A word from the coordination team

Dear IPPOGers,

This third edition of our newsletter, which is much inspired by the Spring IPPOG meeting in Krakow, comes out just before our next meeting at CERN (10—12 November 2016) - at a time when IPPOG has never been so close to becoming an official collaboration which allows us to professionalise the personal investments we all make in IPPOG. In this way we can steadily increase the impact we are able to have. Even though setting up the IPPOG Collaboration turned out to be much more complex and a much longer process than originally imagined, now the final MoU document is circulating and signatures are indeed coming in.

IPPOG is an international body open for new member countries, laboratories and experiments to join. With Australia, Ireland, South Africa, United States of America and more recently Slovenia, we are clearly stepping into the global realm of collaboration. With the burden of the MoU writing and collaboration building (almost) behind us, IPPOG can now concentrate on growing its activities. We will be discussing adding a neutrino program and ‘cosmic rays going global’ to IPPOG’s core activities. Broadening the scope of masterclasses, the flagship activity of IPPOG, geographically and in physics content will be key for continued success. The efforts to improve the IPPOG web-presence will soon materialise.

We wish you fun reading this newsletter, great meeting at CERN and wonderful end of 2016!

Hans Peter, Marge and Barbora

DOWNLOAD the electronic form of this newsletter with clickable hyperlinks at:

IPPOG pilots World Wide Data Day

Imagine a 24 hour span of masterclass-like videoconferences for students and teachers in the schools. To cover that, we’d need world-wide collaboration. And the students would need simple measurements that their teachers can readily explain. Well, we are getting there with the pilot of World Wide Data Day (W2D2) on 2 December this year. Students will measure theta and phi of muon tracks in dimuon events from online ATLAS and CMS displays and try to understand their distributions. Physicists at TRIUMF, CERN, Fermilab and even in Australia will be on hand to help them see the big picture when they connect on Vidyo.

Contact Ken Cecire (kcecire@nd.edu) to discuss how you, a colleague or a good physics teacher you know might be involved.
Welcome Slovenia!

In May 2016 IPPOG welcomed a new member, Slovenia. Representative Andrej Gorišek from Jozef Stefan Institute in Ljubljana, attended two previous meetings. More countries representing new continents expressed interest as well. Discussions with Belle II and Brazil are ongoing, and physicists from the Belle II collaboration will join the upcoming meeting.

Theory jam

What is the difference between Theory in HEP and UFO “Theory”?

The word ‘theory’ is perceived and used differently by the public in everyday language than its scientific meaning. And thus we often see that the general public questions the relevance of science in general and of high energy physics (HEP) research in particular. In IPPOG physicists address these possible misconceptions and develop strategies to overcome them. A better understanding by the public how scientists make discoveries is key.

Science has the freedom to allow for hypotheses. Isaac Newton in his General Scholium states, “For whatever is not deduced from phenomena must be called a hypothesis”. The message which may be difficult to explain to the public and funding agencies, is that theoretical physics often makes predictions decades before their (possibility of) verification/falsification, which explains the costs and time needed. There are many examples of this “theory jam” in the history of science. Take the atom, which was verbally and metaphysically predicted already by Demokritos. The theory that matter is composed of discrete indivisible units called atoms began as a philosophical concept in ancient Greece, however, without any evidence or experimentation. Only in the 19th century was the idea embraced by scientists. In 1808 John Dalton developed the “Law of multiple proportions,” and during almost a century several scientists refined the atom theory (Avogardo number, Brownian motion, Thomson model, Rutherford model, Bohr model, Planck & Einstein quantum theory,…). Indeed, the final confirmation came almost 100 years after Dalton’s hypothesis, and crystal structure and atoms became visible through X-ray diffraction only after 1912 (Max von Laue, Bragg). Also, the path from idea to verification took decades in the famous examples from particle physics, namely 48 years (1964-2012) for the experimental discovery of Higgs boson, 100 years (1916-2016) for gravitational waves and “only” 26 years (1930-1956) for neutrinos. And yet, Wolfgang Pauli on the day he formulated his neutrino hypotheses wrote, “Today I did something terrible which no theoretical physicist should ever do. I proposed something which can never be experimentally verified.” Well, “never say never” is valid also in science. Many big particle physics hypotheses/theories are stuck in the “theory jam”, like Grand Unification, SUSY, Superstrings, Extra-dimensions, Inflation, Multiverse… By the way, nothing is wrong with scientifically based philosophical speculations, which multiverse proposals are, however, we should name them for what they are. Indeed showing the limits of science with honesty is very valuable for confidence building in the society’s eyes. Disappointment shared openly in Summer 2016 by LHC from “bumps” being only a statistical fluke instead of a new particle is a nice example of this.

RECFA supports IPPOG Collaboration

IPPOG reports yearly to the Restricted European Committee for Future Accelerators (RECFA). After his report to RECFA on 19th November 2015, Hans Peter Beck, IPPOG co-chair, stated: “RECFA supports the idea of building an IPPOG collaboration with an MoU and funding structures after having received the MoU.” The conversation will be continued during the next RECFA meeting on 24th November 2016.

IPPOG MOU

The final version of IPPOG Memorandum of Understanding (MoU) approved by CERN legal service has been distributed to IPPOG representatives. The first signatures have arrived, few more firm commitments exist, and once we have received 10 signatures, IPPOG becomes an official collaboration.

Worldwide spotlights by IPPOG

Click on logos!
Some ethical questions in particle physics
How to react to questions and fears of public and media?

IPPOG physicists Ivan Melo, Hans Peter Beck and Thomas Naumann wrote an article “Some ethical questions in particle physics” where they discuss high costs and purported dangers of Big Science projects, the relevance of fundamental research for society and the way particle physicists fill their responsibility to communicate with public.

The authors state that “scientists should respond to fears, worries and ambiguities of the public on the costs and results of their research in a proactive, open, honest, transparent and enlightening way.” Two nice examples are CERN’s honest and transparent response on the universal doomsday due to mini black holes swallowing the Earth at LHC start-up in 2008 which was discussed in the media; and the reaction of Symmetry magazine to the headlines claiming that Stephen Hawking thinks the Higgs boson will cause the end of Universe.

Talking about costs, it is true that building the Large Hadron Collider and the associated experiments meant an investment on the order of 10 billion Euros. However, those costs were spread over many countries (21 CERN member states and an additional 43 directly contributing countries) and over four decades. Moreover, physicists concentrate resources for a big common goal and structure their research worldwide in a coordinated effort that minimises the costs and unnecessary parallelism otherwise occurring in competing small-scale teams.

The relevance of fundamental research can be argued by giving examples of many applications, inventions and spin-offs, now thought of as a given in modern society. Scanning and imaging devices find their roots in particle detector technologies. Radiotherapy, hadron therapy, production of special isotopes used for cancer treatment and special treatment of materials to obtain specific characteristics are all based on accelerator technologies. Indeed, many tens of thousands of particle accelerators are operating almost unnoticed for industrial purposes worldwide, whereas only a handful of pure research accelerators exist in the world...

Great examples for bringing the excitement of cutting edge particle physics research into classroom and motivating high school students are International Particle Physics Masterclasses and Cascade competition.

International Masterclasses 2017
will take place from 1. March to 11. April 2017! Registrations are open!

“IPPOG is a key partner in supporting CERN with its global mission.”
- Director of CERN’s International Relations Sector, Charlotte Lindberg Warakaulle

IPPOG members’ testimonials
Benefits of membership as seen by major particle physics lab

According to CERN’s Director for International Relations, Charlotte Lindberg Warakaulle, IPPOG will be a key partner in CERN’s efforts to promote particle physics in particular and to serve society on a global level, now and in the future. Notably CERN can benefit from IPPOG’s reach to connect with people across the world to inspire scientific curiosity and understanding. During the IPPOG meeting in Krakow, Charlotte outlined where are synergies between IPPOG and CERN:

♦ IPPOG represents a key platform for engaging on a global level, building partnerships within the community and across communities, and for supporting the broader scientific objectives of particle physics
♦ IPPOG represents a platform for information – sharing and for strategic discussions on how to strengthen support for particle physics and fundamental science more broadly
♦ IPPOG can serve as a testing ground for new methods of working, enabling sharing of lessons and good practice
♦ IPPOG brings opportunities to engage with countries that would not otherwise be closely involved with CERN

IPPOG – global partner with global mission

IPPOG is looking forward to being a strong partner of CERN, but also of all other current and future IPPOG members - countries, laboratories and experimental collaborations - who all together within the international network contribute to IPPOG making outreach in particle physics global.
IPPOG at conferences 2016

5th Large Hadron Collider Physics conference (LHCP), 13-18 June 2016, Lund, Sweden, Parallel sessions on education and outreach, IPPOG convener: Kate Shaw, IPPOG talk “Worldwide outreach” by Hans Peter Beck

2nd World Conference on Physics Education (WCPE), 10-15 July 2016, Sao Paulo, Brasil, IPPOG talk “CERN Masterclass courses and the impact on school physics” by Uta Bilow

38th International Conference on High Energy Physics (ICHEP), 3-10 August 2016, Chicago, US, Parallel sessions on education and outreach, diversity and inclusion, IPPOG convener Kate Shaw, IPPOG talks: “Promoting women in physics in South Africa” by Sahal Ya-coob; “Doing outreach with the first direct observation of gravitational waves” by Nicolas Arnaud

Physics, Technology, Ethics conference, University of Žilina, Faculty of Philosophy, 8-9 September 2016, Žilina, Slovakia, Invited contribution on “Some Ethical Questions related to Particle Physics” by Ivan Melo (co-authors, Thomas Naumann, Hans Peter Beck)

Education and Outreach sessions growing popularity!

“Education & Outreach is becoming an integral part in international HEP conferences, where IPPOG is an active player and driver”

- Hans Peter Beck, an IPPOG co-chair

“Education, Communication and Outreach (ECO) Sessions at International physics conferences are getting more and more popular with EPS, ICHEP and LHCP, for example, all holding ECO parallel sessions, and many others now have an invited ECO plenary talk,”, witnesses Kate Shaw, the IPPOG delegate from ATLAS, who acted as a convener of these sessions at both LHCP and ICHEP 2016. She continues, “ICHEP alone had over 40 abstracts submitted to the Education and Outreach track, demonstrating the extensive work being done worldwide, of which IPPOG is a vital driving force. These international high energy physics conferences clearly recognise the importance of education and outreach in high energy physics, and it’s now understood to be a vital part of any particle physics experiment or physics institute. This recognition we hope will motivate institutes to fervidly encourage more of their physicists to dedicate small portions of their time to this important work in ECO, to support their science, and to enrich society.”

Exhibitions on Particle Physics, Science and Arts

Reaching New (Non-traditional) Audiences

- Arts@CMS exhibitions in Geneva, ECOLINT LGB sciART (Oct’15-Feb’16);
  - Cite du Temps (28 Feb-10 Apr’16); ATHENS Science Festival (5-10 Apr’16), University of Arts London sciART collaboration (Oct’15 –Apr’16), as part of exhibition in Vienna (below) since 19 Oct’16

- Enrico Fermi exhibition, inaugurated at the Festival della Scienza 2015 (22 Oct’15-Jan’16); later in Bologna (6 Feb-22 May’16)

- New Microcosm @ CERN permanent exhibition since 30 Nov’15

- Exhibition on “Challenges in Particle Physics for the Next Decades” held at LIP universities (Lisbon, Coimbra, Braga) to celebrate 30th anniversary of LIP, Feb-May’16

- Exhibition “The beginning of everything. About Galaxies, Quarks, Collisions” in Museum of natural history in Vienna to mark 50 years of the Institute for High Energy Physics (HEPHY), 19 Oct’16 - 1 May’17

Invitation to

12th IPPOG meeting at CERN

The IPPOG Fall Meeting 2016 will take place at CERN from Thursday, 10th November until Saturday, 12th November 2016. As usual, there will be an open session on Thursday afternoon and all interested in IPPOG are welcome to participate. Details, agenda and registration can be found at http://indico.cern.ch/event/573645/

We are looking forward to see you soon!

Hans Peter, Marge and Barbora

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