



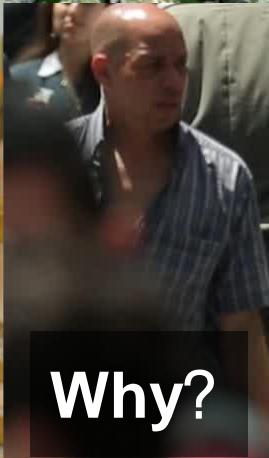
International Particle
Physics Outreach Group

International Particle Physics Outreach Group

Reaching Across the Globe with Science

Steven Goldfarb, *IPPOG Chair*

Presented on behalf of the IPPOG Collaboration, CHEP, Adelaide, Australia, 5 Nov 2019



Why?





How much?



**Who to believe?
What to do?**

A long-exposure photograph of a night sky featuring the Milky Way galaxy. The galaxy's core is visible as a bright, dense band of stars and dust, stretching diagonally across the frame. The foreground shows a range of rugged, snow-capped mountains under a dark, star-filled sky. The overall scene is serene and majestic, capturing the beauty of the natural world and the universe.

What are the answers they see?



A Handy Flowchart For the Anti-Vaccine Science Denier



VACCINES CAUSE AUTISM!

"Findings of this meta-analysis suggest that vaccinations are not associated with the development of autism or autism spectrum disorder. Furthermore, the components of the vaccines (thimerosal or mercury) or multiple vaccines (MMR) are not associated with the development of autism or autism spectrum disorder."



VACCINES CAUSE DIABETES!

"In this large, population-based, case-control study, we did not find an increased risk of type 1 diabetes associated with any of the routinely recommended childhood vaccines."

PEDIATRICS

FINAL VERSION

VACCINES CAUSE MS!

no longer-term association of vaccines with MS or any other central nervous system demyelinating syndromes, which argues against a causal association."

NEUROLOGY

JAMA Neurology

YOU CAN'T TRUST SCIENCE!

Homeopathy

The Journal of the Faculty of Homeopathy

Volume 106 • Issue 4

November 2017

ISSN 1475-4916

- Homeopathy and intellectual honesty
- Model validity of randomised placebo-controlled trials
- HIV nosatak 30c: has anticancer potential
- Case reports of integrated management of TB

- Nuclear Magnetic Resonance characterization
- Review of patenting devices
- Early homeopathy patients



Donald J. Trump

@realDonaldTrump

Follow

The concept of global warming was created by and for the Chinese in order to make U.S. manufacturing non-competitive.

RETWEETS

28,993

LIKES

17,835



11:15 AM - 6 Nov 2012



29K



18K



SCIENCE

'Mad' Mike goes flying

Flat Earth advocate finally launches his own rocket

THURSDAY

LIVE

3:42 pm ET

U.S. SENATE

SEN. JAMES INHOFE

R-OKLAHOMA

'SNOW' JOKE
SENATOR CALLS OUT WH ON CLIMATE CHANGE

FOX & friends



Large Hadron Rap

alpinekat • 8M views • 10 years ago

Rappin' about CERN's Large Hadron Collider! Links below... Apparently YouTube fixed the sound! Still, Will Barras made two ...

and the things that it discover 4:49



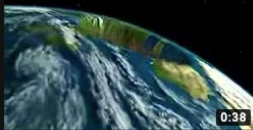
I'm a Physicist At CERN We've Done Something We Shouldn't Have Done part one

Paranoid Times • 6.5M views • 3 years ago

If you like my videos and want to support more content on my heavily censored, demonetized channel: * Patreon: <https://www...>

CC

18:11



The CERN black hole

BrainReleaseValve • 5.2M views • 11 years ago

<http://www.brainreleasevalve.com/> Stolen from Misunderstood Universe. Because its HILARIOUS. Yes, I know this can't happen.

0:38



Did CERN Created Black Hole Inside Earth? City Swallowed, Millions Sinkholes Opened. Hadron Collider

Igor Kryan • 3.2M views • 1 year ago

Did CERN Created Black Hole Inside Earth? City Swallowed, Millions Sinkholes Opened, Ocean Level Drops. Everything you are ...

13:43



Scary Portal Opening Above CERN? Helicopter Chases UFO & More! 9/20/16

secureteam10 • 2.3M views • 2 years ago

NYC UFO channel: <https://www.youtube.com/channel/UCi8wtM-5krkTTBXSoxpcqg> Secureteam10 is your source for reporting the best ...

15:27

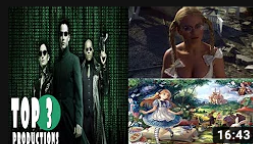


Anonymous - Everyone Needs to Pay Attention to This! (CERN ALERT MESSAGE 2017-2018)

Anonymous Official • 2.2M views • 1 year ago

Anonymous - Everyone Needs to Pay Attention to This! (CERN ALERT MESSAGE 2017-2018) JOIN US: <https://goo.gl/2mQaI0> - Connect ...

11:37



10 Best New Mandela Effect Examples PROOF (CERN Conspiracy) (Mandela Effect Mystery) 2017 - 2018

Hidden Knowledge • 1.3M views • 2 years ago

10 Best New Mandela Effect Examples PROOF (CERN Conspiracy) (Mandela Effect Mystery) 2017 - 2018 10. Alice and ...

16:43



Step inside the Large Hadron Collider (360 video) - BBC News

BBC News • 1.3M views • 3 years ago

A 360 tour of CERN that takes you deep inside the Large Hadron Collider - the world's greatest physics experiment - with BBC ...

4K 360°

3:15



The last words of Dr Edward Mantill a physicist at CERN #paranoidtimes #bestseller #novel

Paranoid Times • 1.1M views • 2 years ago

If you like my videos and want to support more content on my heavily censored, demonetized channel: * Patreon: <https://www...>

CC

9:05



Stewart Swerdlow - CERN, Blue Beam and the Portal to Hell

Freeman Fly • 1M views • 3 years ago

How many extraterrestrials are visiting Earth? Is the Project: Blue Beam alien in origin? Stewart Swerdlow unveils our planets ...

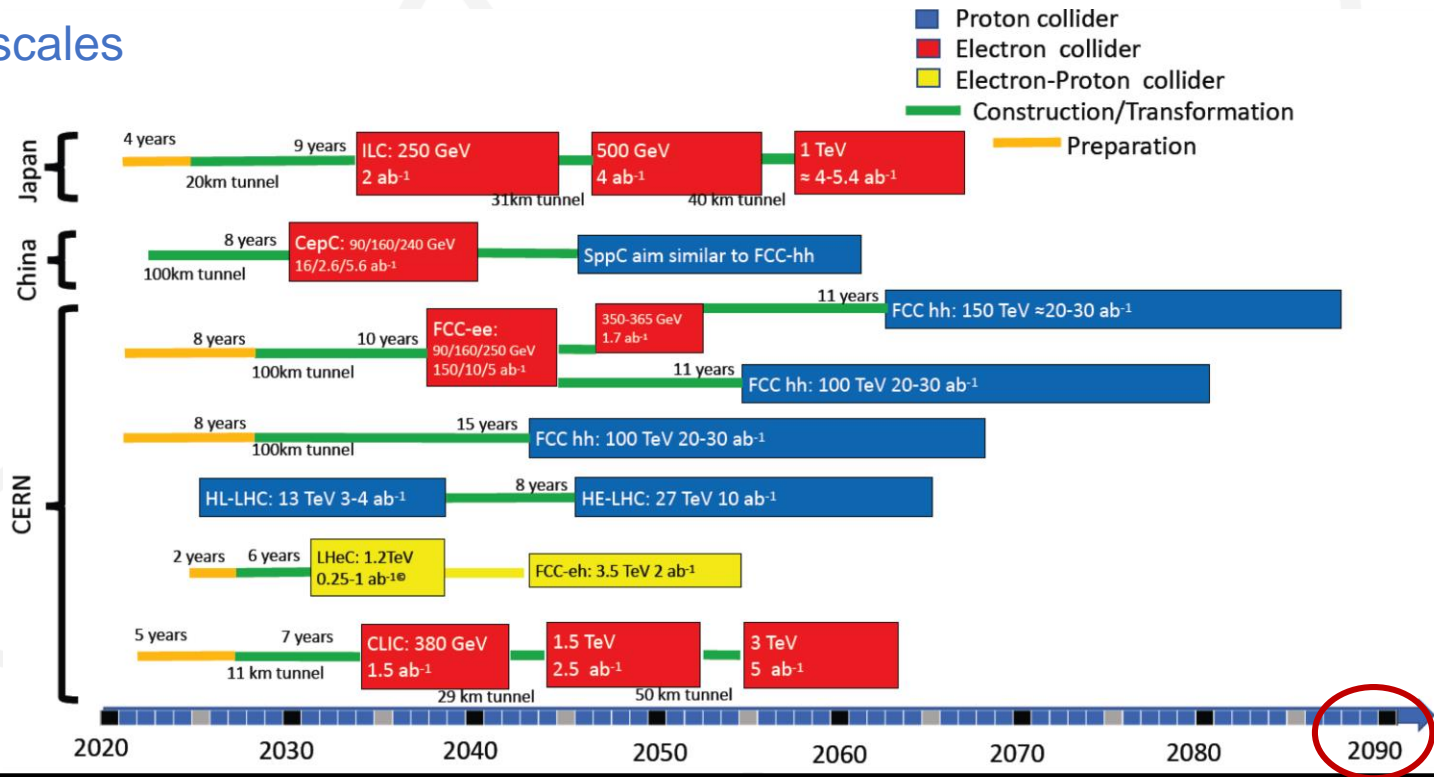
1:09:57

A night sky with the Milky Way galaxy and snow-capped mountains. The Milky Way is visible as a bright, hazy band of stars stretching across the sky. The mountains in the foreground are dark with patches of snow. The overall scene is dark and atmospheric.

Yet, in this environment,
we have big plans...

Future Plans for Particle Physics

Time scales



A long-exposure photograph of a night sky featuring the Milky Way galaxy. The galaxy's bright core and starry arms are visible, stretching across the upper two-thirds of the frame. Below the sky, a range of rugged mountains is silhouetted against the dark horizon, with patches of snow or light-colored rock on their peaks and ridges. The overall scene is dark and atmospheric, with a focus on natural celestial and terrestrial beauty.

How do we prepare for this?

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

- 26 Countries, 5 Experiments, 1 International Lab (CERN)
- Linked with national networks

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 (EPPOG)
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 Goals

Sustainable Development of Particle Physics Outreach

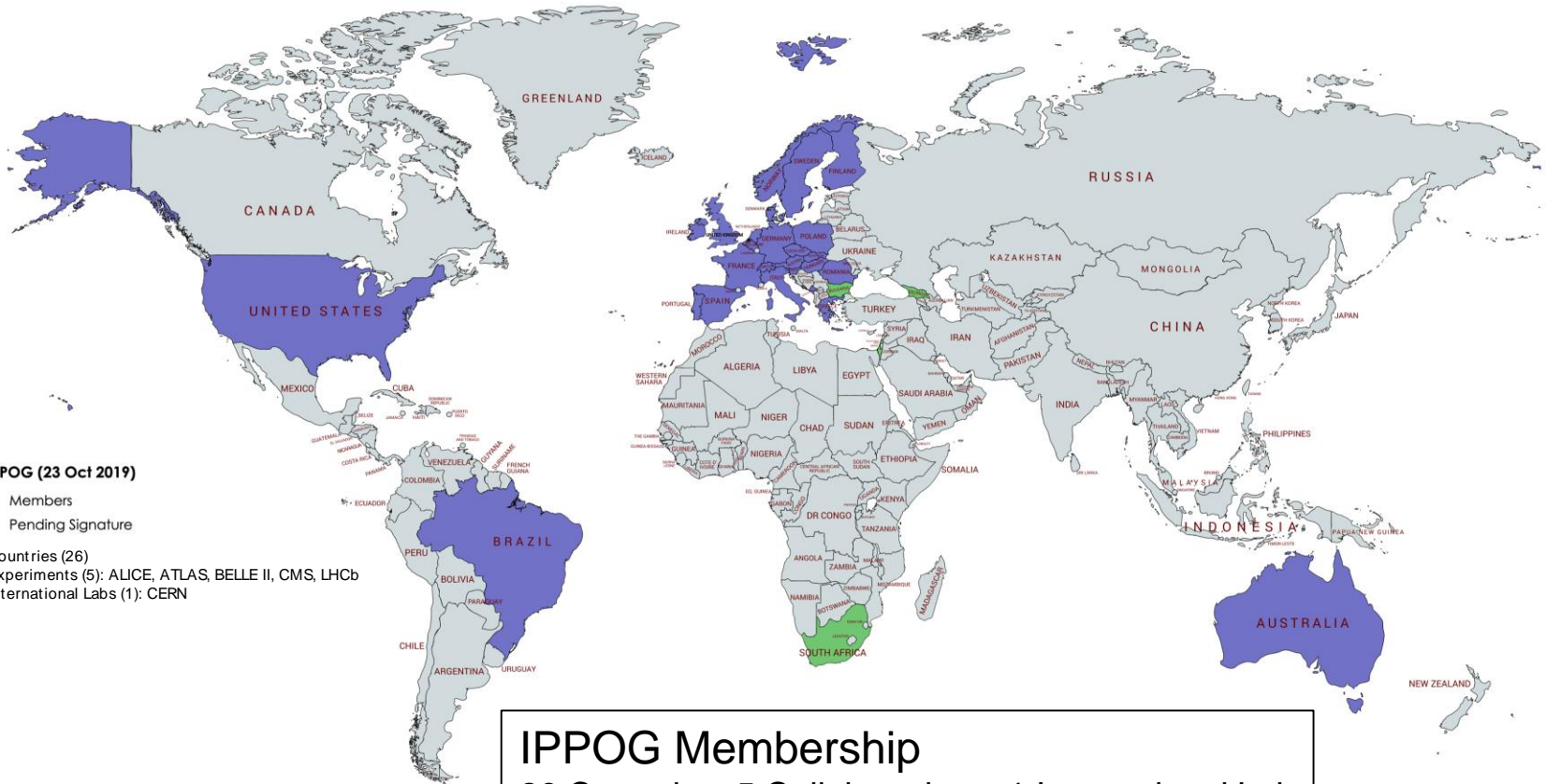
- Discussion forums for scientists active in Outreach and Informal Education
- Information exchange between individuals, institutions and laboratories
- Active working groups addressing specific challenges of global Outreach

Improving Outreach Standards Worldwide

- Development of Strategies based on current best practices and experience
- Long-Term links between scientists and education specialists
- Continual development & improvement of explanatory material

Extending Global Reach

- Expansion to Countries and Peoples underrepresented in Particle Physics
- Usage of new methods, activities and topics to reach broader audiences
- Active online communication platforms



IPPOG (23 Oct 2019)

- Members
- Pending Signature

Countries (26)
 Experiments (5): ALICE, ATLAS, BELLE II, CMS, LHCb
 International Labs (1): CERN

IPPOG Membership
 26 Countries, 5 Collaborations, 1 International Lab

Created with mapchart.net ©

MoU Commitments

Experiments

- Recognition of outreach as key component of research programme
- Recognition of efforts of collaboration members who do outreach
- In-Kind contributions (data, tools, educational material, in-kind support)

Countries

- Representative, access to national research programme & education networks
- Modest monetary support for IPPOG activities & infrastructure

Laboratories

- CERN contributes 5 kEUR + Masterclass Coordinator + Scientific Secretary + Infrastructure for Web, Finance, Legal Support

Organisation

Chairs

- Hans Peter Beck (Universität Bern) 2013-2019 (completing 2nd term)
- Steven Goldfarb (University of Melbourne) 2017-2019 (completing 1st term)

Core Team

- **Strategic Development:** Barbora Gulejova (Universität Bern)
- **Community Lead:** Claudia Marcelloni (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 & Exhibitions

Sharing Ideas

17th IPPOG Meeting

- GSI-FAIR, Darmstadt, Germany, May, 2019
- Steering Group Meetings & Reports:
 - Global Cosmics, Masterclasses
- Working Group Meetings & Reports:
 - Exhibits & Exhibitions
 - Explaining Particle Physics to a Lay Audience
 - Expanding Masterclasses to New Countries
 - Outreach of Applications for Society
- Panel Discussion:
 - Outreach on the benefits to society from fundamental research

18th IPPOG Meeting

- CERN, 28-30 Nov 2019



European Laboratory for Particle Physics

International Particle Physics Outreach Group

HOME | ABOUT PARTICLES4U | The International Particle Physics Outreach Group

IPPOG is a network of scientists and educators from around the globe in informal science education, matter, energy, space and time, and conveys to the public that its most fundamental part is the IPPOG collaboration at international laboratory.

Hans Peter Beck (University of Zurich)

Members of the IPPOG

In memory of our colleagues
*As a scientist I feel I have

International Particle Physics Outreach Group

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- IPPOG Friends
- "Staph" Only - Camp M...
- Young Science

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IPPOG

238 Tweets

IPPOG @ippogOrg

Help Solve the Mystery of Dark Matter

World Wide Data #W2D2 #physics

Instagram

ippogorg

Following

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

Competition physicsIMC IPPOG Co... #RoleMod... Feb.11- M... #GirlsDoP... #GirlsDoP...

POSTS TAGGED

Special Prize Youngest participant

Girls do Physics

Special Prize Most active team

Girls do Physics

Team: Eiviro Contreras Martos, Tania Fernández Millán, Carla Martínez Alcoraz, Lucía Garrido Martínez, 15 years, Spain

Team coach: José María Díaz Fuentes

Fourth Prize

Girls do Physics

Team: Georgiana Stencu & Raisa Rogozan, 16 years, Romania

Second Prize

Girls do Physics

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

Communication Platforms

International Particle Physics Masterclasses

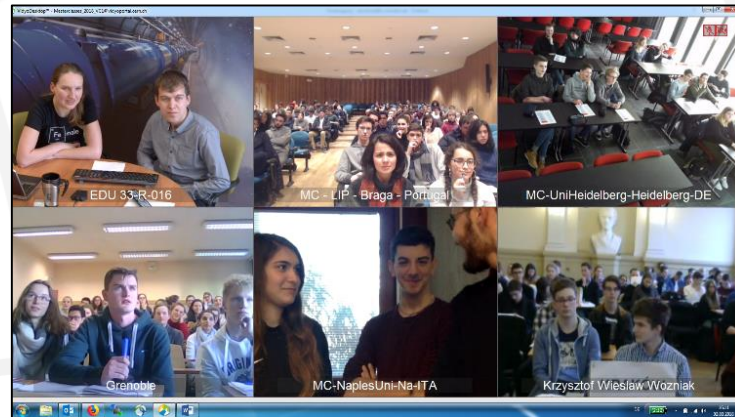
The Flagship of IPPOG

- Students become “Researchers for a Day”
- Invited to research institute or university
- Given introductory lectures on particle physics research
- Taught to use analysis tools on real data
- Spend 2 hours
- Discuss results at a conference with other students from around the world

In 2020

- 26 Feb – 8 Apr

See Track 8 talks of Farid Ould-Saada, Monday 15:00
and Lukasz Graczykowski, Thursday 12:00



International Particle Physics Masterclasses

The Measurements

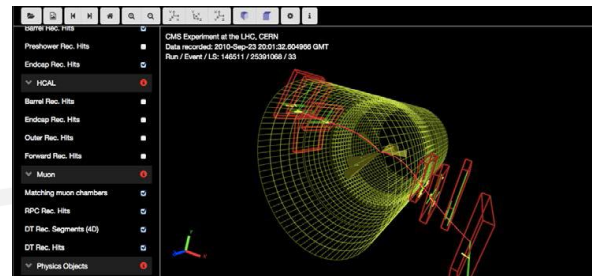
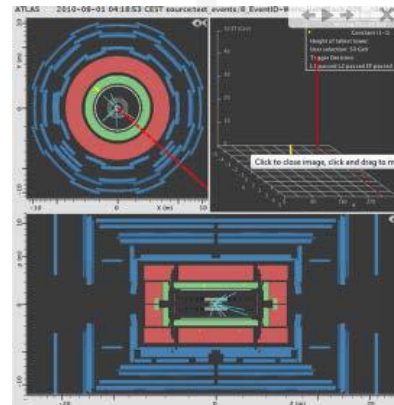
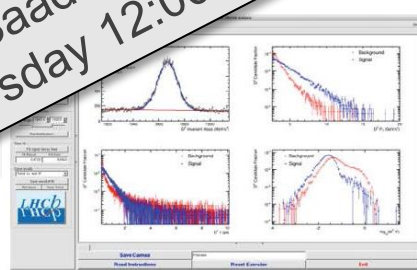
- ATLAS W-Path (Study Ratio W^+ / W^- , extra credit)
- ATLAS Z-Path (Measure Z Mass, extra credit)
- CMS (Identify W, Z, H Decays)
- ALICE Strange Particles
- ALICE R_{AA} Measurement
- LHCb $D^0 \rightarrow K\pi$
- MINERvA

New Measurements Being Explored

- IceCube, BELLE II
- Particle Therapy (GSI/FAIR)

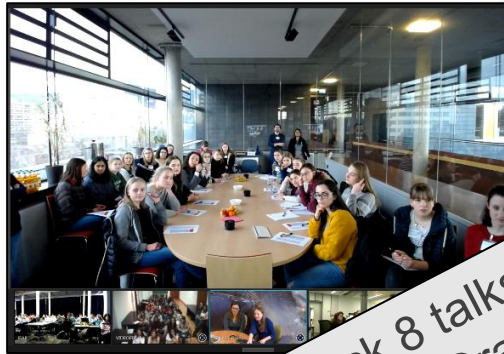
Tools & Data Continually Renewed

See Track 8 talks of Farid Ould-Saada, Monday 15:00
and Lukasz Graczykowski, Thursday 12:00



International Particle Physics Masterclasses

International Day of Women and Girls in Science 2019



See Track 8 talks of Farid Ould-Saada, Monday 15:00
and Lukasz Graczykowski, Thursday 12:00

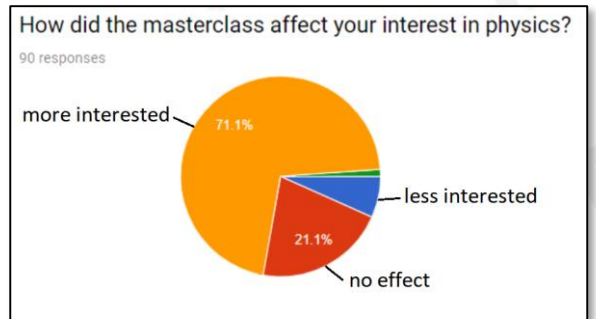


International Particle Physics Masterclasses



26 Apr 2019 Programme
16 Apr 2019

- 54 Countries
- added Spanish Videoconfs



QuarkNet

- 51 Institutes
- 54 LHC Masterclasses
 - 32 CMS
 - 22 ATLAS
- 12 MINERvA Masterclasses

TU Dresden

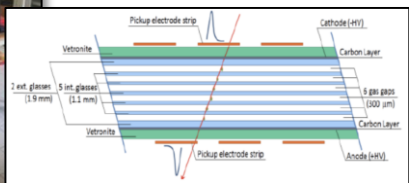
- 188 Institutes
- 266 LHC Masterclasses
 - 30 ATLAS W
 - 101 ATLAS Z
 - 64 CMS
 - 41 LHCb
 - 27 ALICE SP
 - 3 ALICE R_AA

Global Cosmics

High School Initiatives Exploring Cosmic Rays

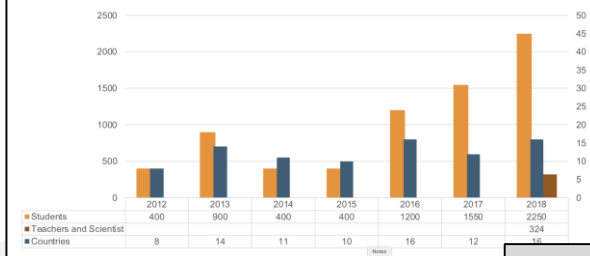
Sabine Hemmer (INFN), Carolin Schwerdt (DESY)

- International Muon Week (1-5 Apr 2019)
 - 54 sites participated
 - World-wide project: measure average speed of muons
- International Cosmic Day (6 Nov 2019)
 - What are cosmic particles? Where do they come from? How can they be measured?



Participants ICD

Growing Event



FINLAND

CALIBO LAB

Doing cosmic ray physics underground is something the young students are really interested in. The Centre for Underground Physics in Pyhäsaari (CLUPP) of Callo Lab, in Finland, has made it possible. The outreach program, established in 2010, 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 out into the community by participating into annual town fair of Pyhäjärvi with general public lectures, and organizing theme weeks on physics topics together with science centre Tietomaa in Oulu. Website: callo.org

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 in high schools and higher education. Large cosmic ray detectors called "Cosmodétecteurs" are built in the Marseille IN2P3 laboratory (CPPM) and given to high school teachers selected as teachers are trained prior to receiving the detector – a one week-long seminar at CERN, part program, plus a technical course in Marseille to learn how to use the apparatus. These teachers through a dedicated internet forum and present the educational activities they develop with their currently 30 such detectors in France and 15 more will be released in 2017.

e-PÉRON is a virtual lab dedicated on cosmic rays. The Labex OCEUVI (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, East/West effect, permanent cosmic ray network) and download the data during a choosen period. The the Pic du Midi de Bigorre in the French Pyrenees and are running continuously since may 2015. Total website is under construction and will be available on June 2017!

<http://globalcosmics.org>

World-Wide Data Day (W2D2)

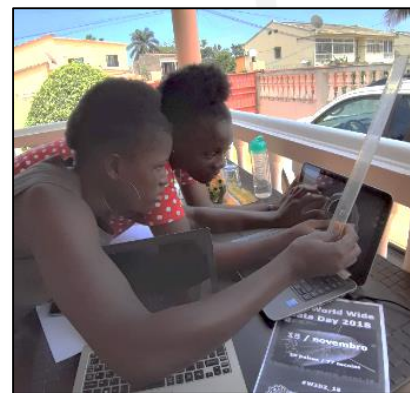
16 Oct 2019 (24h)

- Participating groups: 48
- Students: 969
- Moderators: 8

Measurement

- Students measure theta and phi for dimuon 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

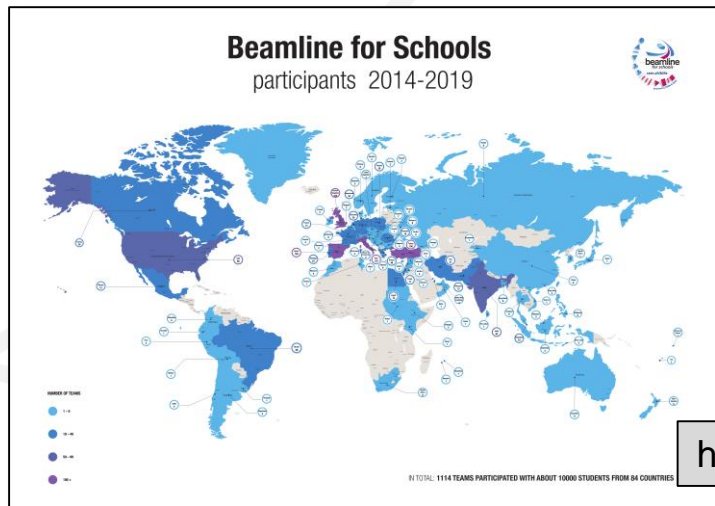
<http://tiny.cc/w2d2-18>



CERN's Beamline 4 Schools

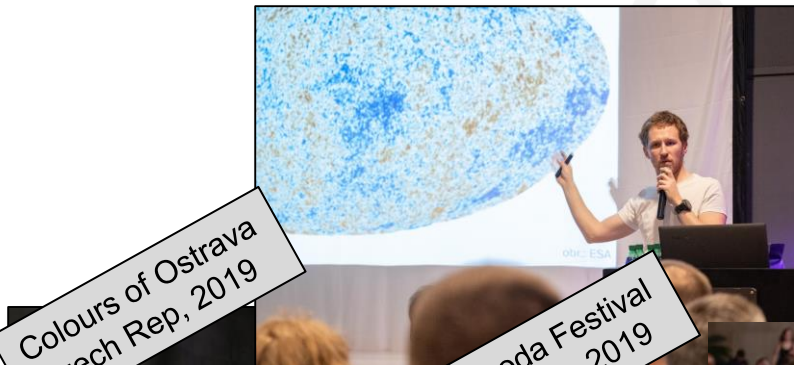
IPPOG Participation

- 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



Universal Science, CHEP
Sofia, Bulgaria, 2018
Adelaide, Australia, 2019



In The Media

Italy, 17 Nov 2018

Bulgaria, 23 Jan 2019

Italy, 5 Feb 2019

Brazil, 26 Mar 2019

Slovakia, 5 Apr 2019

Czech Rep, 26 Feb 2019

Serbia, 18 Mar 2019

Montenegro, 14 May 2019

In Conferences

APS April 2019 – Denver, CO, USA

- *International Masterclasses: Particle Physics for High School Students and Teachers*, Ken Cecire, IPPOG Masterclass Coordinator

LHCP 2019 – Puebla, Mexico

- *Particle Physics Outreach as a Strategic Pillar for Society: A report from IPPOG*, Sascha Mehlhase, ATLAS IPPOG Rep

EPS HEPP 2019, Ghent Belgium

- *Future Challenges in Particle Physics Education and Outreach*, Hans Peter Beck, IPPOG Chair
- *Developments in International Masterclasses*, Uta Bilow, IPPOG Masterclass Coordinator

ICNFP 2019 – Kolymbari, Crete, Greece

- *The International Particle Physics Outreach Group*, Despina Hatzifotiadou, ALICE IPPOG Rep

CHEP 2019 – Adelaide, Australia

- *International Particle Physics Masterclasses - Current development to expand scope and global reach*, Farid Ould-Saada, Norway IPPOG Rep
- *The International Particle Physics Outreach Group - Reaching Across the Globe with Science*, Steven Goldfarb, IPPOG Chair
- *New developments for ALICE MasterClasses and the new Particle Therapy MasterClass*, Lukasz Graczykowski, IPPOG Associate
- *The IPPOG Resource Database – Making Particle Physics Outreach & Education Available Worldwide*, Marzena Lapka, CMS IPPOG Rep



International Particle Physics Outreach Group *Reaching Across the Globe with Science*

