



## Commission on Particles and Fields (C11)

### Assessment of Individual Achievements in Large Collaborations in Particle Physics

Report of Commission 11 (C11), Particles and Fields,  
of the International Union of Pure and Applied Physics (IUPAP)

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#### **1. Introduction**

Elementary Particle Physics addresses basic questions about Nature and explores processes at extreme physics conditions, from high energy particle collisions of cosmic rays and at accelerators to low rate and low background processes in underground experiments.

Experiments in this area of science are only possible in a world-wide collaboration of many scientists. The detectors are designed, constructed and operated by large research groups and the scientific results are a common achievement of many scientists. The time required from the first idea about the experiment, design, construction to data taking and data analysis spans typically more than ten or twenty years. During that period, the continuous contributions of all participants – experts in detector hardware, calibration and data analysis alike – are essential for publishing scientific results. Therefore, it is customary in experimental particle physics for publications to be signed by many authors in alphabetic order.

This procedure implies that an assessment of scientific achievements based mainly on publication lists and impact factors is no longer applicable in experimental particle physics. More factors must be included to judge the scientific merits of individual researchers in this field.

For these reasons IUPAP/C11 has set up a working group to address these issues. Members of the working group are listed in the appendix. This group included representatives of large collaborations in Particle Physics. Through these representatives, the collaborations were invited to comment on a draft version of this report.

## **2. Goals**

The goal of the exercise was to define a common set of measures to enhance the visibility of individual achievements while maintaining the successful collaborative spirit in large collaborations in particle physics.

A common catalogue of objective criteria should be established, which should help to assess individual achievements.

The criteria should be transparent to decision makers outside of the large collaborations, such as at universities, laboratories and prize committees.

The Commission C11 encourages the collaborations in particle physics to agree to a common set of criteria and measures and to adapt their internal procedures accordingly while recognizing that the final decision rests with each collaboration.

Decision makers in selection, promotion and prize committees at universities and science organizations should use these established criteria to assess the achievements of particle physicists and compare them to scientists in other fields.

This catalogue of criteria could be used in other fields of science, where large collaborations are required to achieve results.

## **3. Proposed measures**

The working group proposes the following measures:

### **1. Eligible authors**

The Collaborations shall have clear internal rules regarding who is an eligible author for each publication. The rules shall be public and transparent and follow the guideline that "authorship should be limited to those who have made a significant contribution to the concept, design, execution and interpretation of the research study. All those who have made significant contributions should be offered the opportunity to be listed as authors." (See, as an example: American Physical Society Guidelines for Professional Conduct).

### **2. Publication Web page**

For each publication the collaboration might release a public web page with supporting notes and details about the individual contributions in analysis, operation, calibration, computing, editorial, etc., which have been essential for the publication.

### **3. Most relevant publications**

Rather than a list of all publications, one finds often in the curriculum vitae of experimental particle physicists a list of "most relevant publications." This could be an indicator for scientific merit if the criteria for "most relevant publications" are clearly defined and similar in all collaborations. A good criterion for including a publication in this list could be the appearance of the individual as a significant contributor on the publication web page of the collaboration.

4. Scientific and technical notes  
Scientific and technical notes, published by a few authors in an internally or externally refereed form, could help to make individual contributions more visible. These notes can describe in more detail the detector development, operation and calibration, as well as reconstruction algorithms, analysis techniques and statistical methods.
5. Public track record  
Collaborations should keep a public track record of authorship of refereed internal notes (listed with author names and titles of the notes), nominated speakers for conferences, responsibilities and positions inside the collaboration (with an explanation about the scientific merits required for this task), contributions to the operation of the experiment, membership in editorial boards, and other positions of responsibility.
6. Two-tier author list  
Collaborations could consider the use of a two-tiered author list to emphasize special contributions to publications. One option is to list a group of "main authors", another option is to keep the alphabetical order but mark some names as principal authors.
7. Awards  
Awards are an important measure to make individual achievements in large collaborations known to outside people. More use should be made of awards in particle physics: HEP-wide prizes, awards in countries, laboratories and universities as well as inside collaborations to acknowledge the scientific achievements of scientists (e.g., for PhD theses, data analysis, detector development, detector operation and calibration).

## Appendix

### Members of the working group:

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