



19th IPPOG MEETING – online

May 7-9, 2020

[List of participants](#)

[Link to agenda](#)

The meeting that was planned to take place in Montenegro, was instead host online due the travel and sanitary restrictions due to the global pandemic linked to Covid19. This virtual edition of the collaboration meeting had a record of 64 participants registered; <https://indico.cern.ch/event/888362/registrations/participants>

IPPOG Open Session

- On his first presentation as chair, Pedro Abreu thanked former chair, Hans Peter Beck for his 7 years legacy and welcomed Jose Ruben Alfaro Molina, the representative for the newest member of IPPOG, the HAWC collaboration. At the beginning of this meeting the collaboration comprised a total of 33 members.
- Alexander Sharmazanashvili informed the collaboration that the only element missing to make Georgia a member of IPPOG is the signature of the MoU as all negotiations have been done. However the current Covid-19 situation imposes a problem and the date when that will happen is unknown.
- Uta Bilow and Ken Cecire gave an update on the International Masterclasses program reporting that 25% of it took place before the lock down. Among the new countries participating in this year program there were Croatia, Portugal, Romania, Egypt and India. Currently, the group is preparing for future masterclasses programs with new moderators, while the Belle II masterclasses are expanding in Asia and the particle therapy masterclasses are being developed in Mexico. More than 1000 students participated on The World Wide Data Day and other 600 on the International Women Day. Additionally there are two new proposals for masterclasses content in discussion: FASER and Quantum Computing.
 - **Follow-up: Investigate the suggestion to host one event with different masterclass content in order for students to have access to the full flavor of masterclasses of particle physics**
- Claudia Marcelloni presented the timeline, format and content of the very first IPPOG Annual Report originally requested by the CERN council.
 - Link to introduction of the report: https://drive.google.com/file/d/1jC4DEgSBf2_U7CDyYokqjSx7pwIG-ZHh/view?usp=sharing
 - Link to the member contributions to the report: https://drive.google.com/file/d/1Ls0NHHy_aE-WV9T055xQn55_9F2Ekw-K/view?usp=sharing
 - **Follow-up: Everyone was invited to give feedback through <https://forms.gle/1Wj8Q9Ln97b5fP3q6> by May 14th! And Jonivar kindly volunteered to proofread the final version.**

- Barbora Gulejova gave a report on the development of the IPPOG Website and Resources Database. The work started in 2018 and included the drafting of a technical specification, the production of the call for tender through CERN procurement, the definition of the work packages with the chosen company (BLIND), leading to the proposal of three design concepts. Barbora presented the membership of the newly-enlarged Web Development Steering Group and summarized conclusions from their recent meeting. She concluded with a long list of the work still to be completed in 2020 and 2021.
 - Follow-up: Call for curation team and input on the design and content for the database
 - Follow-up: Upload your IPPOG related photos to the [IPPOG folder on CDS](#)

Inspiring Success Stories

- James Gillies presented on behalf of the [“CERN against COVID-19”](#) taskforce. The task force was established by CERN’s DG in end of March to answer the request by a large number of the community to join forces to fight covid-19. The initiatives include medical devices, computing and data analysis and societal help. James added that the diversity of initiatives shows the strength of the scientific model and how it can benefit society. “It is hard to measure just yet the aftermath of the crisis and the legacy of these initiatives, however it will be interesting to see if it will help address the capacity of countries to produce basic products such as masks as well as what influence it might have on the concept of borders and communities”.
- Savannah Jennifer Thais reported on behalf of [Science Responds](#), an Open Source/Open Science group of 200 ‘Big Science’ researchers set up to: 1) make connections and enable (non-medical) researchers to contribute to understanding and combating the global pandemic 2) promote COVID-19 related research being done by physics and other researchers 3) explore how all types of research activities can adapt and be effective in this ‘virtual’ era. The main projects of the group currently are: virus and protein simulation with [Folding@home](#) and [Rosetta@home](#), medical equipment such as [ventilators from different universities](#), [Contact tracing](#), data storage and access, and [community vulnerability Index](#).
 - Follow-up: Open invitation to join and promote this platform: <https://science-responds.org/>
- Ken Cecire and Uta Bilow talked about the IMC initiatives to deal with the remote learning-at-home environment, giving a glimpse of few examples such as: in Germany 20 students participated in an ATLAS masterclass that was organised using Zoom breakout rooms for in depth discussion with students; in Slovakia scientists made video lectures and distributed them through Facebook and YouTube; in Spain CIEMAT hosted a CMS masterclass coupled with a virtual visit for 84 students. The main lesson learned from these experiences is that it is possible to hold a masterclasses virtually and that perhaps we could do it in the future but it shouldn’t be perceived as a substitute for traditional masterclasses.
- Ricardo Goncalo reported initiatives to fight Covid-19 by LIP. The laboratory used its facilities, the detector lab and workshops to produce face visors and developed an emergency ventilator in partnership with a local hospital. More than 500 visors have been produced and distributed to 3 hospitals and 2 universities

and the ventilator is waiting for a medical certification from the Portuguese agency INFARMED. The paper describing the production of these items is open access and available to anyone in any country. Additionally in order to keep up motivation and well-being of its staff, LIP has promoted a competition for the best teleworking stories and organised virtual coffee among peers.

Countries, Labs and Experiments Highlights

- Rebecca Thompson and Spencer Pasero gave a summary on Fermilab and Quarknet initiatives to serve and expand audiences remotely. Fermilab has created resources that included a grid of activities for students from grades 3–12, using the 5E education model to connect them into coherent strands that consist of: 1) recreating in person experience with virtual resources from the Lederman Science Center and 2) Guidance for parents new to working with students at home. Activities included for example, physics classes and the STEM Career Expo online. Quarknet created a central page of resources to help teachers and students and a whole summer program on particle physics that included online workshops and virtual cosmic ray analyses.
- Ana Godinho discussed two audio-visual projects lead by CERN: a 360 video of CMS that reached 1M viewers and received an honoree Webby award and a series of videos about the scientific research process with focus on how the Higgs was discovered, which has also received great attention on the social media platforms and YouTube.
- Jose Ruben Alfaro Molina talked about HAWC's educational activities in under-privileged areas through the support of two projects. The first project is "Mujeres en ciencia y tecnología" focus on female high school students mostly living in poor communities near INAOE, LMT and HAWC observatories. Participants of tis program attend scientific and personal growth talks. The second initiative is the "Mujeres en STEM Futuras lideres", a mentoring program for young high school students aimed to inspire them to consider science a possible career.
- Yiota Foka reported on the very positive reaction of students to the [First Particle Physics Masterclass in Mexico](#), adding that he organizers are now developing [online tutorials for Latin America](#).
- Nick Tracas, reported that in the last semester Greece host 7 IMC events (3 Athens, 2 Thessaloniki and 2 Crete) with a total of 500 students participating. The community is also involved in two projects, the <http://www.frontiers-project.eu> and the [Universe for all](#) (a 3 week-ends workshop for a total of 30 teachers). Additionally, the [Greek outreach site](#) is constantly being updated with new and enriching content.

IPPOG Session 02 - Panel Discussion

The aim of the panel discussion was to examine the potential for IPPOG to support formal education, through the re-packaging and extension of masterclasses with additional pedagogical methods and evaluation tools. The recent inclusion of a particle physics masterclasses as a required component of the secondary curriculum of physics students in New South Wales, Australia, provides an exciting example of what could be implemented worldwide. Such an endeavour would provide IPPOG with an opportunity to expand its global reach significantly. The panel discussed the current programs

available that address formal education and brainstormed methods to support and develop a coherent worldwide effort.

The panel discussion was organised and moderated by Uta Bilow (TU Dresden), Ken Cecire (U of Notre Dame, QuarkNet) and Christine Kourkouvelis (U Athens). Each panel participant gave a brief presentation of their current challenges before the discussion.

Chris Bormann (high school teacher from NSW) and Shantha Liyanage (research coordinator at NSW Department of Education) stated that their main motivation to organized masterclasses in NSW was to get students interested in STEM. In their point of view to scale up, they would need to provide access to all schools and also be able to connect to CERN at odd hours. Their goal is to have a resource hub, connection with experts and provide teachers support to address the new syllabus.

Christine Kourkouvelis (particle physicist from U of Athens) said that in her point of view the main challenges include sparking curiosity for HEP in students, which in most countries is absent from the national curriculum and help teachers navigate through the material available. To address these challenges, Christine suggests: connecting basic research with technology and applications; training teachers and (workshops, webinars, summer schools, CERN teachers' program etc) encouraging them to start the implementation with "light" scenarios and; informing the general public and the stakeholders who influence the curriculum would help to maintain interest in HEP even with the absence of discoveries.

Philipp Lindenau (didactics researcher from TU Dresden) added that curricula are more competence-orientated and the key questions to be answered are: How can Particle Physics and Particle Physics Masterclasses foster the required competences and which connections are there to established contents of curricula?

Shane Wood (QuarkNet Staff and District Science Supervisor from MN Moderators) shared his best set of practices used by Quarknet in US while organizing masterclasses that include asking teachers to have a gamified experience in the classroom before students attend the masterclass to help with the introduction to the scientific process. The main goal of these activities is to change the perception of the student of science as a pile of knowledge to an interesting and exciting process. He noted that is possible to adapt these pre-masterclasses activities to online platforms.

The panellists then addressed the following questions:

Question 1) What about the scientific method in K7-K9/K10? Chris answered that their goal is to introduce and motivate students in the early years to enquire about the physics process, since HEP is only available in the curriculum at the later years.

Question 2) How can we get some order into the complete chaotic way that particle physics is described and can IPPOG be helpful? Shantha said that one needs to consider the environment and the specific context and that language inconsistency is indeed a challenge. Chris added that language and consistency is a challenge and a body like IPPOG could provide a more uniform language to help teachers' confidence on taking new topics. For example "I think there is a common concept of "pushing scale"

(time, precision, measurements, etc) that I like to use and a story line like this would help”.

Questions 3) Particle physics became mandatory in NSW to teachers; is there a push back? Chris answered that there is more a push out than back, something that teachers leave for last and address very late. He added that a series of videos about the scientific process with data visualization that shows the job of a physicist would really help.

Question 4) How many particle physics data sets are really sufficient for teachers and students? Shane answered that it depends on the experience of the teachers and the information they were giving.

Question 5) Would it be useful to develop more activities in which the students can carry out analyses themselves and how to introduce it to the curriculum through different years? Shane replied that he would prefer to use natural observations about physics and scientific thinking to teach students about analysis versus data per se. Chris added that making a model and explaining to students that there is no one right answer by using examples such as the CERN S’Cool LAB’s mystery box is really great too.

There were couple of remaining questions raised by the collaboration that the panel had not time to address:

- Teacher’s knowledge in particle physics decrease as the years go by, how can we help with that?
- What format would help to make not only teachers, but also students and parents more conscious about potential jobs, for example in applied therapies, which is a field that is missing people with knowledge?
- Do you think that the present situation will help to convince teachers of the value of a remote connection with a scientist?
- What about using some sort of masterclasses to include HEP sessions in national teacher training programmes?

Below some of the parallel discussions and links shared:

Q- Would a follow-up to the 2007 paper Uta sent round be possible on a large pool of students that have gone through MCs and some sort of longitudinal study?

A - that would really be nice, but privacy rules do not allow us to keep information about the students that follow MCs making this request nearly impossible

Comment - Perhaps a pseudo-longitudinal study would be possible?

- http://www.teilchenwelt.de/fileadmin/user_upload/Redaktion/Netzwerk_Teilchenwelt/Downloads/Teilchensteckbriefe_engl.pdf
- <http://inspiringscience.rdea.gr/delivery/view/index.html?id=d9d4548e86fc449699bbd42ada36377f&t=p>
- <http://iopscience.iop.org/article/10.1088/0031-9120/42/6/012/meta>
- <http://opendata.cern.ch/record/700>
- <https://resources.perimeterinstitute.ca/collections/process-of-science/products/the-process-of-science?variant=17149028614>
- <http://opendata.cern.ch/record/700dimuon>

- <http://doi.org/10.7483/OPENDATA.CMS.CB8H.MFFA>
- <http://opendata.cern.ch/record/700>

IPPOG Session 03 – Working Groups - Collaboration Matters

- Michael Hoch and Hans Peter gave a report of all the activities of the members of **the Exhibits and Public events WG**. Vojtech Pleskot presented the preparations for ICHEP and the program “Be Inspired” that included masterclasses, cloud chamber atelier and art workshops in collaboration with a well-known Czech artist; although due to the pandemic the ICHEP conference will take place online and most of the activities will have to be readapted, the collaboration with the artist will continue. Ivica Puljak talked about the initiatives in South East Europe that included an exhibition in the biggest art museum in Split and discussed the application for the EU grant to further projects. Michael Hoch presented the 2020 version of “Collisions in Vienna” with the presence of the CERN DG Fabiola Gianotti and two Nobel Prize winners. Hans Peter talked about the international balloon festival at Chateau-d’Oex in Switzerland, which featured objects and workshops that linked the local characters to science and art.
- Kenneth William Cecire and Uta Bilow reported on the **Expanding Masterclasses WG**. There has been progress in Mozambique with equipment installed for masterclasses; ALICE masterclass’ expansion in India and U.S.; extensive work in Mexico on particle therapy masterclasses; and expansion in East Asia (Vietnam, Taiwan and Hong Kong). They are also combining the current CERN/Fermilab Spanish-language videoconferences and reaching underserved populations. Also the group is considering pumping up the “MC-in-a-box” project by adding a USB drive and be able to provide a plug-and-go kit.
 - Follow up: follow up the idea to continuing perusing online masterclasses beyond covid-19 to reach remote regions.
- Yiota Foka and Barbora Bruant Gulejova presented the summary of the **Outreach of Applications for Society WG**. The main goal of the group is to collect stories on applications of fundamental research for the benefit of society. The main challenge is to maintain the correct and accurate scientific input in the story telling. They are currently collecting examples of application of technology and technical details related to them to delivery coherent stories. Many good examples and ideas were given during the WG such as: PET, muon radiography (study pyramids or volcanos), muon tomography (scanning large volumes...), GNSS (Global Navigation Satellite System); superconductivity potential use for energy transport, GPS and touch screen.
 - Follow up: Call for members to join this working group!
- Despina Hatzifotiadou reported about the activities of the Speakers and Publication Committee. It’s initial members were: Farid Ould Saada, Pedro Abreu, Marge Bardeen, Despina Hatzifotiadou. The current members are Farid Ould-Saada, Dezsö Horvath, Despina Hatzifotiadou and Jonas Strandberg (who will join the group after the summer). The main tasks of the group are: collect relevant events for IPPOG (conferences, schools, exhibitions), collect publication material, follow-up the process and provide quality assurance, submit abstracts, write-ups and publications, circulate material within IPPOG, organise talk rehearsals and circulate draft of talks and assign speakers. Despina gave an

overview of the upcoming 2020 and 2021 planned conferences and the uncertainty around them due to Covid-19. Ian Bearden volunteered to help the committee by suggesting that IPPOG should be present on education conferences. Uta and Phillip suggested the World Conference on Physics Education, GIREP and Edulearn. There was a link shared in a chat related to these educational conferences:

https://www.researchgate.net/publication/335305012_Introducing_an_innovative_approach_of_teaching_the_Standard_Model_of_particle_physics_at_high_school

- Follow-up: Call for members to propose specific talks at the major conferences, especially if they already attending them.
- **Following a vote during the CB meeting, the IPPOG fall meeting will take place at CERN on 2 to 4 of December 2020.**