International Particle
Physics Outreach Group

20th IPPOG MEETING – online

Dec 2-4, 2020

List of participants
Link to agenda

The meeting took place online due the travel and sanitary restrictions linked to Covid19 pandemic. This virtual edition of the collaboration meeting had a record of 69 participants registered:
https://indico.cern.ch/event/963955/registrations/participants

IPPOG Open Session

- Pedro Abreu stated that the collaboration now comprises a total of 35 members and 1 associate member. He welcomed the newest members of IPPOG, Georgia with Alexander Sharmazanashvili as representative, South Africa with Sahal Yacoob as representative as well as DESY as an associate member with Thomas Naumann as representative. Signatures of Israel and Bulgaria are pending. *(By the end of the meeting IPPOG had gained one more associate member, GSI).*
- Uta Bilow and Ken Cecire reported that they expected the pandemic to continue with no high school students allowed at universities or labs in order to attend the International Masterclasses program. Therefore IMC will be mainly remote with students running measurements on their computers. For this configuration, it is clear that institutes need support for remote MC (how-to guide) with Zoom webinar style for large groups with moderators not seating together. Regarding content, there were updates on ATLAS measurements with 13TeV data (ATLAS W path, ATLAS Z path, Citizen Science Project and ATLAS Open Data Portal
- Carol Schwerdt welcomed Kazuo Tanaka from the cosmic ray network in Japan for high school teachers and students and Achintya Rao from CERN ECO who is committed to Open Cosmics. The international cosmic day offered a diverse format, such as project day at school, Masterclass@Home, lectures via live stream, and Kahoot Quiz as exchange platform. Sabine Hemmer reported on the Ocra conference from INFN that held two meetings, one national and one local, with more than 3500 participants in total. They host interactive experiences using excel and python scripts.
- Barbora Gulejova gave a report on the development of the IPPOG website and resources database. The main website pages are ready for alpha testing from today on! There is still some work to be done and that will require time to converge on the final design.
    - Follow-up: Feed-back on the new IPPOG website
    - Follow-up: ideas on new IPPOG RDB items here
    - Follow-up: Upload your IPPOG related photos to the IPPOG folder on CDS

Inspiring Success Stories

- Vojtech Pleskot presented an update of the outreach activities for ichep2020. The conference should have been in Prague but, instead, it was organized online. For the general public, there were: a talk by Barry Barish, "The Big Bang Stage" series of talks/performances hosted by Connie Potter, the "Universal Science" event organized by Marzena Lapka and Steven Goldfarb and "BeInspired@ICHEP2020" inspired by Michael's Hoch's initiative "Cultural Collisions", which received great media attention. Vojtech also highlight the animation movie A day with Particles which has won awards in film festivals.
- Claudia Fracchiolla gave a summary of activities for APS that aims to amplify the voice of science (social media, wiki scientist, etc), communicate the role of physics in the modern world (Kits for activities for mid schools across US called LabEscape) and promote effective physics education for all (community of practice through conferences and website of this community mixing informal and practitioners).
    - Follow-up: Invitation for IPPOGers to join many initiatives such as participating on the Wikipedia training program or apply for funding outreach activities. Contacts at APS are physicscentral@aps.org or directly to fracchiolla@aps.org
- Elora McFall talked on behalf of the International Association of Physics Students (IAPS), an international link for physics students and young physicists around the globe. The organization, which has more than 65,000 members around the world, provides support for young physicists to build international collaborations and to network.
    - Follow-up: Check out the organization and the #ThePhysicistChallenge
- Christine Kourkoumelis reported on the Erasmus project called The Frontiers that has already produced 21 educational resources and trained more than 500 teachers; and the Reinforce EU projects that counts with four demonstrators that are ready to collect date.

Countries, Labs and Experiments Highlights

- Jeff Wiener and Julia Woithe from the Outreach group at CERN created an online particle physics course, with 16 chapters comprising videos/texts, aimed to introduce high-school students to central models of particle physics
    - Follow-up: Input and participation on the translation of these courses by contacting Jeff.wiener@cern.ch or Julia.woithe@cern.ch directly.
- Lisa Johnsen presented the "Week of Particle World" organized by the Netzwerk Teilchenwelt, a national outreach network in particle and astrophysics. The event was organized locally and included activities such as Guided tours, Popular science talks, Science Café, Science Show, Science Slam and Masterclass@home, counting with a participation of more than 1,500 people.
- Marcelo Munhoz described the first national meeting of the IPPOG Brasil group, which aims to motivate broader and inter-institutional projects. Almost 300 people from all over Brazil participated in this conference. Next actions are to create a meeting point in the web for particle physicists interested in

outreach, enhance its social and traditional media presence, and create a network with school teachers.

IPPOG Session 02 – Working Groups - Collaboration Matters

- Kenneth William Cecire and Uta Bilow reported on the **Expanding Masterclasses WG** – Focus on national organizer / local science popularisation or outreach organisation to overcome language barrier, such as countries like India for example, continue doing masterclasses for teachers and create a scenario table for new masterclasses. Next is to think of using some resources of IPPOG such as for video, R-pi servers, etc.
- Michael Hoch and Hans Peter gave a report of all the activities of the members of **the Exhibits and Public events WG** - highlighting updates on Cultural Collisions in Bosnia Herzegovina and Vienna. Additionally, a large number of science talks, art talks, round table discussions, dialogue circles as well as science workshops, masterclass workshops and art ateliers have been offered to international participants through Suratomica Project for Colombia.

IPPOG Session 03 - Panel Discussion - The next steps following the European Strategy Recommendations. Panelists were: Perrine Royole-Degieux (representing EPPCN), Rebecca Thompson (representing Fermilab and reporting discussion from Snowmass), as well as Panagiotis Charitos and Markus Mooslechner (representing communications around the FCC) with Ana Godinho as moderator.

The goal of the discussion was to identify avenues that may inform future activities of the labs, projects and collaborations involved (after the publication of the recommendations of the European Strategy for Particle Physics). Each panellist made a statement then the floor was opened for discussion.

- Perrine Royole-Degieux said that EPPCN is focusing in the communications of "why we need a Higgs machines", which are very ambitious projects that need economic and political reasoning in order to move forward. However it is also important to continue engaging with youth and the scientific community along the way. The main audiences for communications are ministries, scientific community and public who ultimately will be ones influencing decision makers.
- Markus Mooslechner stated that the focus of the communication should be in bridging the knowledge divide between science and society: "When discussing funding we should try to steer away from numbers only…and find a way to make the public understand what the project is really about and what are all the potential deliverables"
- Rebecca Thompson said that she believed the public is in fact thirsty for more knowledge but the content out is not always great. Her work at Fermilab focus on the formal education: "We are trying to train everyone across the lab to do public outreach and break down the deficit of scientists with the message that *There are numerous ways for you to support science even if you are not a scientist".*
- Ana Godinho added that is vital to develop more platforms that engage in dialogue with the public instead of only providing a one way communication

After the first statements the three questions below triggered important discussion.

1. How do we reach out for the broader community?
2. How can we engage teachers in formal education?
3. How to get our non-particle physics colleagues to get onboard on our goal?

Here are some examples of the exchanges that took place:

- "It is hard to have a curriculum only dedicated to particle physics… the easier way is to add particle physics to the current curriculum. Additionally teachers need to be better trained; we see that when teachers have support to bring in material to the curriculum it works."- Becky
- "Provide teachers with materials that are more appealing such as videos and podcasts! Planets are a fascinating topic but Quantum mechanics is also a fascinating topic"- Markus
- "Teach people about the scientific method and the motivation of doing science and not only about the specific topics. That is also a way to bring in other partners from other fields" – Perrine
- "Reaching kids through education is great but how can we expand representation of science into the public mind? I believe that is through storytelling and by developing strong characters instead of focusing on the precision and small steps which can be perceived as boring" - Markus
- " Precision, small steps and breakthroughs are what science is about! So to hear that this is boring is worrisome" – Jonas
- "Our own community and our funding agencies are the most challenging to bring onboard. We are now asking for more money than usual and to just explain why that is needed with pure physics is going to be difficult. In one sense, we have been living in a *golden era* and I think now the benefits for society will be most relevant. EPPCN, will focus on three working groups with a focus on 1) physics, 2) benefits for society and 3) environmental issues which, if it not taken care of, might be a showstopper.

See in the appendix more comments added on the zoom chat in parallel to the panel.

IPPOG Session 04 – Collaboration Matters

- "Science communication needs to be friendlier towards visually impaired," said Suchita Kulkarni (Austrian Academy of Sciences (AT)). Suchita has formed a group that meets twice/week to discuss scientific topics as varied as Dark Matter, Corona virus, Mosquito bites and Yellow throated bulbuls, making them easier to explain orally instead of visually as they usually are.
- Despina Hatzifotiadou reported on the activities of the Speakers and Publications Committee. IPPOG attended APS April2020, ICHEP2020 and LHCP2020 conferences. It presented to the CERN council, LOG, IPPOG Brasil, and created several documents published on CDS.
    - Follow-up: Call for members to propose specific talks at the major conferences in 2021, especially if they already attending them.
- Barbora Gulejova reported on Content Development Strategy that is currently focused on the development of best practices and explanatory material, the usage of new activities and topics to reach broader audiences and the

development of active online communication platforms. The aim for the new RDB is to become as comprehensive and representative a collection of particle physics outreach and education resources as possible. The next steps are to 1) fill the new RDB with curated content 2) add new content from Collection 3) Develop and add new “IPPOG made” content!
    - Follow-up: Propose new resources to RDB, Contribute to IPPOG Wisdom Collection and Contribute to IPPOG stories about applications for society.

- Final remarks: the IPPOG spring meeting will take place most likely online and date will be decided early next year.

Appendix – Notes in Chat Window from the Panel Discussion

Charles Timmermans: What would be the motivation for a teacher, not usually trained in particle physics, to use examples of a field he/she is not comfortable with for 'normal' concepts?

This is the link to the falling walls debate:
https://www.youtube.com/watch?v=U1pq0NbPYM4

Pedro Abreu: A good example is the magnet field bending. It was this bending that was fundamental in the discovery on antimatter and the image is very clear (a track that bends). So, it teaches the importance of being aware of magnet bending that can then also be used to talk about accelerators, which is more "exciting" than just talk about F= q v x B in an abstract way.

Hans Peter: https://www.springer.com/gp/book/9783030523909#aboutBook

Rebecca Thomson: Thank you so much for having me. I have to leave in just a minute, but my email is rebeccat@fnal.gov. I look forward to working with you all in the future!

Michael Kobel: This is exactly what I cited with the concept of charges, Hans-Peter, you know electric charges, and extend the concept to all interactions. this works extremely well with teachers. The four-volume teaching material with this concept you find on https://www.teilchenwelt.de/material/materialien-fuer-lehrkraefte/unterrichtsmaterial-teilchenphysik/ and more material on https://www.teilchenwelt.de/material/materialien-fuer-lehrkraefte/ (all in german, unfortunately)

Pallab Roygupta: We teach that like particles repel each other and unlike particle attract each other but we don't teach why is It so....but it can be explained in the school level as well...small questions often take us to the wonderland of particle world; we just have to Voyage

Ken Cecire: I should mention the QuarkNet Data Activities Portfolio, which emphasizes high school student activities for learning through particle physics data.
https://quarknet.org/data-portfolio

Steve Goldfarb: Decathlon and Migros – only 10 minutes form CERN – have NASA material, but nothing from CERN. I've been frustrated by this issue for years. How do we expect to popularise particle physics if we can't even sell merch?

Connie Potter: I also completely agree with the 'reasoning' begin 'why' we need to do these projects (or even the LHC), as being utterly boring to any non-scientist. We have to find a story, a theme, some excitement. Just saying 'basic research' is meaningless and pointless but @jonas you have to adapt to society's attention span, society's interests.

Jonas Sandberg: @C, regarding the short attention span of society, my point is that we cannot always nurture that by going away from explaining the facts and how things really work in science :) And I think society can handle the truth, to a larger degree than we think (but maybe I am too naive) :)

Ken Cecire: Good points, Jonas - especially the emphasis on what we do not know. That is fundamentally exciting.

Steven Goldfarb: If we want to be inclusive, please steer clear of the “Europeans discovering North America” narrative. I used it in a TED Ed animation and regret it.

Charles Timmermans: Indeed making analogies is very tricky… The problem with the biology analogy is that one animal is enough to extract all info. Ie, you found one and you are done!

Uta Bilow: But extracting all information means studying social behaviour, eating habits, reproduction, etc.. A Long list!

Connie Potter: Which is why Vojtech Pleskot and his friends produced this brilliant film A Day In Particles which premiered at ICHEP, to show a typical day for a scientist, and then also their family life and hobbies

Charles Timmermans: Agreed, however the news only picks up “Discovery”. Afterwards, the public has to wait for national geographic (if they even watch that).