

Outreach Report



21 August 2017

CHIPP Plenary – CERN

Hans Peter Beck / Uni Bern

Outreach in the CHIPP Roadmap

<http://www.chipp.ch/chipp-meet-roadmap.html>

Outreach activities within science are intended to inform the **political platform**, the **informed public**, or the **potential young physicist**.

In the view of the Swiss particle physics community, the **primary aim is to convey to young secondary school students:**

- ❑ The importance, excitement and fantasy of basic physics and in particular recent particle physics and related cosmology developments.
- ❑ The importance of a sound mathematical background, since physics is by definition a mathematical description of fundamental phenomena.



CHIPP: Roadmap (2004)
and updates in 2010

☞ ensure adequate collaboration between Switzerland's high schools and universities on the vital question of outreach.

Outreach in CH

With minimal budget, a lot can be achieved:

- ❑ **Giving talks** to interested groups, open universities, schools, companies, societies, etc.
 - ❑ Schools, Universities Physics on Friday, Saturday Morning physics, Novartis, SECO, SwissRe, Rotary club, Astronomical society, Swiss Embassy London, ESO Montreux, TAK Lichtenstein, Swiss Embassy Tel Aviv, etc. etc. etc.
- ❑ **Interviews in Newspapers and giving expertise to journalists (print & online)**
 - ❑ NZZ, Tages Anzeiger, Tribune de Genève, Blick, Le Temps, 20 Minuten, etc.
- ❑ **TV**
 - ❑ Dedicated science reports, formats for children, even comedy shows
 - ❑ Rosanna checkt's, Müslüm TV
- ❑ **Coordinated outreach** done at/by universities (cantonal and federal) and laboratories (CERN and PSI)
 - ❑ **Open day events, Bachelor/Freshers information Days**
- ❑ **Many enthusiastic CHIPP members, involving all CHIPP institutes, are actively participating and never get tired in giving public talks, participating in public discussion, answering questions, etc.**

Communication offices at universities and laboratories do a great job in communicating headlines, latest results, press releases

but **can't explain the details, cannot educate, cannot get close** with the target audience

In 2016 throughout Switzerland

- ❑ more than **50 educational events** like information days for BSc and MSc students, for pupils finishing high school and for high-school classes were organized involving more than 3000 people.
- ❑ **CHIPP Board Members** gave **about 80 outreach talks** in 2016 on particle physics for high-school students, societies and the general public.
- ❑ **About 50 organized visits to CERN** took place in 2016, not only for university students in physics and other disciplines, but also for children (“Drôle de physique” programme), high-school pupils, alumni, members of societies, the media, and the public at large.
- ❑ An **open day for children** towards their professional orientation (“Zukunftstag”) took place at the Universities of Basel and Bern, which also prepared a few exhibitions.
- ❑ Participation of more than **150 Swiss high-school students** (at the Universities of Bern, Geneva, Zurich and the ETHZ) in the framework of the **International Masterclasses “Hands on Particle Physics”**, where over 13’000 Gymnasium level students in about 240 institutes in 42 countries can actually work with real data from the CERN LHC.

Wochenende Wissen

Treffen mit Laura Baudis, Physikerin auf der Suche nach kosmischen «Schwächlingen»

Die Frau, die Licht ins Dunkel bringt

Laura Baudis von der Universität Zürich sucht nach dunkler Materie im Weltall. Mit dem Detektor XenonIT hat sie gute Chancen, die rätselhaften Teilchen zu entdecken.

Joachim Lukenmann

Mitten im Autobahntunnel durch das Gran-Sasso-Massiv, 350 Kilometer östlich von Rom, zweigt eine Ausfahrt ab. Sie endet abrupt vor einem stilleren Tor. Dahinter verborgen sich die grössten unterirdischen Laboratorien der Welt, die Laboratori Nazionali del Gran Sasso. Dort findet sich ein Instrument, das die Physikerin Laura Baudis von der Universität Zürich massgeblich mitentwickelt hat: der Detektor XenonIT, ein mit rund 3,2 Tonnen flüssigen Xenon gefüllter Tank.

An einer Wand in ihrem Büro hat Baudis (47) ein Poster von XenonIT aufgehängt. Oben und unten am zylinderförmigen Tank sind insgesamt 248 Lichtdetektoren angebracht. «XenonIT ist derzeit das sensibelste Instrument der Welt, um nach der kosmischen dunklen Materie zu suchen», sagt Baudis. Viele Beobachtungen deuten darauf hin, dass die uns bekannte Materie nur rund 20 Prozent der gesamten Materie im Weltall ausmacht. Der Löwenanteil von rund 80 Prozent muss aus einer anderen, nicht leuchtenden Substanz bestehen, die kaum mit der uns bekannten Materie in Wechselwirkung steht. «Mit XenonIT hoffen wir völlige Neuland. Wir können unsere Messungen von Xenon untersuchen, wo noch niemand hingeschaut hat», sagt Baudis. «Es ist das Faszinierendste.»

Bereits 1933 hat der Schweizer Astrophysiker Fritz Zwicky erste indirekte Hinweise auf die dunkle Materie entdeckt. Dabei handelte es sich um eine Annammlung von über tausend Galaxien, die wie Mücken in einem Schwarm umeinander kreisen, und zwar so schnell, dass der Coma-Khaufen Energie hätte ausstrahlen müssen. Es sei denn, der Galaxienhaufen bade in einem See aus unsichtbarer, dunkler Materie, der die Galaxien durch seine Schwerkraft zusammenhält. Mittlerweile gibt es zahlreiche weitere Indizien für die Existenz der dunklen Materie.

1400 Meter dicke Abschirmung
Möglicherweise handelt es sich dabei um recht schwere, elektrisch neutrale Teilchen, die nur schwach mit der gewöhnlichen Materie interagieren. Die Physiker nennen sie daher «weakly interacting massive particles», kurz Wimpis, das englische Wort für Schwächlinge. Laut Theorie jagt jede Sekunde eine Million Wimpis durch die Fläche einer Hand. Nur ausserst selten kollidiert eines der Teilchen mit einem Atomkern. Wenn das im Xenon-detektor geschieht, entsteht ein Lichtblitz, den die Lichtdetektoren registrieren.

Die Kaverte in Gran Sasso ist der ideale Ort für die Suche nach Wimpis. «Die rund 1400 Meter dicke Gesteinshülle über dem Labor schirmt einen Grossteil der kosmischen Strahlung ab», sagt Baudis. Diese Strahlung würde sonst die schwachen, wimpisähnlichen Signale hinterlassen wie die Teilchen der dunklen Materie. Auch radioaktive Strahlung stört. «Wir dichten den Detektor nicht anfüllen», sagt Baudis. «Bereits die Fragmente werden zu viele radioaktive Elemente enthalten.» Daher wurden alle Materialien sorgfältig ausgewählt, und der Detektor in einem Behälter aufgebaut. Zum Schutz vor radioaktiver Strahlung aus dem umliegenden Gestein steckt der ganze Detektor zudem in einem drei Stockwerke hohen mit hochreinem Wasser ge-



Laura Baudis schaut dorthin, wo noch niemand hingeschaut hat. Foto: Dominique Monberg



Zwei grosse Röhren mit Coma-Haufen. Foto: Nasa

Das grosse Rätsel: Wie hält die dunkle Materie Galaxien zusammen?

das deutsche Abitur nach und begann das Physikstudium. «In der Physik konnte ich sowohl Informatik als auch Mathematik anwenden», sagt sie. Die dunkle Materie war damals noch kein Trendthema wie heute. Genau das war es, was Baudis reizte. Die Detektoren waren noch klein. Sie konnte praktisch alles selber machen und viel lernen: den Bau eines Detektors, die Elektronik, die Datenanalyse. Seit summer 20 Jahren steht die dunkle Materie im Fokus ihrer Forschung. Nach Stationen in den USA und an der RWTH Aachen kam sie 2007 an die Uni Zürich. Dort wurde nicht nur ihr, sondern auch ihrem Mann, heute Professor im Bereich der Krebsforschung, eine Stelle angeboten. Das Paar hat einen 18 Jahre alten Sohn und eine 11 Jahre alte Tochter.

50 Tonnen Xenon für «Darwin»
Sollte es gelingen, mit XenonIT dunkle Wimpis nachzuweisen, wäre das nur ein erster Schritt die Wimpis zu charakterisieren, brauchen wir grösseren Detektoren, sagt Baudis. Der wird geplant und heisst Xenon-nT. Statt drei Tonnen soll es acht bis zehn Tonnen flüssiges Xenon IT 2019 soll Xenon-nT aufgebaut werden. Im 2025 soll der Detektor Darwin (Dark matter search with liquid xenon) mit 50 Tonnen Xenon in Betrieb gehen. Baudis nimmt eine kleine Stofftasche aus einem Schrank, öffnet sie und holt ein etwa fingernagelgrosses silbernes Gefäss heraus. «Das ist eine Photodiode aus Sil die wir derzeit entwickeln. Sie ist viel kleinerkömmliche Lichtdetektoren und erhellbarer radioaktiv», sagt Baudis. «Für Darwin wird die Radioaktivität der Materialien noch mehr als einen Faktor Hundert reduziert.»

Sollten XenonIT oder Xenon-nT tausend Wimpis entdecken, würde Darwin ein neues Tier zum Weltall ausstatten. «Mit Darwin können wir erstmals Wimpis-Astronomie betreiben», sagt Baudis. Wir können zum Beispiel herausfinden, wie die Geschwindigkeitsverteilung der Wimpis im Galaxis-Halo der Milchstrasse aussieht. Damit liesse sich das Alter lösen. «Astrophysiker zweifeln vor 84 Jahren aufgab hat: Wie genau hält die dunkle Materie Coma- und Galaxienhaufen zusammen?»



Interview GEOkompakt Die Geburt des Universums, Nr. 51, 2017



that he called "dark matter," and which, like a glue,

3:09 / 13:29

Exploring the vast dark universe TEDxCERN talk CERN, November 5, 2016

Medizinisches Kabinett Von Martina Frei

Tages-Anzeiger Portraet Tages-Anzeiger, June 10, 2017

nd | Dienstag, 21. März 2017 21



Hans Peter Beck Bild: pd

TAK Lounge mit Teilchenphysiker

Schaan Zu Gast in der TAK Lounge am Donnerstag, 23. März, um 20.09 Uhr, ist der renommierte Teilchenphysiker am CERN, Hans Peter Beck. Er gehört einem internationalen Team von Wissenschaftlern an, die den Aufbau der Materie und der Welt erkunden. Er war an der Entdeckung des mysteriösen Higgs-Teilchens beteiligt und vermittelt mit Leidenschaft physikalische Grundlagenforschung.

Im Gespräch mit Alexa Seeger und Thomas Spieckermann erklärt Hans Peter Beck, was es mit den kleinsten Teilchen auf sich hat, aber auch, wie ein ganz normaler Forscher-Alltag am CERN aussieht. Darüber hinaus beleuchtet Hans Peter Beck physikalische, mathematische, aber auch philosophische Zusammenhänge: Was ist die Raumkrümmung? Warum gibt es keine Antimaterie in der Welt? Was ist Dunkle Energie? Und all das auf allgemein verständliche Weise, ohne in den Fachjargon der Physik zu wechseln. So wird der Abend zu einem leichten Spaziergang durch die Naturwissenschaft.

Der gebürtige Schweizer Hans Peter Beck studierte Physik an der Universität Zürich und ist seit 2006 Dozent am Physikalischen Institut der Universität Bern. Seit 1997 arbeitet er auch am CERN (European Organization for Nuclear Research). Er engagiert sich sehr im Bereich der schulischen Vermittlung von naturwissenschaftlicher Grundlagenforschung und ist Vizepräsident der Schweizer Physikalischen Gesellschaft. (pd)

Infos und Karten unter +423 237 59 69, vorverkauf@tak.li, www.tak.li



TAK Lounge mit Teilchenphysiker, Schaan, Lichtenstein, 23 March, 2017

Lichtensteiner Vaterland TAK Lounge mit Teilchenphysiker, 21. March, 2017



Müslüm TV SRF, first emission 3 November 2016





EOS 2017 – inauguration ceremony with 2'500 orthodontists



Montreux, Stravinski auditorium
5 June 2017

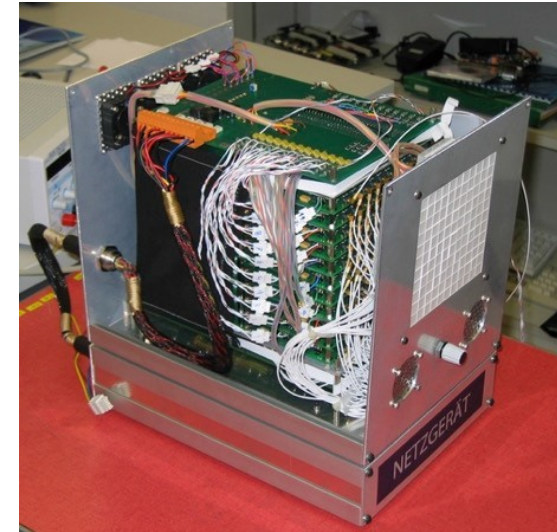
- ❑ **The common activities :**
 - open days at ETH, public talks by our staff, visiting schools
 - schools visiting our sites (CERN, PSI, ETH, institutes)
 - Outreach activities of ETH members at CERN (VIPs, tours, others)
- ❑ **„ETH-unterwegs“:**
 - Rolling exhibition at high schools
 - Particular talks for pupils, and public Podium-discussions
- ❑ **Scientifica:** Public exhibition at ETH+UZH (2.5 days: 1-3.9.17)
- ❑ **Maturaarbeiten** = “Thesis at end of high-school”
 - supported through “tutoring”, access to experiments, access to labs
- ❑ **Masterclasses :** we participate also in European MC
- ❑ **Many individual** activities, too many to cover ...

C. Grab

□ We visit high-schools with a traveling exhibition

“ETH unterwegs”, “ETH on the road”:

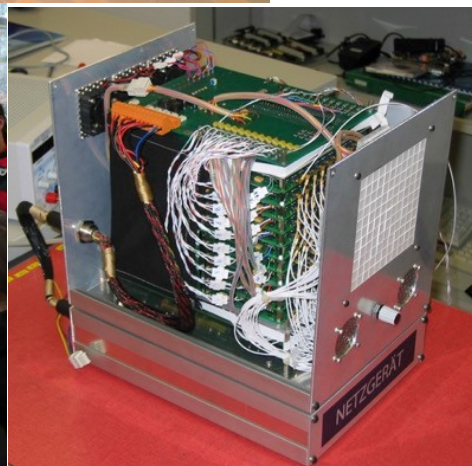
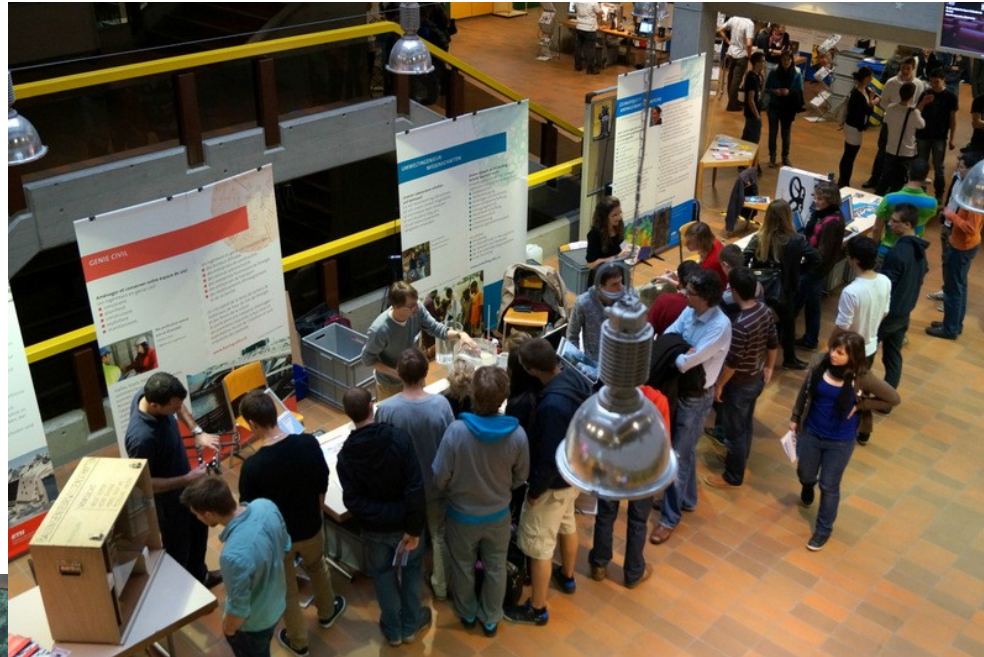
- truck loaded with “Exhibition material, experiments ...”
[various departments participate; typically about 10-15 high-schools in fall/winter]
- At the location we feature a booth for each “subject”, where pupils can visit the booth, experiment talk directly to researchers/PhD-students of the topic.
- Physics features a “COsmic RAY CUbe detectore”
- During day, a series of presentations are given, to topics of choice by the school.
- Evening: “Podiums discussions”, and/or other events open to the public village/city.



□ **Teachers education** : workshops at ETH

or at high-schools a la CERN-teachers education;
adapted to regional conditions in direct cooperation with teachers

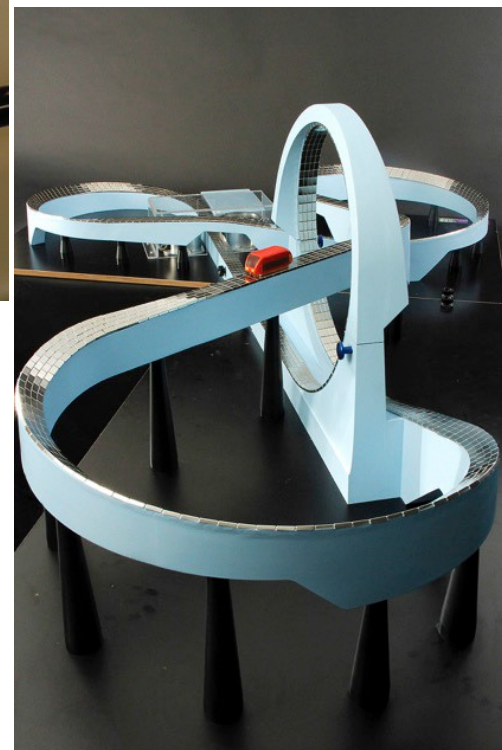
C. Grab



C. Grab

- **ETHZ exploit so-called "Wanderzirkus",**
 - For presentations to public and school, can use:
 - a set of transportable experiments, for giving "experimental lectures" at high-schools.
 - Built by "Apprentices", Including instructions, online reservation system,

...



ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zürich

Info • Vorlesungsexperimente • Portraits • Wanderzirkus • Students

100. Wanderzirkus

- 100.1. A - D
- 100.2. E - H
- 100.3. I - N
- 100.4. O - S

Optische Wand	Photoeffekt - Planck'sche Konstante	Rauchringe	Rubens Flammenrohr

- Rauchringe
- Rubens Flammenrohr
- Schallgeschwindigkeit in Gasen
- Schaumkuss im Vakuum
- Schwebende Welt
- Schwebender Magnet
- Schwingwagen
- Sonnenzelle (Fotovoltaik)
- Sprechen mit He + SF₆
- Stehende Wellen mit Gummischnur
- Stickstoff-Laser
- Supraleiterbahn
- 100.5. T - Z

Schallgeschwindigkeit in Gasen	Schaumkuss im Vakuum	Schwebende Welt	Schwebender Magnet

Schwingwagen	Sonnenzelle (Fotovoltaik)	Sprechen mit He + SF ₆	Stehende Wellen mit Gummischnur

Stickstoff-Laser	Supraleiterbahn



Special pupil's laboratory in CH

Attract interested youngster age 14-19 to natural or technical sciences

— Program adjustable to age of interested pupils

— Whole classes can come, reserve a topic and work hands-on with complete guidance

— Example: Vacuum-lab, Sound-lab; Spectrometry-lab, Fields (magnets..)

☐ “PhysiScope” : @ Uni GE

— See: <http://www.psi.ch/ilab/>

☐ “Science Lab UZH” : @ Uni ZH

— See: <http://www.sciencelab.uzh.ch>

☐ “iLab” : @ PSI

— See: <https://www.psi.ch/ilab/>

☐ “S’Cool LAB” : @ CERN

Inform the teachers about these pupil's labs – whenever you meet one!

«Der einfachste Versuch, den man selbst gemacht hat, ist besser als der schönste, den man nur sieht.»

Michael Faraday, 1791–1867



~80 visits organized by CHIPP members during 2016

typical program:

- ❑ Inspirational intro talk from a senior researcher
- ❑ guided tour comprising a selection of relevant visit points i.e. ATLAS/CMS/LHCb, SM18, LEIR, AD, CCC, new microcosm. All involving senior researchers, PhD students and post-docs
- ❑ Lunch; discussion with CHIPP members
- ❑ In particular for CMS: Distributing booklet with Swiss contributions to the construction of CMS and existing liaisons with Swiss companies



Kabelwerk Brugg
CMS Gold Award, 2002

BRUGG CABLES
Well connected.



Building the super-conducting cables

Brugg Cables is a global company specialised in technical cables for the power and telecommunication industry, and in coated steel belts for elevators. The company headquarters are in its hometown of Brugg, 30 km east of Zurich. Initial contacts between ETH Zurich and Brugg Cables for the CMS project date from 1997. For the next two years, many important parts of the special production process were planned, tested and

approved. Strands of conductors needed to be knitted to a complex pattern to form the specified profile of the CMS cable.

"At the end of 1999, everything was in place for the start of production. A number of production processes got underway over the next three years for the manufacture of 22 cables, each 2,600 metres long. The cabling machine worked at four metres a minute, operating continuously for 11 hours to make each cable. The collaboration with the CMS scientists played a major role in setting up the best conditions to realize this", Kurt Hächler, Department manager at Brugg.

Empa, a Swiss research institute specialised in material science and technology development, ensured the online quality control of the continuous process (see page 16).

The company has also produced some of cables for the LHC dipole magnets, as well as for the ATLAS air-core toroid magnet.

K. Hächler (from Brugg Cables), F. Pauss and B. Blau observe the superconducting cable



Detailed structure of the cable



This is one of several CERN Member State Thematic Forums. Their goal is to bring together CERN and Member State representatives who are experts in the relevant field to exchange information, share ideas and discuss the development of coherent strategies. Associate Member States may also participate.

The Teacher and Student Forum will focus on pre-university activities, both for teachers and for students.

Contact

In case of any question, problem, or suggestion, please contact TeacherAndStudentForum-Contact@cern.ch.



“There is nothing more enriching and gratifying than learning.” [Fabiola Gianotti, CERN Director-General]

Every year, CERN offers various professional development programmes for teachers to keep up-to-date with the latest developments in particle physics and related areas, and experience a dynamic, international research environment. All programmes are facilitated by experts in the field of physics, engineering, and computing and include an extensive lecture and visit itinerary.

Furthermore, CERN's teacher programmes enable you to meet with teaching colleagues from your country or from all around the world. We offer teacher programmes in English or in one of the national languages of CERN Member States, lasting between 3 days and 3 weeks. Take part!

[National Teacher Programmes](#) & [International Teacher Programmes](#)

Members

- Austria
- Bulgaria
- Czech Republic
- Denmark
- Finland
- France
- Germany
- Greece
- Hungary
- Italy
- Netherlands
- Norway
- Poland
- Portugal
- Slovakia
- Switzerland**
- United-Kingdom
- Pakistan
- Serbia
- Ukraine

- Prof. Martin Hopf
- Atanas Batinkov
- Dr. Jiří Dolejší
- Prof. Ian Bearden
- Dr. Kati Lassila-Perini
- Dr. Nicolas Arnaud
- Prof. Arnulf Quadt
- Prof. Evangelos Gazis
- Prof. Dezső Horváth
- Prof. Pierluigi Paolucci
- Marcel Vlastuin
- Nils Hoimyr
- Urszula Rybaltowska
- Prof. Pedro Abreu
- Dr. Zuzana Ješková
- Prof. Andreas Müller**
- Elisabeth Cunningham
- Falak Sher
- Dr. Predrag Milenovic
- Dr. Tetiana Hryn'ova

CERN Swiss Teachers Programme

The CERN Swiss Teachers Program is constantly difficult to realize.

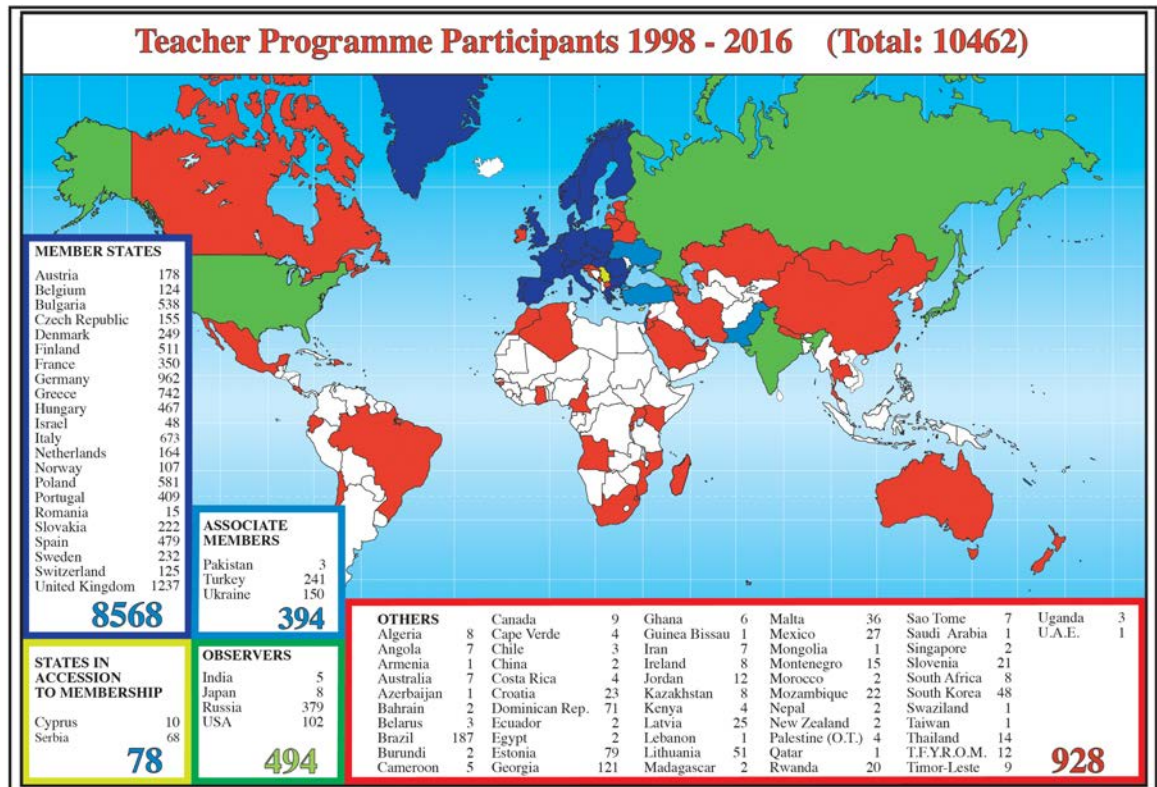
- ❑ Despite of collaboration with the Swiss Physical Societies,
- ❑ Despite of interacting with the teachers societies in German, French and Italian speaking Switzerland
- ❑ Despite of involving the federal teachers structure WBZ/CPS
- ❑ Despite of financial contributions to subsidize travel money for teachers

Too few teachers apply, such that the Swiss Teachers program had to be cancelled in recent years.

125 Swiss Teachers participated in 1998-2016 at the international CERN Teacher program.

**Not so bad, after all !
Germany had 962 but is ten times as large.**

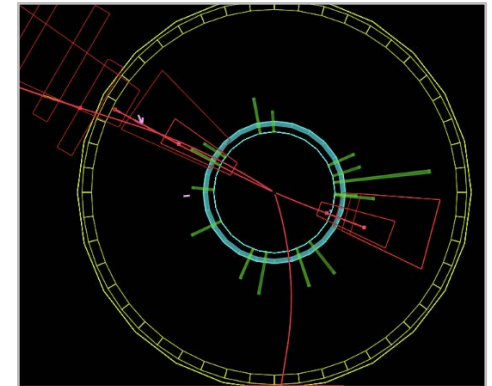
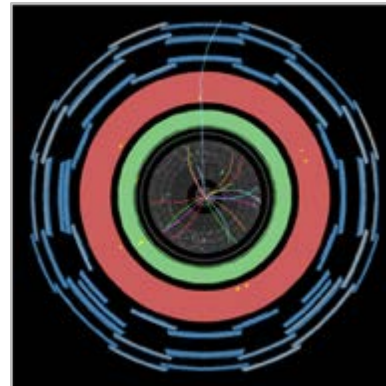
**Austria had 178
Netherlands had 164
Bulgaria had 538**



Masterclass

High school students become particle physicists at a near-by institute for a day

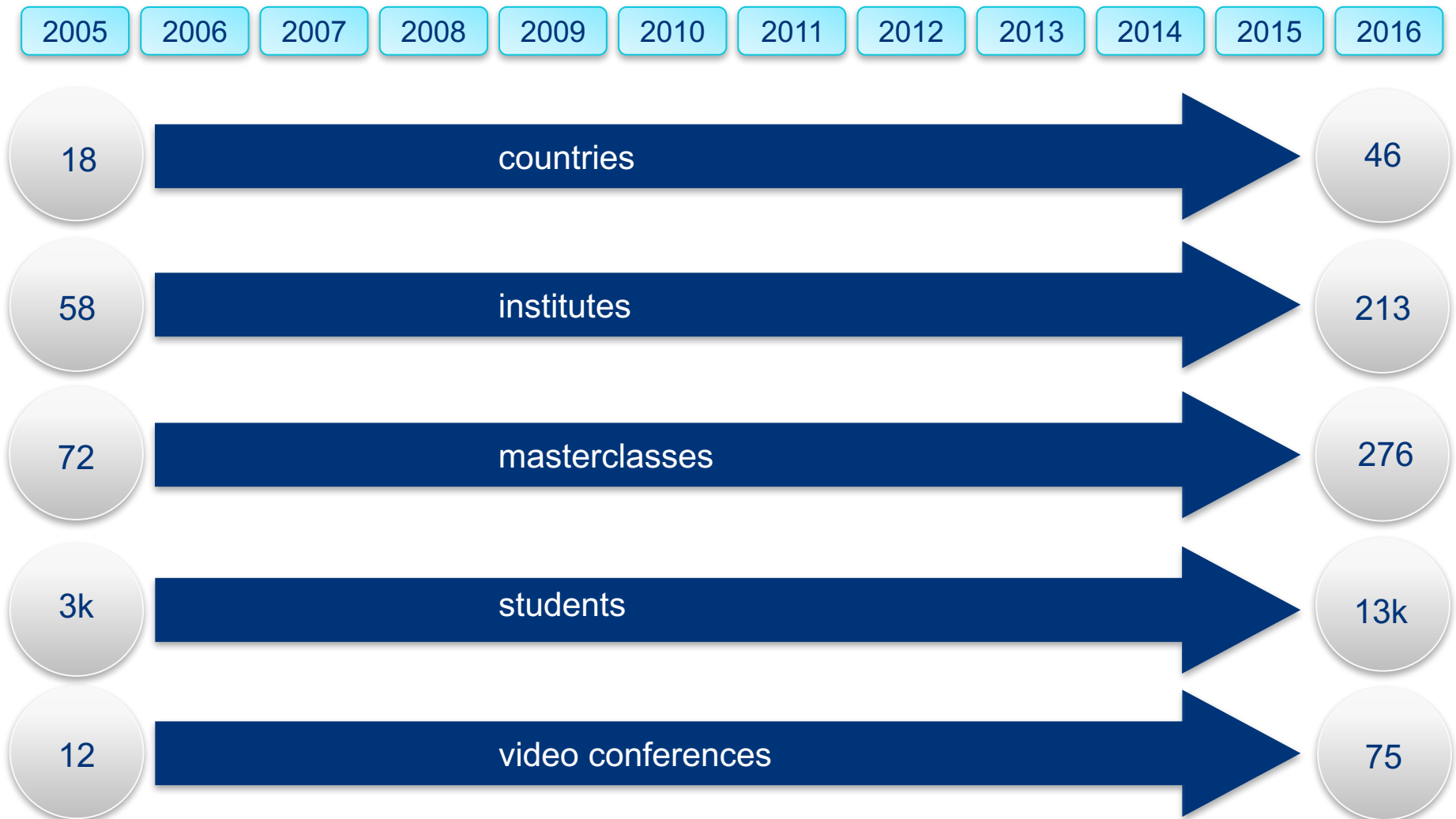
International Particle Physics Outreach Group (ippog.web.cern.ch)



- Learn the topic
- Analyze LHC collision data
- Get result
- Statistical combination with peer groups
- And
- Discussion in a Vidyo Conference

Ca 150-200 pupils every year at Universities BE, ETHZ+ZH, GE

Evolution of Masterclass participation



A typical Masterclass day
Here at Uni ZH (co-organized with ETHZ)



Very similar also at Uni Bern and Uni Geneva

In Zurich – focus on CMS

In Bern + Geneva – focus on ATLAS

In Lausanne – opportunity to add a focus on LHCb

International Videconference at end of the day (Uni BE and GE)

Vormittag:

9:00 – 9:05

Hörsaal Y15 G19

Begrüssung

(Prof. Florencia Canelli)

9:05 – 9:40

Einführung in die Teilchenphysik

(Simon Corrodi)

9:40 – 10:15

Beschleuniger und Detektoren

(Myriam Schönenberger)

10:15 – 10:45

Kaffeepause im Foyer

10:45 – 12:30

Führung durch das Physik-Institut

12:30 – 14:00

Mittagspause

Nachmittag:

14:00 – 14:30

Hörsaal Y15 G19

Einführung in das "Scannen" von Ereignissen

(Maren Meinhard)

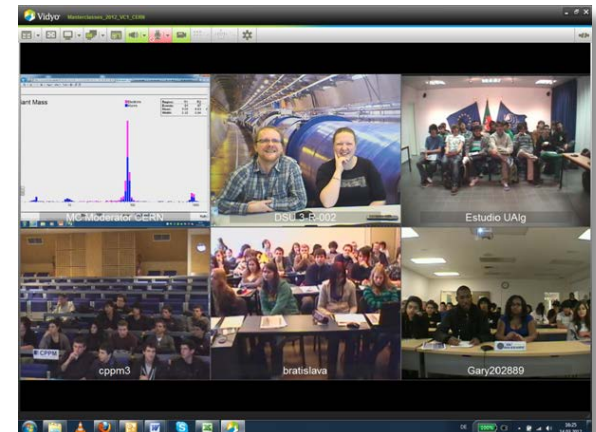
Nachmittag:

14:45 – 15:45

Computerräume

Y01 F08, Y11 F49, Y11 G34 und Y11 G40

Eventanalyse



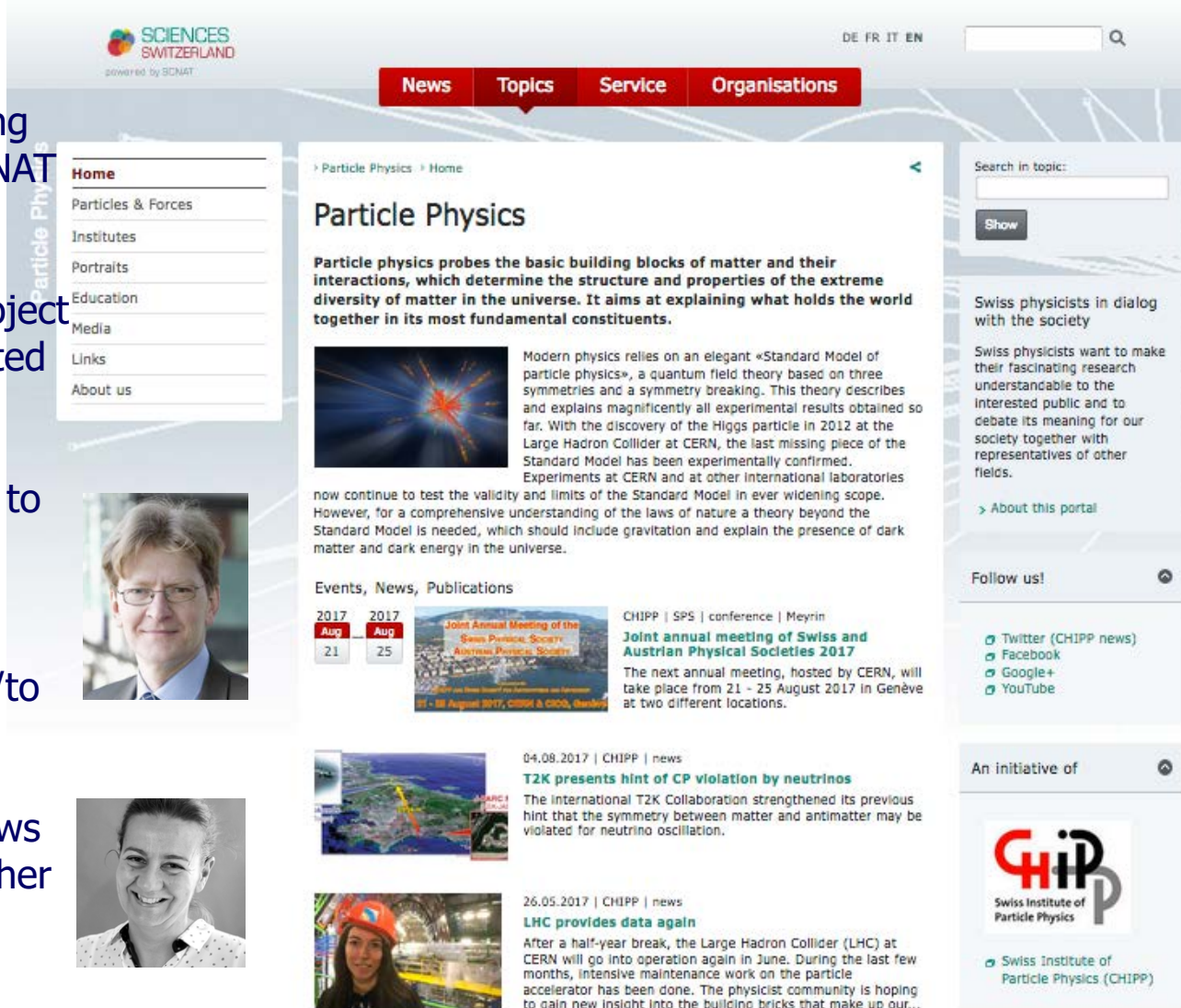
SCNAT is supportive to our outreach activities by providing a theme portal within the SCNAT web portal.

Out of the passed AGORA project almost all content is now ported to the new portal.

Benedikt Vogel will be able to write articles showcasing interdisciplinary of particle physics research, activities, results and its applications in/to society.

Angela Benelli is adding news and pressreleases and any other input you will provide.


Also some articles needed from CHIPP members to keep the portal alive !





The screenshot shows the Particle Physics theme portal. At the top, there is a navigation bar with 'News', 'Topics', 'Service', and 'Organisations'. A search bar is located in the top right corner. On the left side, there is a vertical menu with 'Home', 'Particles & Forces', 'Institutes', 'Portraits', 'Education', 'Media', 'Links', and 'About us'. The main content area features a 'Particle Physics' section with a sub-header 'Particle physics probes the basic building blocks of matter and their interactions, which determine the structure and properties of the extreme diversity of matter in the universe. It aims at explaining what holds the world together in its most fundamental constituents.' Below this is an image of a particle collision and a text block describing the Standard Model. There is also a section for 'Events, News, Publications' with a calendar for August 2017 and a list of events, including the 'Joint Annual Meeting of the Swiss Physical Society and Austrian Physical Societies 2017' and 'LHC provides data again'. On the right side, there are sections for 'Swiss physicists in dialog with the society', 'Follow us!' (with links to Twitter, Facebook, Google+, and YouTube), and 'An initiative of' (with the CHIPP logo).





News articles appear at regularly thanks to the professional help of **Benedikt Vogel** !


- 


04.06.2017 | CHIPP | news
TZK presents hint of CP violation by neutrinos
 The international TZK Collaboration strengthened its previous hint that the symmetry between matter and antimatter may be violated for neutrino oscillation.
- 


26.05.2017 | CHIPP | news
LHC provides data again
 After a half-year break, the Large Hadron Collider (LHC) at CERN will go into operation again in June. During the last few months, intensive maintenance work on the particle accelerator has been done. The physicist community is hoping to gain new insight into the building bricks that make up our...
- 


28.04.2017 | CHIPP | news
Artistic View on Physics
 The highly complex research of elementary particle physics is for most people not immediately comprehensible. An artistic approach can help overcome the inaccessibility of this discipline and make particle physics understandable. This is the basic idea of the art @ CMS program, which is...
- 


06.04.2017 | CHIPP | news
A Voyage to the Boundaries of Physics
 As complicated as particle physics may be, experiments such as those conducted at CERN make it clear how researchers in this discipline work. However, theoretical physicists, whose work is based on mathematical models, have more difficulty explaining their work. A project from ETH Zurich attempts to...
- 


09.03.2017 | CHIPP | news
Heart surgery at CERN
 During the recent service pause of the CERN Large Hadron Collider (LHC), a key component of the CMS experiment was replaced at the beginning of March: the new pixel detector is even more powerful than its predecessor – raising hopes for new insights in elementary particle physics.
- 


15.02.2017 | CHIPP | news
Research as a peace project
 The laws of particle physics apply regardless of place and time, but the laws can't be explored or their applications studied equally well in any location. Particularly in poorer countries, cost-intensive research projects face big challenges. Against this background, there is a ray of hope that the first...
- 


12.01.2017 | CHIPP | news
Blocked future
 The Chinese writer Cixin Liu has landed an international bestseller with the novel 'The Three-Body Problem'. Now his story about the fight between the Earth and the Trisolaran population is also available in German translation. In the dress of a science fiction novel, the 53-year-old author expresses...
- 


07.12.2016 | CHIPP | news
"Making physics vivid and interesting"
 Bahar Behzadi, physics teacher at the Frieses Gymnasium Zurich, participated with her pupils in the last year's competition "Physics in Advent". The class performed excellently in the competition and was granted a visit to the Swiss Science Center Technorama in Winterthur. In the...
- 


28.11.2016 | CHIPP | news
"We do not see the whole picture"
 Laura Baudis, Professor of Particle Physics at the University of Zurich, recently talked about the extremely difficult search for Dark Matter at the TEDxCERN event in Geneva. In the talk, which is available as a video recording, she gives a well understandable insight into one of the hottest topics of...
- 


18.11.2016 | CHIPP | news
24 simple and yet ingenious experiments until Christmas
 Once more, clever pupils from all over Switzerland are invited to the pre-Christmas competition "Physics in Advent". Starting on December 1st, participants are asked to solve a simple physical task every day. Special prizes for individual pupils as well as for whole school classes are provided. Indeed...
- 


15.11.2016 | CHIPP | news
"Like the CEO of a multinational company"
 The abbreviation CMS stands for one of the currently largest physics experiments worldwide. Günther Dissertori, a particle physicist at the Swiss Federal Institute of Technology (ETH) Zurich, was recently appointed to the three-headed spokesperson-team of the CMS experiment, which is located...
- 

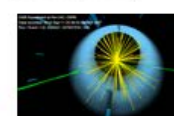
28.09.2016 | CHIPP | news
Track and trap – the long search for magnetic monopoles
 Is there an elementary particle carrying magnetic charge? This fundamental question is being addressed by an experiment currently performed at CERN near Geneva. Recently the MoEDAL research collaboration published its first findings. No discovery has been made so far, but now the experiment will...
- 


14.09.2016 | CHIPP | news
Precision with a Broad Benefit
 Marco Valente is a PhD student, born in Ticino and is currently working at the University of Geneva. He is evaluating the performance of a method from which it is expected to improve important measurements of the ATLAS experiment at CERN. For his current studies, the 23 years old researcher has just...
- 


23.08.2016 | CHIPP | news
Mohamed Rameez wins the CHIPP Prize 2016
 The prize of the Swiss Institute of Particle Physics (CHIPP) 2016 goes to Mohamed Rameez. The 27-year-old neutrino researcher who just has earned his PhD at the University of Geneva has been awarded for his outstanding contributions to the IceCube Collaboration.
- 


12.08.2016 | CHIPP | news
The deuteron too poses a mystery
 The deuteron — one of the simplest atomic nuclei, consisting of just one proton and one neutron — is considerably smaller than previously thought. This finding was arrived at by an international research group that carried out experiments at the Paul Scherrer Institute, PSI. The new result is consistent...
- 


01.07.2016 | CHIPP | news
Glimpses Beyond the Standard Model
 A highlight of the traditional Nobel Laureate Meeting in Lindau, Germany, which ended on July 1st, was a distinguished panel on particle physics that tried to glimpse beyond the standard model.
- 


10.06.2016 | CHIPP | news
In the front row of neutrino research
 Over 30 Nobel Laureates will debate this year in Lindau, Germany with about 400 young scientists from nearly 80 countries. The 66th Lindau Nobel Laureate Meeting from June 26th to July 1st is dedicated to the field of physics with a special focus on particle physics including neutrino physics...
- 


01.06.2016 | CHIPP | news
Is a window to New Physics about to open?
 The Higgs particle was detected by the CERN large particle accelerator in 2012. Now there are hints that CERN's worldwide unique particle accelerator will help physicists discover a new elementary particle. Excitement is rising.
- 

03.05.2016 | CHIPP | news
"Particlephysics.ch" is now on the SCNAT portal
 The outreach portal of CHIPP - the Swiss Institute of Particle Physics - has now been migrated to the new thematic portal of SCNAT on particle physics. This is an important step towards a better visibility of particle physics among the other fields of natural sciences.
- 

02.05.2016 | CHIPP | news
The graviton remains a phantom
 The experimental detection of gravitational waves this spring confirmed with much fanfare Einstein's General Theory of Relativity. Until the phenomenon of gravitation is fully understood, however, physics has a Herculean task before it. A giant next step is the LISA experiment, which is being...
- 

23.03.2016 | CHIPP | news
Teilchenphysik für alle
 Ein frei und kostenlos zugänglicher Einführungskurs ermöglicht interessierten Personen einen unkomplizierten Einstieg in die Welt der Teilchenphysik. Dr. Mercedes Panizza und Prof. Martin Pohl vom Departement für Nuklear- und Teilchenphysik der Universität Genf haben den Kurs aus 57 Videolektionen...
- 

12.10.2015 | CHIPP | news
Auch Kinder verstehen Teilchenphysik
 Nein, ganz einfach ist Teilchenphysik nicht zu verstehen. Doch wenn man die richtigen Worte und Bilder findet, können auch Kinder schon eine Vorstellung von der Welt der Elementarteilchen gewinnen. Das zeigt die Sendung 'Rosanna checks!' des Schweizer Fernsehens, die am 29. September...
- 

28.09.2015 | CHIPP | news
"Particle Fever" im Doppelpack
 Am letzten September-Wochenende feierte die Akademie der Naturwissenschaften Schweiz in Sitten ihren 200. Geburtstag. Für vier Tage machte die Wissenschaftstournee 'Forschung live' in der Kantonshauptort des Wallis Halt. Ein Programmpunkt der Jubiläumsveranstaltung war die zweimalige Aufführung des...
- 

24.08.2015 | CHIPP | news
Open Air Kino Aarau
 Vom 26. bis zum 29. August feiert die Akademie der Naturwissenschaften Schweiz (SCNAT) in Aarau mit der Wissenschaftstournee 'Forschung live' ihren 200. Geburtstag. Aus diesem Anlass wurde am Aarauer Open Air Kino der US-amerikanische Dokumentarfilm 'Particle Fever' über die...

**Angela Benelli is the new Swiss EPPCN delegate
taking over from Marc Türler**

-- Thank you Marc – it was a pleasure working with you

**-- Thank you Angela – we already had great interactions and I
am looking forward to a smooth ramping up of activities
around CHIPP outreach EPPCN and IPPOG.**



☞ The EPPCN delegate helps improving the communication channels between the CERN press office and the communication offices of Swiss universities and institutes, as well as with the media and the general public.

Angela Benelli

EPPCN wishes more involvement from the representatives of the Member States in Social Media activities: it will enhance the visibility of national laboratories and researchers.



Already existing project that we could join:



Throwback Thursday: old photos

#CHatCERN (any Swiss activity at CERN)

#IWorkInPhysics ?



Guess what it is?
(Answer and image credit will be posted on Monday.)



779 Likes 256 Comments 150 Shares

Guess What It Is on Facebook

Send articles, news, photos & curiosities about your research/laboratory to Angela Benelli
Angela.Benelli@cern.ch

Twitter: @CHIPP_news



Tweets	Following	Followers	Likes
805	316	585	98

Following

CHIPP_news

@CHIPP_news · Follows you

About particle physics in Switzerland and throughout the world. For students and teachers. And for the curious ones.

Schweiz

teichenphysik.ch

Joined July 2012

Tweet to

Message

18 Followers you know

Tweets Tweets & replies Media



CHIPP_news @CHIPP_news · Aug 19

Made in Switzerland: United In Science .. look at @ndtv goo.gl/E14Ro6



Who to follow · Refresh · View all



Phys. unserer Zeit @Phiu... ×

Follow



John Jowett @JohnJowett ×

Follow



Physik-Journal @PhysikJ... ×

Follow

Find people you know

Angela Benelli

You go for a Talk to a conference ..
PHOTO and link to your talk

Special events

CHIPP_news @CHIPP_news · Jun 20
Olaf Steinkamp, @uzh_news_en: Outreach, Education
#EPSHEP2017 !!



EPS HEPP Board @HEPPboard
Olaf Steinkamp, @uzh_news_e
the Outreach, Education and I
#EPSHEP2017 facebook.com

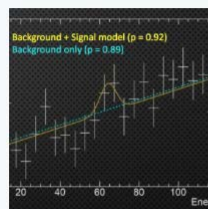


CHIPP_news @CHIPP_news · Aug 1
Researchers' Night @CERN Friday 29 September 2017! #physics #CERN
goo.gl/vRtYuq



If you have news from big and small experiment
that you would like to publish

CHIPP_news @CHIPP_news · Aug 4
What if neutrino and antineutrino oscillate differently?? @HyperKamioka
t2k-experiment.org goo.gl/WzAcoK



Laura Baudis @lbaudis
A search for the two-neutrino
124-Xe in XENON100 & @X
indico.cern.ch/event/60669

Angela Benelli



Several Events and conferences were announced:

Dark Matter Day, 31 October 2017: idea to promote events related to dark matter on Halloween's day.

<http://www.darkmatterday.com> website: starting-kit on how to organize events in institutes and universities. The movie "Phantom of the Universe" will be available for free to be shown at the events.

WCSJ 2019: The World Conference of Science Journalists (WCSJ) is a big conference for scientific journalists. In 2017, it will take place in San Francisco, where it will be decided if the next venue will be Lausanne in 2019. In this case it would be very interesting for journalists to visit particle physics or astronomy institutes in Switzerland, such as CERN, PSI and also EPFL

Angela Benelli

I would like to make a list of people from CHIPP that are willing to participate (even occasionally) to certain projects proposed by EPPCN or from one of us. If you would send me your e-mail it would be great !

Thank you, Angela

Angela.Benelli@cern.ch



International Particle Physics Outreach Group

[Login / Sign-up / FAQs](#)

[HOME](#) | [ABOUT](#) | [MEMBERS](#) | [RESOURCES](#) | [MASTERCLASSES](#) | [IPPOG NEWS](#)

The International Particle Physics Outreach Group (IPPOG)

IPPOG is a network of scientists, science educators and communication specialists working across the globe in informal science education and outreach for particle physics. Particle physics is the science of matter, energy, space and time. IPPOG brings new discoveries in this exciting field to young people and conveys to the public that the beauty of nature is indeed becoming understandable from the interactions of its most fundamental parts - the elementary particles.

Current members come from the 22 member states of CERN, Australia, Ireland, Slovenia, South Africa, the USA, and from DESY, CERN and five of the major experiments at the Large Hadron Collider (LHC).

Hans Peter Beck (University of Bern) and Steve Goldfarb (University of Melbourne), IPPOG Chairs

Dans la peau d'un chercheur

To educate and enthuse 9-12 year olds in the world of Particle Physics and general science exploration.

Classroom Outreach Program



Latest Resources



A Big Bang In The...

To introduce main research subjects at LHC to secondary school pupils in their last year of studies

0 comments



Das Verflixte Higgs...

Article published originally in the German journal 'Astronomie & Raumfahrt 51 (2014) 6...

0 comments



Quiz for IMC17

This multiple-choice quiz is designed for high school students and will be used in the...

2 comments

Viewpoint

Reaching out in the era of big science

Now a formal collaboration, IPPOG provides a new force for global particle-physics outreach.



CERN director for international relations, Charlotte Warakaulle, signs the memorandum of understanding with IPPOG chairperson Hans Peter Beck on 19 December, allowing the IPPOG collaboration to officially enter into force.

By Hans Peter Beck

Establishing and maintaining a strong link between science and society is vital, and is something that has long been recognised by CERN. Writing in 1972, former Director-General Victor Weisskopf put it well when he argued that a concerted effort towards the presentation and popularisation of science would “provide a potent antidote to overspecialisation, bring out clearly what is significant in current research, and make science a more integral part of the culture of today”.

Forty-five years later, as we enter the so-called “post-factual world” emerging from political ideologies in a growing number of modern democracies, it is more important than ever for science and society to maintain an open and transparent dialogue. It has also become evident that the tools and methods currently used to support such a dialogue have not been as successful as we would have hoped. Indeed, many excellent outreach activities at research centres, universities and museums often attract only those people who are already interested and appreciative of the basic and fundamental relevance of science.

Without compromising established methods, we must explore new paths to engage citizens – especially the young. Reaching out to high-school students and their teachers to convey the methods and tools used in fundamental science is a strong investment in the future. While only a fraction of young students will become scientists, and fewer still will become particle physicists, all will become ambassadors for the scientific method and evidence-based decision-making. Developing a dialogue with those who have left school early raises important challenges of its own, and requires that scientists take courageous steps. Partnering with artists, musicians and celebrities, for instance, has enormous potential to get science into the spotlight.



Hans Peter Beck is chairperson of IPPOG, member of the ATLAS experiment and a reader at the University of Bern. (Image credit: C Marcelloni.)

But it involves a delicate balance between raising curiosity and descending into trivialities.

The International Particle Physics Outreach Group (IPPOG) is making a concerted and systematic effort to present and popularise particle physics across all audiences and age groups. Established 20 years ago following the recommendations of former CERN Director-General Christopher Llewellyn Smith, IPPOG has evolved from a European to a global network that involves countries, laboratories and scientific collaborations active in particle-physics research. It is best known for its International Masterclasses (IMC) programme, which evolved in the mid-1990s from national outreach efforts in the days of the LEP collider and has gone from strength to strength. Since 2005, the programme has offered high-school students the opportunity to become physicists for a day by performing a tailor-made physics analysis involving real LHC data (*CERN Courier* June 2014 p37). In terms of numbers, last year’s edition of the IMC included 213 institutions in 46 countries and around 13,000 students took part.

Particle physics has become a truly global activity, with experimental collaborations such as those of the LHC experiments featuring thousands of researchers from all over the world. With this trend, IPPOG is evolving further to cover more countries, laboratories and experiments spanning all aspects of collider and non-collider research, including astroparticle physics and accelerator and detector technology. This expanding remit demands that IPPOG adopts a more formal structure to guarantee the quality and sustainability of its work.

Following the model of collaboration in experimental particle physics, on 19 December IPPOG became a formal scientific collaboration based on a memorandum of understanding. A total of 13 countries have now signed as members, with several candidate members expected to join soon, and each is required to contribute a membership fee weighted by its GDP and the size of its particle-physics community. Laboratories and even individual scientific collaborations are also part of IPPOG, where they contribute to the expert knowledge and skills required to inspire young thinkers.

The new collaboration status of IPPOG, and CERN’s formal membership, demonstrates a clear commitment to sustainable science outreach. With further countries and organisations expected to join soon, and others invited to get involved, the worldwide particle-physics community has a strong partner at hand when reaching out to wider society in diverse ways that are adapted for every target audience.

IPPOG, the International Particle Physics Outreach Group, a formal collaboration.



INTERNATIONAL PARTICLE PHYSICS OUTREACH GROUP

MEMORANDUM OF UNDERSTANDING Establishing

The International Particle Physics Outreach Group (IPPOG) Collaboration

PREAMBLE

IPPOG is a network of scientists, researchers, science educators, explainers and communication specialists active across the globe in outreach for particle physics;

IPPOG’s mission is to maximise the impact of education and outreach efforts related to particle physics;

The European Strategy for Particle Physics, as adopted and updated regularly by the CERN Council, acknowledges the important role played by IPPOG in the promotion of particle physics;

The IPPOG stakeholders recognise the need to create a formal legal structure permitting IPPOG to increase the scope and quality of its work;

This Memorandum of Understanding (the “MoU”) creates the IPPOG Collaboration and sets out its governance and the rights and obligations of participants.

ARTICLE 1 PURPOSE OF THIS MOU

- 1.1 This MoU creates the IPPOG Collaboration and sets out its governance and the rights and obligations of participants.
- 1.2 This MoU is not legally binding, but its signatories recognise that the long-term success of the IPPOG Collaboration depends on their adherence to the provisions of this MoU.

CERN Courier March 2017

CHIPP is the signatory organization for Switzerland’s participation in IPPOG. MoU signed on 4 November 2016.



IPPOG Collaboration meeting 20-22 April 2017 in Lisbon

Steve Goldfarb, Melbourne & HPB are co-chairs of IPPOG

Katharina Müller, Uni ZH
elected as the Swiss delegate to IPPOG
in today's CHIPP Board meeting.

Welcome Katharina to IPPOG !



IPPOG NEWSLETTER



SEPTEMBER 2015

A word from the coord

LABORATOIRE DE L'ACCELERATEUR LINEAIRE



IPPOG meeting, 16-18 April 2015, Paris

After a very interactive and productive spring meeting in Paris, IPPOG is now ready to take several new actions and count on your support! The future of IPPOG is very promising and a lot of work is ahead. We hope you enjoy this first number of IPPOG newsletter and our next meeting in autumn at CERN.

Hans Peter



'Universe of Particles - Explore, Discover, Inspire' International network of scientists, science education and outreach for particle physics. Vision for the future. Understanding and enthusiastic support of particle physics.

IPPOG's current members come from 2015's 21 member states, plus Ireland, from 10 countries in Europe and USA and 5 major experiments of LHC. Since 2013 the

"The discovery of Higgs boson is not the end of the story... it is just the beginning of a new era... The scalar era."

- IPPOG on LHC as a discovery machine

"Higgs-what now?"

IPPOG feels the need for LHC Run 2 strategy especially in the context of fundamental research in particle physics and scientific audience acceptance.

"How to prepare/approach the end of the Standard Model?"

IPPOG NEWSLETTER



FEBRUARY 2016

A word from the coordin



IPPOG meeting, 6-7 November at CERN, IPPOG & EPPCN family

Our membership is growing worldwide and IPPOG is becoming a new member and several others intend to become members this year in terms of conference education and outreach contributions on the

The last IPPOG meeting in November 2015 at CERN (<https://indico.cern.ch/event/314447>) was fruitful. Tradition from 2014 continued, and EPPCN colleagues joined was opened by the new CERN DG, Fabiola Gianotti, who stressed EPPCN. The former Head of the Education and Outreach Group Landua, also highlighted the importance of IPPOG and the will to continue. The program of the meeting was very rich and diverse about the highlights in this second edition of the IPPOG Newsletter.

Withing you a great and successful 2016. We look forward to see you in May in Cracow.

Hans Peter, Margit

IPPOG growing truly international



Last year Australia was mously voted in as the newest member of IPPOG! Australia is the IPPOG Masterclass as part of their formation in high schools in Wales. We are glad to have such a proactive part come Paul Jackson, it

Moreover, two new members expressed interest for membership and potential candidacy for next year. We look forward to see you in the pipeline!

IPPOG NEWSLETTER



NOVEMBER 2016

A word from the coordina



IPPOG meeting, 19-21 May 2016, Krakow

IPPOG is an international body open for new member countries, like Australia, Ireland, South Africa, United States of America and clearly stepping into the global realm of collaboration. With the burden of the radiation building (almost) behind us, IPPOG can now concentrate on discussing adding a neutrino program and 'cosmic rays going global' broadening the scope of masterclasses, the flagship activity of IPPOG content will be key for continued success. The efforts to improve the materialise.

We wish you fun reading this newsletter, great meeting at CERN and

Download the electronic form of this newsletter with <http://ippog.web.cern.ch/sites/ippog.web.cern.ch/files/IPPOG>

IPPOG pilots World W

Imagine a 24 hour span of masterclass-like videoconferences for the schools. To cover that, we'd need world-wide collaborative simple measurements that their teachers can readily explain. We 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.

The whole IPPOG community is so proud to be part of the IPPOG family.

Hans

IPPOG NEWSLETTER



JULY 2017

Number 4

International Particle
Physics Outreach Group

A word from the coordination team



IPPOG meeting, 5-7 November 2017, CERN

Dear IPPOGers, Last 9 months have been very remarkable period for IPPOG. The 12th IPPOG meeting at CERN, 5-7 November 2016, was historically the last meeting of IPPOG as a group of volunteers enthusiastic about outreach in particle physics. In December 2016 IPPOG became an official scientific collaboration with MoU entering into force upon 10th signature of CERN. In 2017 signatures kept coming and as of today there are 16 with many others in the pipeline. 2017 is marked as a 'bootstrapping year' where the MoU and new way of functioning of IPPOG Collaboration is being implemented and tested. The terms of participation of all types of members (countries, scientific collaborations and scientific laboratories) have been discussed and are being defined in details. We have agreed on our first ever budget and we are really proud of this achievement which brings us to a new era of IPPOG.

The 13th IPPOG meeting in Lisbon, 20-22 April 2017 (where we were very well received by Pedro and Catarina), was also very special. Not only we celebrated IPPOG's newly born official collaboration with nice IPPOG champagne 'Cuvée Special IPPOG 2016', but we also had our first IPPOG Collaboration Board meeting. Moreover, thanks to the overlap of the IPPOG meeting dates with March for Science, IPPOGers had an occasion to participate at this event as an official organisation. A lot of work done, still a lot ahead, we would like to thank to all IPPOGers for your valuable contribution and looking forward to continue paving way to the promising future.

Hans Peter, Steve and Barbara

IPPOG at March for Science

By nice coincidence, the March for Science happened to take place at different locations around the world, including Lisbon right after the 13th IPPOG meeting on Saturday 22 April 2017. This provided a great occasion for IPPOGers to participate officially as an organisation and support the March for Science, diverse nonpartisan group to call for science that upholds the common good, and for political leaders and policymakers to enact evidence-based policies in public interest.



IPPOG Coordination Team with Portuguese politicians

"Silence NO, Science YES"

This idea of Science March aligns well with the IPPOG objectives to promote informal science education and outreach for particle physics, as well as our core values as a diverse, international collaboration of scientists. About 15 IPPOGers joined March for Science in Lisbon wearing new IPPOG T-shirts and holding posters, showing the solidarity with scientists all over the world - all in the motto of 'silêncio não, ciência sim' (silence no, science yes) and accompanied by the Portuguese minister of science and European commissioner for science.

IN THIS ISSUE

★ IPPOG worldwide

- Viewpoint on IPPOG in CERN Courier
- IPPOG members' testimonials
- IPPOG @ social media
- EPS awards
- Teachers working for IPPOG
- IPPOG at March for Science
- IPPOG in EPS Newsletter
- Article about IPPOG in INFN Newsletter

IPPOG internal affairs

- Newly born IPPOG Collaboration
- New IPPOG chairs

IPPOG activities

- Explaining particle physics to laymen
- Global cosmic rays studies
- From STEM to STEAM

Outreach activities within science are intended to inform the **political platform**, the **informed public**, or the **potential young physicist**.

With minimal and budget, still a lot can be achieved:

- ❑ **Giving talks** to interested groups, open universities, schools, companies, societies, etc.
- ❑ **Participating in Coordinated outreach** done at/by universities (cantonal and federal) and laboratories (CERN and PSI)
 - ❑ Open day events, Bachelor/Freshers information Days

With real money, professionals can be hired to enrich outreach to unprecedented levels enabling a true and broad dialogue with society ← with many CHIPP members directly implied. As e.g. **Benedikt Vogel**, who is writing regularly for <http://particlephysics.ch>;

Involving teachers and bringing them to CERN is notoriously difficult – we keep trying!

But many motivated teachers active with their school classes to visit CERN

Outreach talks at schools are important and indeed many CHIPP members do go to schools to give talks.