



International Particle
Physics Outreach Group

International Particle Physics Outreach Group

Introduction & Dark Matter Masterclass

Steven Goldfarb, *IPPOG Chair*

Presented on behalf of the IPPOG Collaboration, iDMEu, 12 May 2021

Education, Outreach & Communication

Communication

- **Report Goals and Results** to the public
- **Extend Reach** through methods & networks

Education & Outreach

- **Establish Understanding** of scientific process
- **Instil Appreciation** of fundamental research
- **Build Trust** with communities
- **Train Next Generation** of scientists



Education, Outreach and Communication are **Strategic Pillars** of Research
They are what we have to do **before** we build, not just after!

IPPOG

International Scientific Collaboration

- Active Researchers with Experience in Education & Outreach
- Experts in Communication & Education

Global Network

- 37 members: 30 countries, 6 experiments, 1 intl lab (CERN)
- 2 associate members: 2 national labs (DESY, GSI)

Organise Global Activities

- International Particle Physics Masterclasses
- World-Wide Data Day, Global Cosmics, etc.

Support Local Activities

- Sharing of expertise, best practices, material database
- Resources to support events, kick-start activities



IPPOG Origins

1997 Birth of European Particle Physics Outreach Group (EPOG)
formed under the joint auspices of ECFA and EPS-HEPP

"...the particle physics community has a moral obligation to inform the public on its activities. To do this well, experiences must be shared among countries in view of the need to optimize the use of resources."

- Chris Llewellyn-Smith, CERN DG

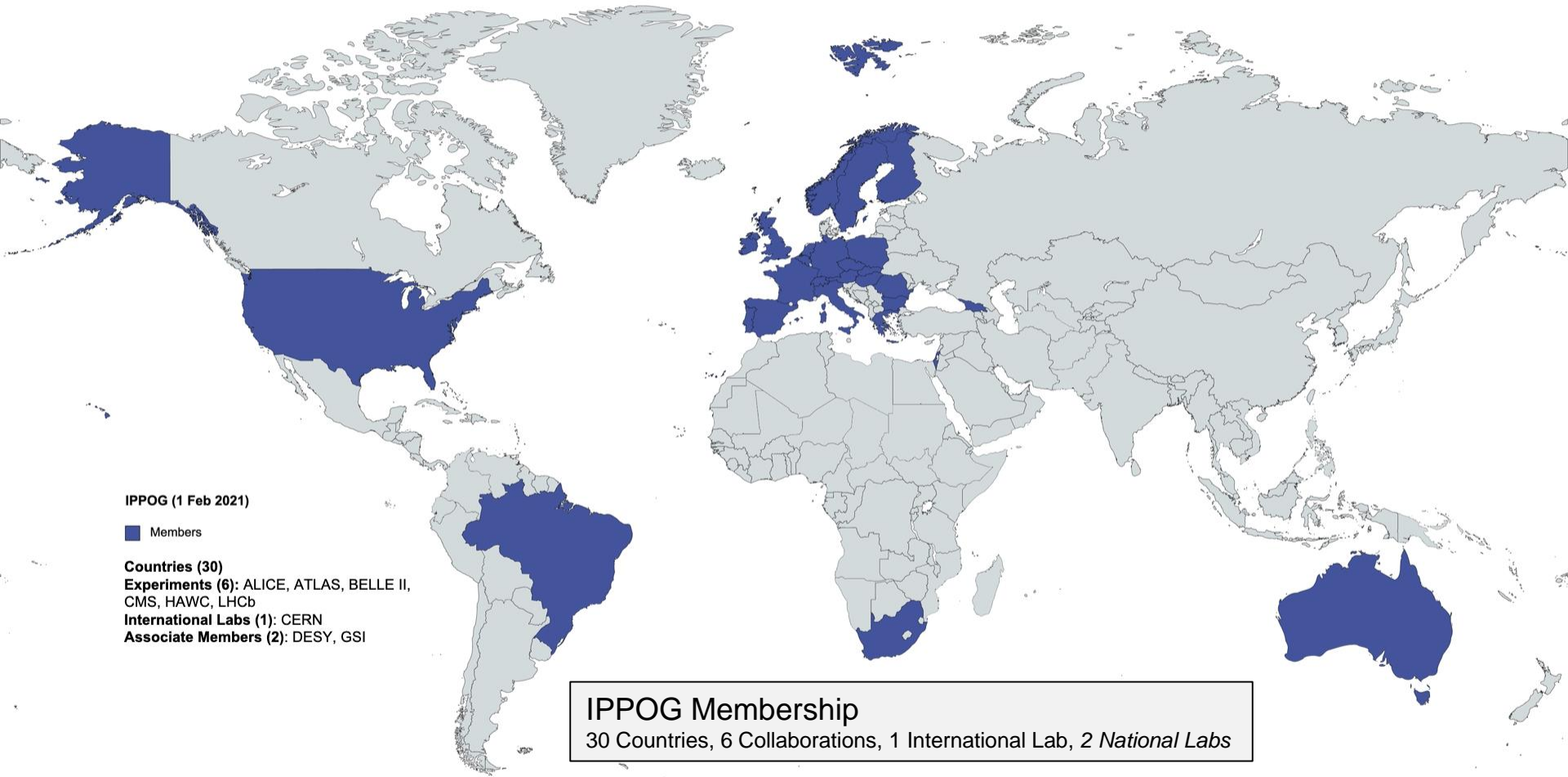


2011 Global Expansion to IPPOG

Israel, Australia, USA (now South Africa, Brazil,...)

2016 Formal Scientific Collaboration

Memorandum of Understanding



IPPOG (1 Feb 2021)

■ Members

Countries (30)

Experiments (6): ALICE, ATLAS, BELLE II, CMS, HAWC, LHCb

International Labs (1): CERN

Associate Members (2): DESY, GSI

IPPOG Membership

30 Countries, 6 Collaborations, 1 International Lab, 2 *National Labs*

Organisation

Chairs

- Steven Goldfarb (University of Melbourne) 2017-2022 (2nd term)
- Pedro Abreu (LIP, IST Universidade de Lisboa) 2020-2022 (1st term)

Core Team

- **Strategic Development & Communication:** Barbora Gulejova (Universität Bern)
- **Administrative Support:** Anita Bens (CERN)

Coordination

- **Masterclasses:** Uta Bilow (Dresden University), Ken Cecire (University of Notre Dame)
- **Global Cosmics:** Sabine Hemmer (INFN), Carolin Schwerdt (DESY)

Organisational Bodies

- **Advisory Boards & Committees:** Finance, Speakers & Publications
- **Steering Groups:** Masterclasses, Global Cosmics, Web Development
- **Working Groups:** Bringing Masterclasses to New Countries, Explaining Particle Physics Hot Topics, Exhibits & Public Events, Outreach of Applications for Society

Sharing Ideas

19th IPPOG Meeting

- Online, 7-9 May 2020
- Working Group Meetings & Reports:
 - Exhibits & Public Events
 - Expanding Masterclasses to New Countries
 - Outreach of Applications for Society
- Panel Discussion: “IPPOG, Masterclasses and Formal Education”
 - Educators & Education Specialists
 - Australia, Germany, Greece, USA

20th IPPOG Meeting

- Online, 2-4 Dec 2020
- Working Group Meetings & Reports:
 - Expanding Masterclasses to New Countries
 - Exhibits & Public Events
- Panel Discussion: “The next steps following the European Strategy Recommendations”
 - CERN ECO, EPPCN, NuPECC, APPEC, FNAL
- Masterclass Training Sessions



European Laboratory for Particle Physics

International Particle Physics Outreach Group

IPPOG Friends

IPPOG 238 Tweets

Instagram

ippogorg

118 posts 461 followers 28 following

IPPOG International Particle Physics Outreach Group: a global network of scientists, educators and communicators for #particlephysics education and outreach ippog.org.wixsite.com/girlsdophysics

Followed by ihcexperiment, cern, anagodinho11 + 8 more

Communication Platforms

International Particle Physics Outreach Group
<http://ippog.org>
<http://facebook.com/ippog>
<http://facebook.com/groups/friends.ippog>
<http://twitter.com/ippogOrg>
<http://instagram.com/ippogOrg>
ippog-friends@cern.ch

Special Prize Youngest participant
 Girls do Physics
 Special Prize Most active team
 Girls do Physics
 Fourth Prize
 Girls do Physics
 Second Prize
 Girls do Physics

International Particle Physics Masterclasses

The Flagship of IPPOG

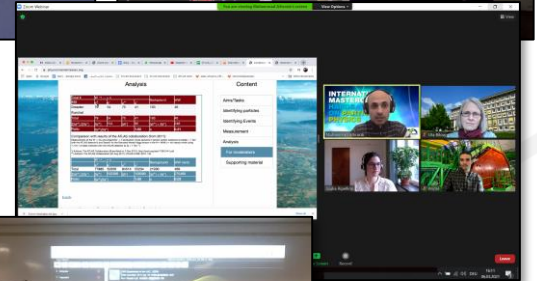
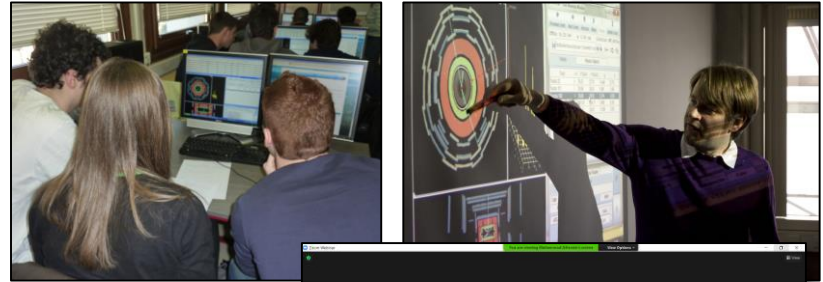
- Students become “Researchers for a Day”
- Invited to research institute or university
- Introductory lectures on research
- Use analysis tools to examine real data
- Worldwide videoconference w/other students

2019

- 60 countries, 220 labs, **14,000 students**

2021 (11 Feb – 27 Mar)

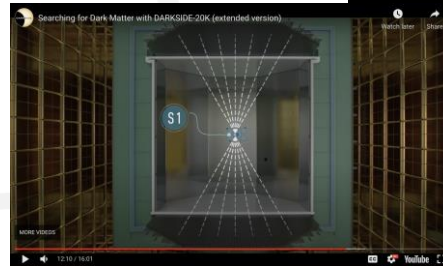
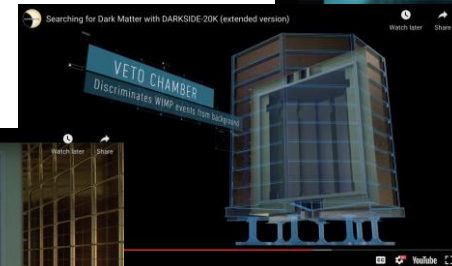
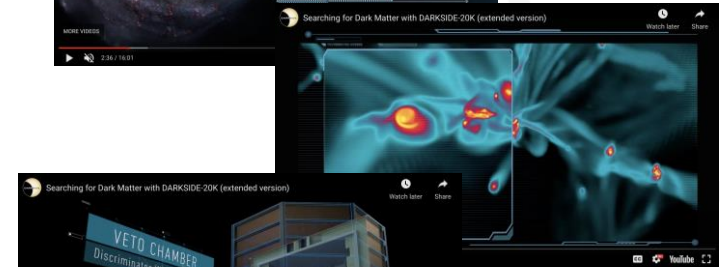
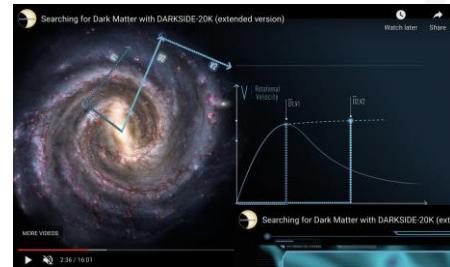
- Feb 11 (UN Day Women & Girls in Science): 7 groups
- CERN (LHC): 137 Masterclasses, **5192 students**
- GSI (Particle Therapy): 33 Masterclasses
- KEK (Belle II): 5 Zoom sessions
- FNAL (LHC, Neutrino): 38 Masterclasses, **600 students**



The IPPOG Darkside Masterclass

Direct Measurement by the Darkside Experiment

- Created in 2020
 - Darkside researchers, Centro Fermi, IPPOG
- LAr detector in Gran Sasso
- Simple, Excel-based analysis
 - Cuts on timing, energy, fiducial region, etc.
 - Look for DM candidates
- Excellent Introductory Video

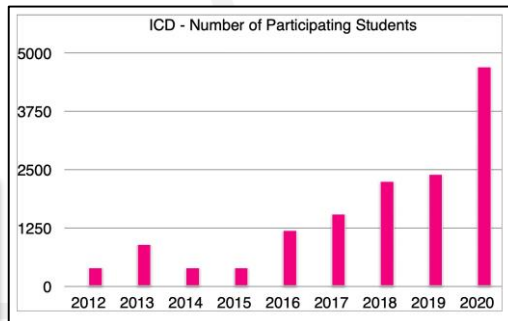
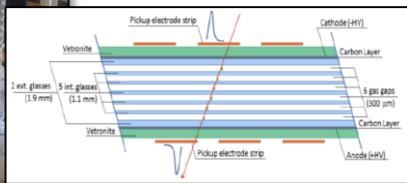
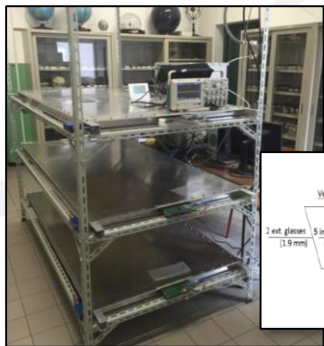


Global Cosmics

High School Initiatives Exploring Cosmic Rays

Sabine Hemmer (INFN), Carolin Schwerdt (DESY)

- International Muon Week (1-5 Apr 2019)
 - 54 sites participated
 - World-wide project: measure average speed of muons
- International Cosmic Day (4 Nov 2020)
 - 16 countries, 100 cities, 4700 students



Discover Cosmic Rays

INTERNATIONAL COSMIC DAY

HOME POSTER PHYSICS PROGRAM PARTICIPATE MAP PROJECTS PROCEEDINGS MEDIA

FAQ [Print](#) [Facebook](#) [Twitter](#) ORGANIZATION

Global Cosmic Ray Studies

Projects for High School Students

There are several projects around the world that address young people and teachers, to give them the opportunity to explore cosmic particles. These projects are presented below. For further information, please visit the websites.

FINLAND

CALLIO LAB Doing cosmic ray physics underground is something the young students are really interested in. The Centre for Underground Physics in Pyhäsaari (CLUP) of Callio Lab, in Finland, has made it possible. The outreach program, established in 2016, is based on the cosmic ray experiment EMMA and particle physics. The emphasis is on the hands-on exercises with simple data and detectors. The workshops and theme days are well liked. The outreach is also taken into the community by participating into annual town fair of Pyhäsaari with general public lectures, and organizing theme weeks on physics topics together with science centre Tietomaa in Oulu. Website: [Callio Lab](#).

FRANCE

Sciences à l'École Cosmos à l'École. In France, a collaboration started several years ago between the "Institut National de Physique Nucléaire et de Physique des Particules" (IN2P3) of the CNRS and "Sciences à l'École", a project from the French Education Ministry which is promoting science at high schools and higher education. Large cosmic ray detectors called "CosmoMoteurs" are built in the Marseille IN2P3 laboratory (CPPM) and given to high school teachers selected by "Sciences à l'École". These teachers are trained prior to receiving the detector – a one week-long seminar at CERN, part of the High School Teacher program, plus a technical course in Marseille to learn how to use the apparatus. These teachers then exchange information through a dedicated internet forum and present the educational activities they develop with their CosmoMoteurs. There are currently 30 such detectors in France and 15 more will be released in 2017. Website: [Sciences à l'École](#).

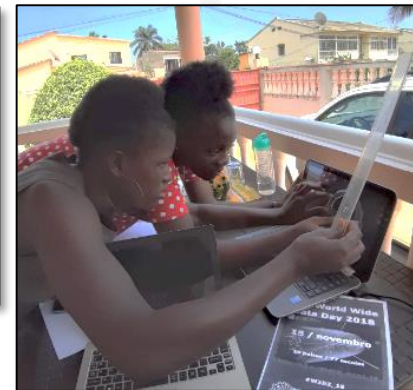
CERON CERON is a virtual lab dedicated on cosmic rays. The Labex OCEVU (a cluster of 6 research laboratories located in the south of France) and the Observatoire Midi-Pyrénées offers the possibility for the teachers and their students, from high school to university to experiment cosmic ray physics for real on a dedicated platform online. Via a website, they could select their own experiment through several ones (muon lifetime, Earth's West effect, Rossi experiment, Auger experiment, cosmic ray network) and download the data during a chosen period. The experiments are located on the Pic du Midi de Bigorre in the French Pyrenees and are running continuously since may 2015. The use is in open access. Website: [CERON](#), the official website is under construction and will be available on June 2017).

<http://globalcosmics.org>

World-Wide Data Day (W2D2)

Oct 2019/2021 (24h)

- Participating groups: 48/43
- Students: 969/590
- Moderators: 8 / Videoconfs: 15



Measurement

- Students worldwide analyse data from LHC events
- Data analysis at school, physics discussion in VC
- Measurement used in Chile, Mexico, Namibia workshops in 2018
- Great growth in Mexico: 9 groups
- Measurement stable

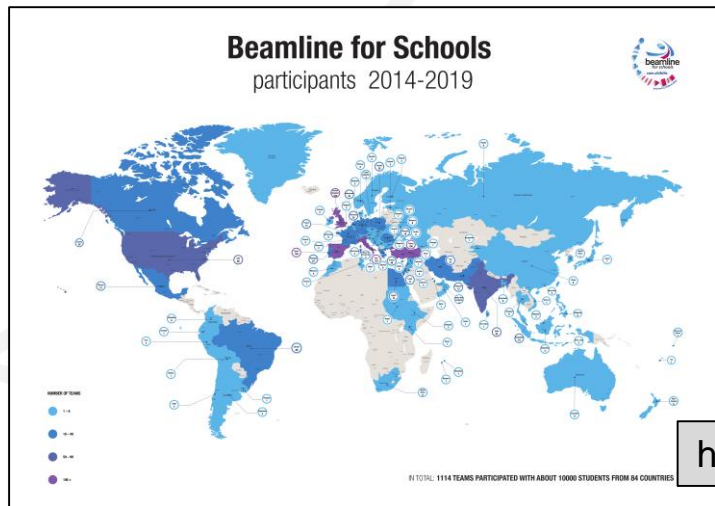


<https://quarknet.org/content/world-wide-data-day>

CERN's Beamline 4 Schools

IPPOG Participation

- Local Contacts to Schools
- Help Remove Language Barrier
- Give Guidance for Physics, Feasibility



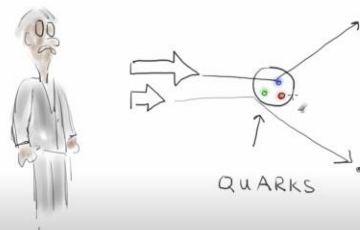
<http://beamlineforschools.cern>

Public Events & Festivals

Colours of Ostrava
Czech Rep, 2019

Pohoda Festival
Slovakia, 2019

CHEP, Sofia, Bulgaria, 2018
• Universal Science
CHEP, Adelaide, Australia, 2019
• Universal Science
ICHEP, Online, 5 Aug 2020
• Big Bang Stage



the particles from which protons and neutrons are composed.

<http://universalscience.web.cern.ch>



Thank you

