysis notes.
- c. What are the pros and cons of doing that?

Pro's (only from HP):

- give credit to scientists involved in analysis (mostly junior), making notes public provides more information.
- Improved transparency towards peers and the public.

Con's:

- HP: Notes are too lengthy, too technical, too specific and often confidential to each experiment and cannot be understood by outsiders. Notes contain mostly preliminary results that should not be made public. It may delay or even jeopardize the publication of any physics result that was not already published in a paper. An external review would be needed.
- NP: this could delay or even jeopardize "real" publications. A positive impact in the CV is questioned.

- d. Would you object to a system where statistics can be collected for the proponents of ana-notes?

This question was not understood by all collaborations. From HP it was considered problematic for the following reasons: it would need to unravel all individual contributions, and penalize people who do only hardware work. It was also considered meaningless in case not all collaborations participate in such a database.

- e. Would it be useful to introduce a JENAS wide system?

This question was not understood by all collaborations, one positive opinion was expressed, one indifferent one stating this might be only interesting for people changing fields.

## 6. Feedback on prizes and rewards

- a. What is your opinion of prizes and awards
  - i. HP: Internal prizes are mostly existing or planned, mostly PhD prizes including a PhD prize for a theoretical thesis by one collaboration. Leadership roles or conference talks are often considered as being awards. In one case this is done not at collaboration level but at the level of the laboratory, which ensures wider visibility.
  - ii. NP: only one collaboration has internal rewards, some consider it useful to implement, some were considering only external awards and prizes and did not consider the possibility of creating internal ones.
  
- b. Do you differentiate between awards (a prize for “the best”) and “rewards” (a prize for “an achievement” – no selection)

In general no distinction is made, only one collaboration has started discussing it as a follow-up of this questionnaire.

## 7. One way to recognize achievement is appointing people to responsible positions (board member, conveners, reviewer etc.).

- a. How does that work in practice in your collaboration?
  - i. HP: partly exists, especially for the largest collaborations. In one case only for project leaders and project technical coordinators but not yet for analysis as the experiment is in the construction phase. One collaboration clearly stated that for filling responsible positions expertise and dedication

is more important than recognition. They are nominated by boards of the management after consultation with the groups, some are done by elections. Some try to give priority to young scientists if appropriate. One collaboration sees problems with the procedure if responsible persons are leaving.

- ii. NP: in the small collaboration only few such positions exist. Some want to develop this scheme in the future.

- b. Does it have a political aspect e.g. equal share between countries?

Both communities see no political aspects involved in appointing responsible people. One nuclear physics collaboration aims at a broad representation of countries in their boards, but not for responsible people.

- 8. Analysis reviews are sometimes lengthy procedures that take longer than the job contract of individuals doing the analysis, such that papers are not ready to be published or event results unblinded before graduation or end of contract. Is this an issue? If so, is there a mechanism to deal with that?

- a. HP: this is a general issue, but no solution was proposed except to avoid it. It is seen to be the responsibility of local supervisors. Mitigation is done by trying to speed up the internal review process, allowing members to stay on papers for a limited period after they leave and sometimes to opt-in later. Some try to extend the contracts until the analysis is finished.
- b. NP: it is an issue in 3 out of 4 collaborations, it is considered the responsibility of the supervisor. The biggest problem is the loss of students from the community (apparently mostly of them leave science). People can sign papers after leaving, in this case with the affiliation at the time of the experiment. It is partly considered in a more general context of the uncertainty of employment and the need of frequent changes of jobs and country in the early stage of a scientific career. The need for better mentoring and career management is pointed out.

Questions 9 -13 were not included in the NuPECC questionnaire.

## Points raised during meetings with collaborations

We had a two video meetings with NuPECC collaborations where in addition to the points included in the questionnaire the following topics were were raised

## 1. Meeting 8 Jul 2020

The participants were, in general, positive about the initiative although the problem was not clear to all. A few clarifying questions were answered. In particular, smaller collaborations were slightly worried about having new “rules” which are made for larger collaborations and MUST be applied to everyone. We made it clear that the committee would only make a list of best practices and no one is OBLIGED to follow them strictly. Neither will we have an ombuds-function.

The author list was discussed and various collaborations have different rules for this and there seems to be general consensus that the problem is proportional to the size of the collaboration. For the conference and workshops, the same pattern holds.

For the recognition within the community at large and also the recognition outside our community (promotions within faculties etc.), there seems to be the same trends as was observed in the ECFA survey.

From one relatively large collaboration (larger than 200), it was reported that the young people (graduate students and postdocs) recently took the initiative and proposed to have a voting member in the collaboration council (the highest decision-making body). The role of young people in the committees etc. was then emphasized.

Two additional points discussed were:

- In the UK a taxonomy system exists to define contributor roles in scientific scholarly output <https://casrai.org/credit/>.
- A way that is gaining popularity to judge applicants (instead of h-factor or other metrics) is to ask applicants to give 5 selected papers and to describe their contributions. For a proper judgment, interviews are needed with each applicant.

## 2. Meeting 7 Oct 2020

The following points were discussed widely:

### a. Talks at conferences

There were two recommendations:

- i. towards collaborations: invitations received by senior members should preferably be handed over to younger colleagues.
- ii. Towards conference organizers: they should consider the “age” profile of invited speakers, where “age” does not refer to the biological age but to the time spent in science, i.e. after obtaining a PhD.

b. Recommendation letters

A point was raised regarding so-called *un-biased letters* that are recently often asked by funding agencies and usually exclude persons with joint publications. This is problematic as collaboration peers know the contribution of individuals best, which is not the case for outsiders.

c. Recognition by giving formal responsibilities

Assigning formal responsibilities, like leaders of analysis/detector groups, convenors, etc., is considered a best practice for recognition by many collaborations present.

d. Analysis notes and technical notes

In general all the problems appearing in the questionnaire were also discussed here. One point in favour was raised referring to the Open Science Policy of the European Union. The opinion brought forward by one WG member was that this will ultimately require the publication also of analysis notes in the context of open data.

## Appendix D: List of collaborations who provided feedback

Among the 81 collaborations we approached, the following 64 provided valuable feedback to this committee. The authors wish to express their gratitude for their implication and for providing valuable material in the context of this working group.

### APPEC collaborations:

AMS, Antares, Auger, Borexino, CALET, CUORE, DAMIC, DarkSide, Darwin, Einstein Telescope, EUCLID, Gerda, HAWC, HESS, IceCube, JEM-EUSO, Juno, KATRIN, KM3NeT, Legend, LHAASO, Litebird, LSST - DESC, MAGIC, Pamela, Planck, Qubic, Simons Observatory, VIRGO.

### ECFA collaborations:

ATLAS, AWAKE, CALICE, CAST, CMS, COMPASS, DUNE, LHCb, NA61/SHINE, NA62, SoLid.

### NuPECC collaborations:

ACTAR-TPC, AGATA, ALICE, BM@N, CBM, CLAS, CRIS, Galileo, HADES, HISPEC/DESPEC, IDS, Isolde, JEDI, Mass measurement program at GSI/FAIR, MATS/Laspec, Miniball, MPD, NUMEN, n\_TOF, NUSTAR, PANDA, R3B.