

EPPOG → IPPOG: An Evolution of Particle Physics Outreach

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INTRODUCTION

After more than 15 years, the European Particle Physics Outreach Group is on the verge of a transformation from a “discussion forum” to a possible worldwide leader in outreach and informal scientific education activities for particle physics and related fields. This document outlines the history of EPPOG and its planned evolution over the coming years.

Definitions of Outreach and Informal Education

To understand EPPOG as a science outreach group that undertakes outreach and informal scientific education, the terms “outreach” and “informal education” in this context must be made clear. Outreach here refers to activities designed to raise awareness, appreciation and understanding of particle physics, its research and experiment results to a mainly non-scientific audience. It may also include educational activities that impart practical science knowledge and skills within the presenter’s field of expertise to eager minds in venues such as museums and afterschool settings. These knowledge and skill-building educational activities are strictly informal in nature due to their delivery and design. In particular, they are delivered by informal science educators (mainly the scientists themselves) rather than trained education specialists. Further, compared to formal education programs, informal education activities tend to be shorter in length, have a drop-in rather than consistent participant group, and set more modest requirements for goals and learner outcomes. Formal educational activities include rigorous program assessment and evaluation mechanisms set against accepted academic standards and research whereas informal educational activities do not. For a list of typical outreach and informal education activities versus formal education initiatives, please see the footnote below.¹

THE ORIGINS OF EPPOG

The European Particle Physics Outreach Group (EPPOG) is a network of scientists and informal science educators from science institutions and laboratories working in high-energy particle physics who undertake outreach and informal education initiatives. EPPOG was formed in 1997 under the joint auspices of the European Committee for Future Accelerators (ECFA) and the High Energy Particle Physics Board of the European Physical Society (EPS-HEPP) Board. As CERN’s then Director General Mr. Chris Llewellyn Smith explained in September 1997 at the first-ever EPPOG meeting, *“the particle physics community has a moral obligation to inform the public on its activities. To do this well”*, he

¹ Outreach Activities/informal education: one-day/short term courses, (e.g. EPPOG Masterclasses) site tours, lectures, classroom visits, science shows, exhibitions; Formal education initiatives: professional development programs for teachers, instructional courses and/or materials based on set standardized learning objectives, field trips associated with instructional units

explained, “*experiences must be shared among countries in view of the need to optimize the use of resources.*” He also highlighted the need of being selective on future actions and collective decision-making regarding outreach efforts, giving the example of informing school children as a good long range investment.² Out of this obligation to communicate effectively with the public in a targeted way and a need to pool resources, EPPOG was born.

Once EPPOG was formed, members outlined their primary tasks as being:

- to exchange information on outreach activities and experiences
- to take inventory of materials to be used for outreach
- to pool resources
- to identify media contacts
- to identify other possible collaborating partners to strengthen efforts¹.

EPPOG’s PAST EVOLUTION – MEMBERSHIP & ACTIVITIES

Membership

When EPPOG began in 1997, LEP was still taking data and the analysis of data from several LEP experiments formed the basis of the first years of the EPPOG Masterclasses (see later). But plans were already well advanced for the development of the largest particle physics experiment of a generation – the LHC. The EPPOG membership in the first decade was thus very much LHC-centered, reflecting the opportunity to gain the public’s attention throughout the construction, commissioning and operation phases of the LHC. In addition to an EPPOG representative from each of the 20 CERN member states, representatives came from CERN, DESY and the two largest LHC experiments - ATLAS and CMS. Participation from ALICE and LHCb soon followed. In more recent years, efforts have been made to extend membership to non-member states – most notably the USA, as well as other European particle physics experiments (such as neutrino physics) and related disciplines, such as astro-particle physics (with the ASPERA network).

The first chairperson of EPPOG was Frank Close of Oxford University, who was succeeded by Erik Johansson of the University of Stockholm and, from 2009 onwards (for an initial term of 3 years) David Barney of CERN and Michael Kobel from the University of Dresden – serving as co-chairs.

Activities

Information Exchange: the original primary focus

As EPPOG began primarily as an information exchange forum between science institutions and laboratories, with a view to fostering better outreach initiatives, members held two meetings per year to give briefings on country activities. Members also communicated through regular e-mail exchanges and a basic website was created giving details of membership and easy access to past meeting agendas and notes. Yet members wanted to go further to strengthen outreach on a pro-active global scale with a measurable impact.

¹ EPPOG Meeting Minutes 19 September, 1997, CERN

Masterclasses

In response to the group's desire to move forward and realize practical and replicable outreach activities, EPPOG created the European Masterclass program. This was based on an idea from the UK, where 17-18 year-old students are invited to university physics departments for a day for lectures, discussions and measurements using real data from particle physics experiments. Apart from widening the scope of this concept (presently 23 participating countries on 4 continents) and translating the material into 17 languages, the central extension introduced by EPPOG in 2005 was to connect several institutes together per day via a video-conference hosted at CERN to combine and discuss results, ask questions etc. The aim of this program is to raise awareness, knowledge and enthusiasm of particle physics among our young budding scientists and decision makers of the future and strengthen existing science programs in schools. In the five years of the European Masterclasses numbers of participants have increased from 3000 to 6000 per year, and now include institutes in the US, South America and Africa. It is a model that colleagues in other disciplines (most notably Astrophysics) are keen to replicate. During the last five years in-kind and financial support was received from CERN, DESY, EPS, EVO (via Caltech and the Slovak Virtual collaboration), the German Ministry for Education and Research, BMBF, and notably from the German Helmholtz Alliance "Physics at the Terascale" funding a part-time coordinator position for the past 2 years.

Networking & Raising Awareness

EPPOG continued its pro-active approach by holding special sessions with the European Network of Science Centres and Museums (ECSITE) conferences in Lisbon (2007) and Milan (2009) to gain support for more exhibitions on particle physics. An example of the success of these sessions is a recent initiative to establish a particle physics exhibition in several middle-eastern and North African countries where a contributing factor to the idea was a discussion between a director from an Israeli science centre and one of the EPPOG co-chairs.

EPPOG Best Practice Database

The latest EPPOG initiative is the EPPOG Best Practice Database. The database concept was first proposed at the October 2009 EPPOG meeting at CERN. This database is to contain high quality tools, materials and templates to be used by science institutions and laboratories for outreach and informal science education purposes. Lessons learned from past initiatives would be stored so that users can build on experience and improve future undertakings. Members at the October 2009 EPPOG meeting unanimously agreed of the need for such an essential tool. EPPOG then brought the idea to ECFA in December 2009. ECFA members also unanimously supported the proposal, with funds being offered by ECFA and the CERN Director General for this ambitious project. A part-time project associate was hired to determine the requirements of the database (including identifying groups of potential users), develop the database schema (in conjunction with professionals in this area) and start entering items into the database. The eventual aim is that the database is self-sustaining, with the EPPOG members (and others) adding new items when appropriate and users "voting" to ensure that the highest quality and most useful items are the ones

that become the “best practice.” The database is to be fully operational by December 31, 2010.

Relationship between EPPOG and similar groups

When EPPOG began in 1997 there was no similar multi-national organization in particle physics. During the past 13 years several groups have developed including the following:

Interactions.org

The InterAction collaboration is a group of science communication professionals whose resources are focused on communication with the media and the public. They maintain a website, Interactions.org to serve as a vital resource for professional science communicators world-wide. From their website:

“Interactions.org is designed to serve as a central resource for communicators of particle physics. The site is updated daily with news, information, images and links from the world of particle physics. It provides links to current particle physics news from the world's press, high-resolution photos and graphics from the particle physics laboratories of the world; links to education and outreach programs; information about science policy and funding; links to universities; a glossary; and a conference calendar. Although Interactions.org is not designed to provide basic education about the science of particle physics, it provides links to many such educational sites.

The Interactions.org web site was developed and is jointly maintained by the InterAction collaboration, whose members represent the world's particle physics laboratories in Europe, North America and Asia, with funding provided by science funding agencies of many nations.”

EPPCN – European Particle Physics Communication Network

This is a network of (mostly) professional science communicators in the CERN member states, who state as their objectives:

- Making the most of the unique communications opportunity presented by the start-up of the LHC.
- Maximizing the public image benefit for particle physics in the CERN Member States.
- Ensuring that we are communicating as effectively as possible in each Member State.

Quarknet

A US-funded education initiative to develop enquiry-based learning in US high schools through activities related to high-energy physics. From their website:

- **The Opportunity:** "Your program rejuvenates my soul. It connects me with a cadre of intelligent and excited educators. It reinvigorates my teaching and provides me avenues to extend and enliven the projects that I can offer my students. Without the Quarknet program I am sure that I would have left teaching years ago."
- **The Players:** High school students, teachers and physicists working together on physics research projects exploring the hidden nature of matter, energy, space and time.

- **The Questions:** What are the origins of mass? Can the basic forces of nature be unified? How did the universe begin? How will it evolve?

Several EPPOG members are also members of one or more of the above groups. In addition, EPPOG meets yearly with EPPCN at CERN. The relationship between all groups is, in fact, still being fully defined and there is clearly a large overlap between some activities.

EPPOG- A VIEW TO THE FUTURE

Clearly EPPOG is off to a good start. Communication between members has fostered idea sharing and some programmatic manifestations of this are seen. However, EPPOG's members are ready to do more. They see a need for EPPOG to serve not only as a conduit for idea sharing and resource pooling in a more targeted way, but also to serve as a pro-active leader in the field of outreach for particle physics and related fields world-wide by improving and maintaining the quality of initiatives with tangible programmatic results. With this in mind, members wish to expand EPPOG membership to include more non-LHC experiments and institutions, and increase country representation across the globe. In addition, EPPOG wishes to pursue and maintain more programs among its members, and encourage others working in nearby sciences, which, like particle physics, are posing fundamental questions about the structure and the origin of the universe, to do the same. As a first step it is proposed that EPPOG becomes "IPPOG" with an emphasis on the truly International rather than European nature of its mandate.

THE NEW "IPPOG" AND ITS AIMS

The aim of the International Particle Physics Outreach Group (IPPOG) is to contribute to global efforts in strengthening cultural awareness, understanding and support of particle physics and related sciences.

More specifically, IPPOG's purpose is to raise standards of global outreach and informal science education efforts of particle physics and to communicate its results and findings to the public by, amongst other things:

- **Strengthening the sustainability, reproduction and growth of outreach activities in particle physics and related disciplines** through the provision of reliable and regular discussion forums and information exchange for science institutions and laboratories as well as for individual scientists engaged in science outreach and informal science education world-wide
- **Raising standards** for outreach and informal science education initiatives by proposing and implementing strategies designed to share lessons learned and best practices for outreach in particle physics and related fields
- **Providing explanatory materials** for helping disseminate results from particle physics and related subjects

IPPOG'S PLANNED ACTIVITIES

- Increase membership to more non-member states of CERN and widen its scientific disciplines
- Continue to hold twice-yearly meetings to facilitate in-person information exchange, strengthen the IPPOG network and share best practices and lessons learned for outreach activities world-wide
- Manage the best-practices database of world-wide outreach activities, containing a catalog of high quality tools, materials and templates from across the globe primarily in particle physics with a view that these can be replicated for other sciences
- Facilitate world-wide dialog amongst outreach and education specialists on current and future endeavors through an on-line forum via a new inter-active IPPOG website including Web-2 functionalities
- Support projects in developing countries, to help students and the general public appreciate the benefits of education and fundamental research for the benefit of humanity

Other things IPPOG could do:

- Support global outreach and informal science education activities through in-kind contributions from its members whenever possible (donations/loans of materials, people power, etc. to, for example, help others set up Masterclasses for science topics other than particle physics) To do this, IPPOG could incorporate an on-line community forum for initiatives much like Earthbongo and similarⁱ.
- Help identify funding resources for particle physics and related sciences outreach and informal science education activities worldwide

IPPOG MEMBERS

- a. One member nominated by the particle physics community of each CERN Member State
- b. One member each from DESY and CERN, appointed by the managements of those laboratories
- c. A number of representatives from particle physics experiments, astro-particle physics and non-Member States of CERN
- d. A number of representatives from 3 continents outside of Europe

IPPOG PARTNERS

As mentioned previously, EPPPOG is collaborating with a number of different groups worldwide and the new IPPOG will continue to do so. The relationships between the groups will need to be more fully defined and strengthened. Additional partners should include similar networks in other related sciences, such as the ASPERA European network for astro-particle physics.

ⁱ Earthbongo allows individuals or groups to create and share projects, solicit input and participation, and measure the results of their combined actions. The site allows information and experiences to be aggregated so that people can share ideas and support, such as funding sources or people in the area with expertise to share. <http://www.earthbongo.com>