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Memorandum on the evaluation of Experimental Particle Physicists

Joint ECFA/HEPP-EPS Document



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### **Motivation and purpose of this document**

The difficulty to properly evaluate particle physicists especially for panel members from other fields of research has increased significantly over the last ten years, due to the growth of the size of experimental collaborations and hence the length of the publication author lists. This trend is not unique to particle physics (also known as High-Energy Physics, or HEP) – indeed it may be observed to variable extents in related as well as unrelated fields. In particle physics, it has become prevalent because of the size and complexity of the needed experiments and the time necessary to build experimental facilities and then to acquire and analyze the data. As a result, particle physics publications are authored by all collaboration members, listed in alphabetical order. Members of large collaborations are therefore authors of hundreds of papers with very similar author lists. Whereas satisfactory evaluation procedures are used within the Particle Physics Community, these informal but efficient recipes are not fully known or easily usable for evaluations outside the community or for comparison with scientists from other disciplines competing for the same positions. This document, elaborated by a joint ECFA/HEPP-EPS committee after consultations within and outside the HEP community, aims to give some guidelines for non-expert panel members to efficiently evaluate experimental particle physicists. In the last section, recommendations are made to help particle physicists in preparing for evaluations.

### **Section 1. INFORMATION FOR EVALUATORS FROM FIELDS OTHER THAN HEP**

This section summarizes the criteria that are helpful in evaluating experimental HEP colleagues working in large collaborations.

#### **1.1 Publications in refereed journals**

A widely used and publicly available source to find publications in refereed journals and other information is the high-energy physics information system (<http://inspirehep.net>) developed jointly by CERN (Conseil Européen pour la Recherche Nucléaire, Geneva), DESY (Deutsches Elektronen-Synchrotron, Hamburg), FNAL (Fermi National Accelerator Laboratory, Batavia, Illinois) and SLAC (Stanford Linear Accelerator Center, Palo Alto, California)..

In this regard, it should be noted that papers by large collaborations, covering the full spectrum of activities from physics analyses to technical developments, are usually published in a few high-impact journals. With only a few exceptions, particle physics papers are not published in highest-impact multidisciplinary journals such as Nature or Science.

Given the publication practices mentioned above, the usual indicators such as citation index, h index, ranking in the author lists, etc., are not useful in the field and can be misleading. Evaluators should rather focus on the most significant publications indicated by the candidates and look in detail for the specific role they have played in each of them. Have they been authors of the analysis that led to the publication (quite often, several analyses compete within a collaboration but only a single result is published based on the best tools and ideas used in these different approaches) or worked on a key technical contribution for that paper? Have they defended the final analyses in front of the collaboration? Have they been selected as a contact person for the journal reviewers? It is important to notice that even in such papers there is often a significant number of people entitled to claim a crucial role. This is a fact and necessity of our field, which does not diminish the merits of individual contributors.

It is also important to note that given the very long construction time of the large experiments, an individual's publication rate can be quite low during the construction

period only to suddenly become quite high once the data become available. Therefore these fluctuations may be completely uncorrelated with the candidate's scientific achievements.

### 1.2 Visibility within large collaborations

An important criterion to evaluate experimental scientists in HEP is their visibility within their collaboration. In general the collaborations are structured in different work areas such as detector R&D, construction and operation, trigger, data preparation, physics analysis, and computing. These areas are led by coordinators, who together with the collaboration management have important responsibilities. Areas are usually organized in a hierarchical structure with conveners of working groups. For example in physics analyses of the LHC experiments, all major topics like Standard Model physics, Higgs boson searches and measurements, Searches for Supersymmetry etc. have co-leaders. Such (co)-convenerships represent top-level positions within the collaborations and are very sought after. They are assigned to highly respected people and confer significant recognition to those who get them. Still on matters of visibility, due to strong internal competition, being selected to present the result of an analysis in a collaboration meeting's plenary session is a significant achievement. For more senior people, managerial positions, like chairpersons of collaboration boards, sub detector coordinators, and membership of publication, authorship or speaker committees are of added value. The collaborations are encouraged to keep a public record of these positions.

### 1.3 Participation in committees and boards as chair or members

The large collaborations have a sizeable number of committees, e.g. speaker committee or publication committee, and boards. As an example of the latter, the Editorial Boards that review and scrutinize analyses before publication do very delicate work. Appointments to such boards acknowledge the scientific competence and critical judgment of their members.

### 1.4 Presentations at conferences on behalf of the collaboration

Talks at international conferences and workshops, where individual candidates present the results in plenary or parallel talks on behalf of the collaboration are very important. These talks are assigned by the speaker committees of the collaborations. In the selection procedure the contributions of the candidates to all relevant experimental areas (detector construction, commissioning, operation, software, reconstruction of particle signatures and data analysis) are taken into account. The selection is highly competitive and provides an important acknowledgment of the contributions of individuals to the large experiments, as well as their scientific competence.

### 1.5 Seminars

Invitations for seminars at research institutes or universities constitute another significant acknowledgment because very often speakers are invited by researchers from within the collaboration who have exact knowledge of the merits of the individual.

### 1.6 Prizes, awards and distinctions

As in any other discipline, prizes and awards are also important in HEP. In addition to the usual prizes and awards, a few large collaborations have established annual prizes for the best theses. Such awards mark a significant distinction, especially because there are many theses to choose from.

### 1.7 International recognition by membership in committees

Major HEP labs have high-level scientific councils to which key members of the community are invited to contribute their expertise. Such international or national recognition is highly valued in the field.

### 1.8 More subjective criteria

Specific HEP contributions are the work of many people. Therefore it is quite important to assess to what extent a candidate took initiatives and contributed original ideas. The diversity of skills (theoretical knowledge, experimental analysis, instrumentation, computing) is a great asset, given the tendency towards narrow specialization. Leadership positions and leadership capabilities, the aptitude for team work, language and communication skills, as well as the ability to work under pressure, should be highly considered.

### 1.9 Letters of recommendation

Carefully composed letters of recommendation may provide a solid basis for a comparative assessment. Very often, the author will be part of the same collaboration and sometimes will be in a very senior position. Of course, a spokesperson's letter can attract more attention but may not display sufficient familiarity with the candidate's work. A letter from a convener may bring precise and unique information on the personal impact of the candidate's work in the experimental results. Such a letter may be more useful than one from a referee not from the same collaboration.

## Section 2. RECOMMENDATIONS FOR THE HEP COMMUNITY

The following recommendations are intended for candidates applying for positions (in particular those not specifically earmarked for particle physics), for experimental collaborations and for authors of reference letters, in order to maximize the chances of success of HEP members.

### RECOMMENDATIONS FOR CANDIDATES

#### **- Personal webpage**

A link to a well-structured, up-to-date personal webpage should be provided for complementary information, as application documents are often required to conform to a specific format or are restricted in length.

#### **- Specific information on publications and other documents**

Given that it is virtually impossible for an external reviewer to assess the role of candidates in dozens of publications with many authors, it is recommended to single out those to which candidates have contributed in a significant way, and to describe the nature of these contributions. In addition, documents not always publicly available, such as analysis or detector notes, which are generally signed by a small number of authors, should be listed if allowed by the collaboration. The number of authors contributing to a specific analysis or development, and the degree of competitiveness, could be mentioned. Contributions may include performing an analysis, defending it in internal reviews, presenting it at important meetings, editing a paper or note, or interacting with a journal.

#### **- Specific information on conference contributions**

Given that there is a large number of HEP conferences and many potential speakers, it is recommended that candidates mention the level of competition in the assignment of talks or posters, and the significance and size of a conference.

### RECOMMENDATIONS FOR COLLABORATIONS

#### **- Author identification scheme**

In the very long author lists of many HEP publications, different authors have the same name or the spelling of an author's name is not identical across publications, which makes it hard to unambiguously identify authorship. It is therefore recommended to adopt a recognized author identification scheme.

#### **- Record of organizational structure and position holders**

Given the importance of high-level positions for a candidate's career, collaborations should provide current and past information about their organizational structure and the names of the most important position holders on their websites. Their history should be kept over time and be publicly available.

### RECOMMENDATIONS FOR AUTHORS OF REFERENCE LETTERS

Reference letters are of prime importance to support applications in the field of HEP.

#### **- Content of reference letters**

Authors should describe their position and relationship to the candidate, in particular within large collaborations, followed by a description of the work performed by the candidate and other factual information, an assessment of the candidate in the context of the evaluation criteria, and finally, more subjective comments.