

# **CHIPP Outreach Report**



***30 June 2014***  
***CHIPP Plenary***  
***Fribourg***

***HP Beck***

**Plenty of outreach activities** pursued by **all groups** and at various scales

open days

public talks

visiting schools

going to schools

schools visiting sites (CERN, PSI, Universities/EPFL/ETH)

Maturaarbeiten

Media coverage

Higgs, and all CHIPP sites big in media (print news, web, radio, TV)

**Quite a wealth of activities**

targeted to **high school students, teachers, public.**

**I will give a focus on CHIPP activities**

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

HOME | ABOUT | MEMBERS | RESOURCES | MASTERCLASSES

## 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 member come from the 21 member states of CERN, Ireland, Romania, South Africa, the USA, and from DESY, CERN and five of the major experiments at the Large Hadron Collider (LHC).

Marge Bardeen (FNAL) and Hans Peter Beck (University of Bern), co-chairs of IPPOG.

### PhD TV: The Higgs Boson Explained

A clever animation explaining what the Higgs Boson is and how the LHC will find it (if it exists).

Film / Video, Book



## Latest Resources



### Hand-outs for...

to prepare secondary school children for Particle Physics Masterclasses

0 comments



### Particle Physics...

to teach secondary school children about research in particle physics

0 comments



### The ATLAS-Detector

to inform secondary school children about the ATLAS Project

0 comments

## IPPOG – The International Particle Physics Outreach Group co-chaired by HPB

brings Masterclasses to many countries



## Switzerland participating institutes

**Zürich** (Uni+ETHZ) March 28 CMS

**Bern** March 26 ATLAS

**Geneva** is covered by CERN which offers (ALICE, ATLAS, CMS & LHCb masterclass activities)

btw

Masterclass activities for LHCb are defined and used in 2014

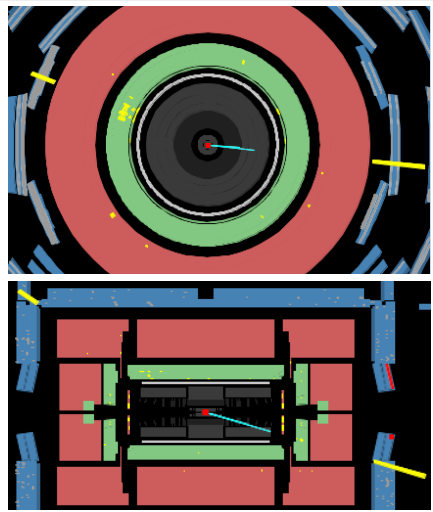
Good opportunity for **EPFL** to participate in 2015

recognized by

- the European Strategy report
- ICHEP invited plenary

- Left:  $p_T > 1 \text{ GeV}$ ; right  $p_T > 5 \text{ GeV}$ 
  - 2 apparent tracks pointing to 2 calorimeter objects
- Zoom reveals 2-pairs  $e^+e^-$ 
  - Left pair disappears if at least 2 pixel hits are required (bottom)
  - Each pair has an invariant mass of  $\sim 0.1 \text{ GeV}$ , i.e. consistent with a photon conversion! (circle)
  - We are in presence of 2-photons, both converted.
  - The invariant mass of the 4 electrons is  $\sim 134 \text{ GeV}$  [square]
- Calorimeter object information

Tracks		Physics Objects			
Track	P [GeV]	Pt [GeV]	$\phi$	$\theta$	
Object 0	111.67	31.42	-0.099	0.285	
Object 1	23.58	12.92	2.755	2.562	



Canvas Window - File: event004.xml Run: 180636 Event: 81441149

Canvas Window - File: event004.xml Run: 180636 Event: 81441149

Pt [GeV]	$\phi$	$\eta$	M(2) [GeV]	M(4) [GeV]	e/m/g
31.5	-0.097	1.941	0.087	134.282	e
8.1	-0.103	1.941			e
5.3	2.762	-1.210	0.097		e
12.7	2.750	-1.209			e

HYPATIA - Track Momenta Window

Previous Event Next Event Electron Muon Photon Delete Track Reset Can  
 ETRMis: 13.100 GeV  $\phi$ : 2.678 rad Collection: MET RefFinal  
 events/group04.zip/event004.xml

Tracks	Physics Objects	Track	+/-	P [GeV]	Pt [GeV]	$\phi$	$\theta$
Tracks 0			+	111.98	31.51	-0.097	0.285
Tracks 1			-	28.94	8.14	-0.103	0.285
Tracks 36			+	9.59	5.25	2.762	2.562
Tracks 38			-	23.21	12.72	2.750	2.562

HYPATIA - Control Window

Parameter Control Interaction and Window Control Output Display

Projection	Data	Cuts	InDet	Calo	MuonDet	Objects	Geometry
InDet							
Calo							
MuonDet							
Objects							
ATLAS							
	Name		Value				
	<input checked="" type="checkbox"/>  Pt		> 5.0 GeV				
	<input checked="" type="checkbox"/>  d0		< 2.5 mm				
	<input checked="" type="checkbox"/>  z0		< 20.0 cm				
	<input type="checkbox"/>  d0 Loose		< 2.0 cm				
	<input type="checkbox"/>  z0-zVtx		< 2.5 mm				
	<input type="checkbox"/> Layer		> 0				
	<input type="checkbox"/> Number Pixel Hits		>= 3				
	<input type="checkbox"/> Number SCT Hits		>= 7				
	<input type="checkbox"/> Number TRT Hits		>= 15				

- The conclusion is that the 2 calorimeter objects correspond to 2 photons, which have converted and lead to 4 tracks; the tracks from one pair had less than 3 pixel hits
- So, to be classified and entered as  $\gamma\gamma$



High-school students from all geographical regions master real event-display programmes, software tools and analysis methods. Having been introduced to the problem, they identify electrons, muons, photons and jets by exploiting their characteristic signals in various detector elements, perform event selection and categorization, and achieve the final analysis goals. (Image credits, left to right: Caroline Hamilton/CoEPP/University of Melbourne, Jayne Ion/iON creative, Franziska Viebach/TU Dresden.)

## International Masterclasses in the LHC era

Each year in spring, the International Particle Physics Outreach Group organizes the International Masterclasses, which give students the opportunity to analyse data from the LHC.

ATLAS "discovery" data are available Higgs boson, CMS approved 13 Higgs candidates of interest, which are mixed with a more Z events, for "treasure hunt" activities, to study the relative production of strange quarks, a tell-tale signal of quark-gluon plasma students how to measure the lifetime of containing b and c quarks are studied experimentally, the mystery of antimatter in the universe. Students quickly master real event-d

The International Masterclasses (IMCs) began in 2005 as an initiative...

**CERN Courier  
June 2014 edition**

CERN Courier June 2014  
Education

CERN Courier June 2014  
Education



More than 200 institutions in 40 countries and more than 10,000 high-school students participated in the 2014 IMC, analysing LHC data.

parameters are all inferred from the decay products – pairs of  $e^+e^-$  or  $\mu^+\mu^-$  leptons. When a hypothetical new heavy gauge boson,  $Z'$ , is

**International Masterclasses**, the flagship activity of IPPOG trained 10'000 students in Spring 2014.

200 institutions in 40 countries participating.

Measurement	No. of masterclasses (CERN + Fermilab)	No. of video conferences (CERN + Fermilab)
ALICE	16 (16+0)	4 (4+0)
ATLAS	132 (118 + 14)	33 (27+6)
CMS	70 (46 + 24)	23 (10+ 13)
LHCb	21 (21+0)	7 (7+0)

Table 1. Use of the different measurements in 2014.

The LHCb measurement allows students to extract the lifetime of the  $D^0$  meson after having studied and fitted an invariant-mass distribution of identified kaons and pions. The next step is to compare and discuss properties of  $D^0$  and  $\bar{D}^0$  decays.

All of these educational packages are tuned and expanded to follow the LHC's "heartbeats". The intention is for the IMCs to bring measurements for new discoveries in the coming years.

**A model for science education**

The IMCs have led to other masterclass initiatives. National programmes bring masterclasses to students in areas far from the research institutes that host the international programme. In sev-

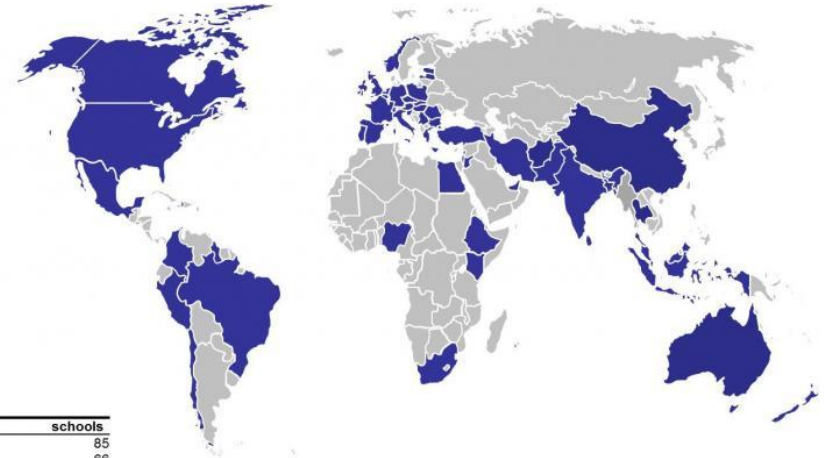
# Competition: a beam line for schools

<http://home.web.cern.ch/students-educators/spotlight/2013/competition-beam-line-schools>

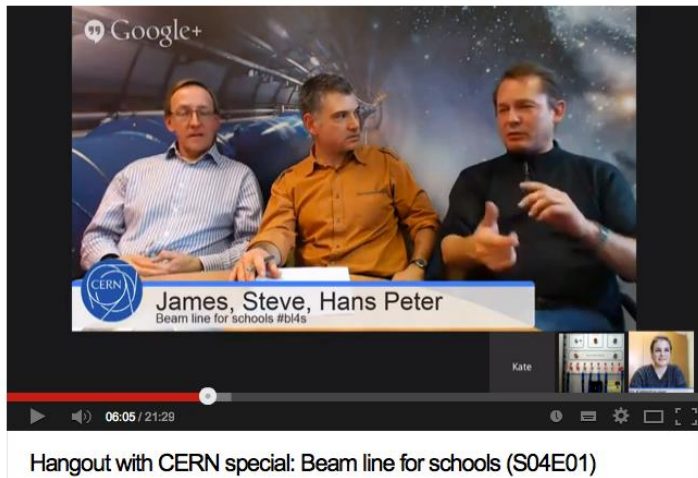
**CERN is making a fully equipped beam line available for a team of school students to run an experiment in September 2014.**

**T9 beamline up to 10 GeV  $e/p/\mu/\pi$**

**IPPOG acted as local contacts to schools in many countries.**



Country	schools	Country	schools	Country	schools	Country	schools
Italy	85	Netherlands	6	Egypt	3	Jordan	1
Spain	66	Singapore	5	Slovakia	3	Mauritius	1
United States	45	South Africa	5	New Zealand	2	China	1
United Kingdom	43	Indonesia	4	Czech Republic	2	Kuwait	1
India	28	Hungary	4	Brazil	2	Nigeria	1
Greece	19	Austria	4	Norway	2	Malaysia	1
Germany	17	Mexico	4	Serbia	2	Ethiopia	1
Canada	13	Ireland	4	Slovenia	2	Haiti	1
Poland	10	Iran	3	Bulgaria	2	Pakistan	1
Switzerland	8	Colombia	3	Australia	2	Guyana	1
France	7	Estonia	3	Afghanistan	2	Peru	1
Portugal	7	Thailand	3	Lebanon	1	Latvia	1
Romania	6					<b>Total</b>	<b>455</b>
Turkey	6						



**455 teams from 60 countries registered to participate in the competition**  
**8 Swiss teams participating**

~290 teams filed in written proposals  
 16 teams short listed **1 Swiss Team**

**2 teams selected (NL & GR) to form a collaboration and perform their proposed experiment at CERN in September 2014.**

## Funding through SERI, SCNAT and SNF/AGORA



„Die Grundlagenforschung vermittelt eine Begeisterung, von der unsere Studenten und Studentinnen lange zehren.“  
Olivier Schneider, Physikprofessor an der ETH Lausanne

NEWS   TEILCHEN & KRÄFTE   PORTRÄTS   INSTITUTE   EXPERIMENTE   UNTERRICHT   ÜBER UNS   Suche

**60 Jahre CERN**

**„Das CERN vermittelt der Schweiz ein positives Image der Weltoffenheit“**

Olivier Schneider, Professor für Teilchenphysik an der ETH Lausanne (EPFL), ist Präsident des 'Swiss Institute of Particle Physics' (CHIPP), einer Organisation, welche alle in der Schweiz tätigen Teilchenphysiker umfasst. Anlässlich des 60 Jahr-Jubiläums, das das CERN in diesem Jahr feiert, erläutert Olivier Schneider im Interview die Bedeutung des CERN für die Schweiz.

60 Jahre CERN  
MicroBooNE  
Kathmandu ruft  
BOSS-Experiment

<http://www.teilchenphysik.ch>

<http://www.physiquedesparticules.ch>

<http://www.fiscadelleparticelle.ch>

<http://www.particlephysics.ch>

Project only possible with the professional help of two journalists:

**Dr. Benedikt Vogel** and **Christine Plass**

Build up from the huge public interest generated by the Higgs discovery and explain the Higgs and its role in our understanding of the universe to high school students.

- Website: <http://www.teilchenphysik.ch> and in F, I, E
- Social Media: Facebook, Google+, Youtube
- Videointerviews of CHIPP members
- 62 news messages as of today; many are translated to E,F,I
- Poster session at high schools
- Teachers education



**Benedikt Vogel**



**Christiane Plass**

**Inform us if you want to have a reportage on your physics topic!**

# Interactions – Podium Discussions

## Double Dialogue – online && in real life

### Debatte Rämibühl

#### Mit welcher Sprache begreifen wir die Welt?

Die Physikerin Laura Baudis (Universität Zürich), der Theologe Luzius Müller (Basel) und der deutsche Lyriker Jochen Winter haben bei einer Podiumsdiskussion am Mathematisch-Naturwissenschaftlichen Gymnasium (MNG) Rämibühl vor 400 Schülerinnen und Schülern über Aussagekraft und gesellschaftliche Relevanz der modernen Physik diskutiert. Bereits am 22. Oktober hatten die Podiumsteilnehmer in der gleichen Zusammensetzung eine Internetdebatte (Hangout On Air) geführt. Bei der Doppelveranstaltung handelte es sich um den ersten von sieben *Double dialogues* im Rahmen des vom Schweizerischen Nationalfonds finanzierten Projektes *Interactions*. Beide Diskussionsveranstaltungen standen unter dem Titel *Mit welcher Sprache begreifen wir die Welt?*.

**1.11.2013**

**Gymnasium Rämibühl Zürich**

**22.10.2013 (online)**

<https://www.youtube.com/watch?v=qBi1fSMoofA>

<http://www.teilchenphysik.ch/mit-welcher-sprache-begreifen-wir-die-welt-0>



### Debatte Neufeld

#### Physik macht – gesund!

Der Physiker Jonas Knüsel (SWAN Isotopen AG) und Nuklearmedizinerin Sabine Weidner (Inselspital Bern) haben bei einer Podiumsdiskussion am Gymnasium Neufeld in Bern über Nutzen und Perspektiven der Medizinphysik insbesondere im Bereich der Krebsdiagnostik diskutiert. Bereits zuvor hatte eine Internetdebatte (Hangout On Air) zum selben Thema stattgefunden. Dabei handelte es sich um den zweiten von sieben *Double dialogues* im Rahmen des vom Schweizerischen Nationalfonds finanzierten Projektes 'Interactions'. Beide Diskussionsveranstaltungen standen unter dem Titel 'Physik macht – gesund!'.

**5.11.2013**

**Gymnasium Neufeld Bern**

**31.10.2013 (online)**

<https://www.youtube.com/watch?v=jg2KfQLvHV8>

<http://www.teilchenphysik.ch/physik-macht-gesund>

# Interactions – Podium Discussions

## Double Dialogue – online && in real life

### Dibattito Liceo di Locarno

#### Materia viva o materia morta

Ma serve? La domanda è legittima. Miliardi di franchi investiti per scoprire una nuova particella e...? Già: e poi? Che cosa ne deriva per il miglioramento della vita delle persone? Insomma, a che serve la fisica? Quali ricadute ha nell'ambito della medicina, per esempio? Proprio di questo hanno discusso per un paio d'ore, nel pomeriggio di venerdì 4 aprile, Martina Bucciantonio e Franco Cavalli, moderati dal giornalista Gerhard Lob, in un appassionante confronto dal titolo "Materia viva o materia morta - La ricerca in medicina, la ricerca in fisica", davanti a una cinquantina di studenti di quarta del Liceo di Locarno.

4.4.2014

Gymnasium von Locarno

20.03.2014 <https://www.youtube.com/watch?v=aKYF-4i7Pjg>

<http://www.teilchenphysik.ch/lebensbendige-materie-oder-tote-materie>

12.2.2014

Hightech Zentrum Aargau in Brugg

23.04.2014

(online) <https://www.youtube.com/watch?v=tfygNcsCJ1k>

<http://www.teilchenphysik.ch/fruechte-der-grundlagenforschung>

### Debatte Brugg

#### Früchte der Grundlagenforschung

Teilchenphysikerinnen und Teilchenphysiker leisten mit ihrer Forschung einen Beitrag zum Verständnis der Welt. Sie tragen aber oft auch bei zur Weiterentwicklung der Wirtschaft durch innovative Produkte. Diesen Aspekt hat am 12. Februar 2014 eine Podiumsdebatte am Hightech Zentrum Aargau in Brugg beleuchtet, an der Roland Horisberger, ETH-Professor und Leiter der Hochenergiephysik am Paul Scherrer Institut in Villigen/AG, mit Wirtschaftsvertretern diskutierte. Am 23. April 2014 fand mit den Teilnehmern eine Internetdiskussion (Hangout) zum gleichen Thema statt (die Aufzeichnung finden Sie auf dieser Seite ganz unten). Podiumsgespräch und Hangout waren Veranstaltungen im Rahmen des vom Schweizerischen Nationalfonds geförderten Projekts 'Interactions'.

In preparation:

3 September Microcity Neuchâtel – **Big science – un défi pour notre société**

1 October, Technorama Winterthur – **Particle Fever**



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Education

this site
  All CERN

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[Teaching Resources](#)
[Visit CERN](#)



**Kurse 2014**

21.-22. November 2014

**Archiv**

8.-9. November 2013

7.-8. Juni 2013

**National contacts**

Andreas Schopper  
 Andreas.Schopper@cern.ch

Hans-Peter Beck  
 Hans.Peter.Beck@cern.ch

**Swiss Teacher Programme**

Im Rahmen seiner Nationalen Lehrerprogramme organisiert das CERN in Zusammenarbeit mit der Schweizerischen Physikalischen Gesellschaft (SPG) ein auf Schweizer Physiklehrer zugeschnittenes Fortbildungsprogramm. Das nächste Programm findet am 21. und 22. November statt. Details zur Anmeldung entnehmen Sie bitte dem Link unter dem Kursangebot in der linken Spalte.

[http://education.web.cern.ch/education/Chapter1/Page3\\_CH.html](http://education.web.cern.ch/education/Chapter1/Page3_CH.html)

## Lehrerfortbildung: 18 Deutschschweizer Lehrer im Herz von CERN

Christine Plass (Text und Bilder)

Im Rahmen der Nachwuchsförderung setzt sich die SPG für die Lehrerfortbildung im Gebiet der Physik ein. Im Frühjahr wurde aus aktuellem Anlass, im Zusammenhang mit der Higgs-Entdeckung am CERN, eine Lehrerfortbildung mit Schwerpunkt Teilchenphysik zusammen mit [teilchenphysik.ch](http://www.teilchenphysik.ch) durchgeführt. Anfang Juni 2013 reisten 18 Lehrerinnen und Lehrer aus der Deutschschweiz nach Genf. Der Weiterbildungstag am CERN vermittelte ihnen Anschauungsmaterial und Experimente, um Hochenergiephysik zu unterrichten.

"Das ist eine einmalige Gelegenheit, den Detektor zu besichtigen!", erkannten acht Physiklehrer der Kantonsschule Zug, als ihr Kollege Markus Schmidinger ihnen von seiner Einladung ans CERN erzählte. Schmidinger hatte an einer Fortbildung zu Teilchenphysik in Bern teilgenommen und war zur Folgeveranstaltung ans CERN nach Genf eingeladen worden. Höflich fragte er an, ob seine Kollegen wohl mitkommen dürften? Initiator Hans Peter Beck, Physiker am CERN und Dozent der Uni Bern, überlegte nicht lange. Er konzipierte sein Programm so um, dass es auch ohne Vorbildung verständlich war. Insgesamt nahmen 18 Lehrerinnen und Lehrer aus der Kantonsschule Ausserschwyz,

einem eines der faszinierendsten Forschungszentren der Welt, können zu lernen.



Im Herz von CERN, der Protonenquelle. Am Modell erklärt Mik Storz, wie dem Wasserstoffgas hier die Protonen entzogen werden, die dann im Large Hadron Collider (LHC) miteinander kollidieren.

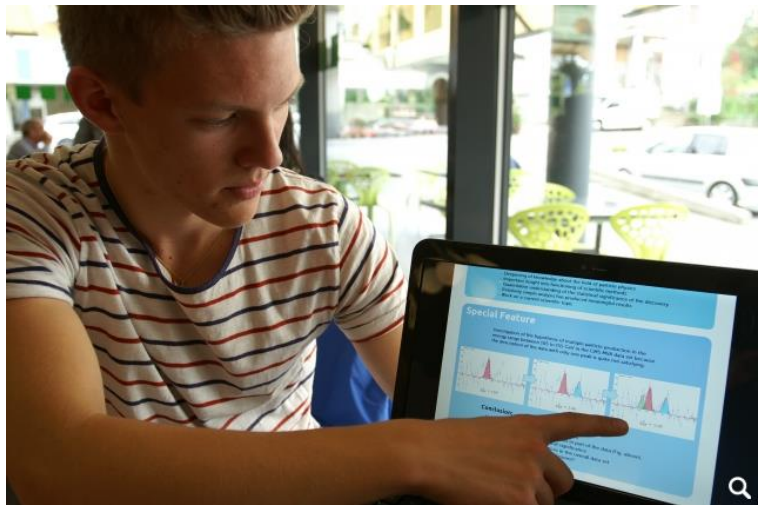
<http://www.teilchenphysik.ch/moderne-physik-fuer-den-schulalltag>

<http://www.teilchenphysik.ch/im-herz-von-cern>

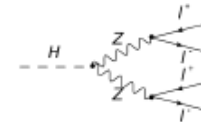
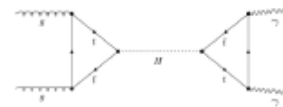
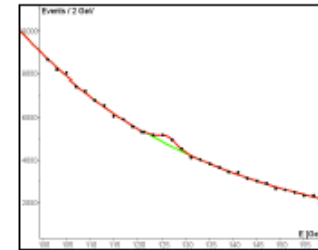
One of the teachers who participated to the teachers event triggered one of his students to write a Maturaarbeit on the Higgs discovery:

## Analysis of CERN's 2012 Boson Signal

This **Maturarbeit** was sent in to the **SJF - Schweizer Jugend Forscht – competition** and was evaluated as **“sehr gut”**.



## Analysis of CERN's 2012 Boson Signal



Author:  
 Benjamin Estermann, 6b  
 Im Hubel 4  
 6210 Sursee

Supervisor:  
 Dr. Jerzy Sromicki  
 Kirchstrasse 9  
 8107 Buchs, ZH

CHIPP members from ETHZ and Uni Bern have been involved with this Maturaarbeit and evaluation.

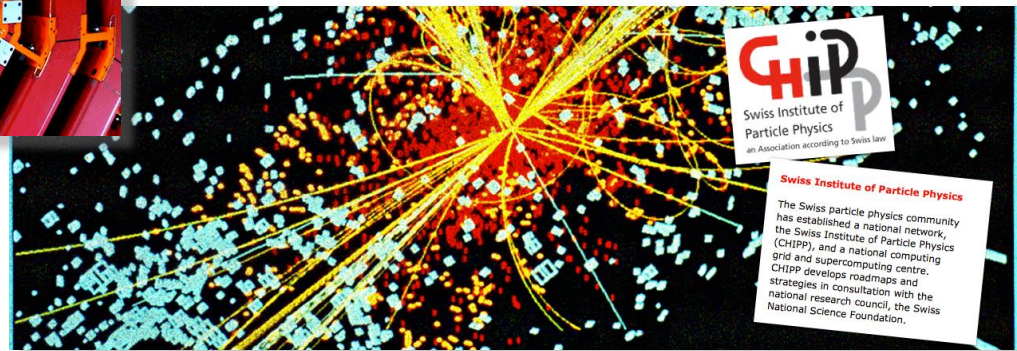
## Switzerland: Small Country - Big Science



Switzerland in the United Kingdom

Particle Physics

## A strong Swiss particle physics community



Interested in more?

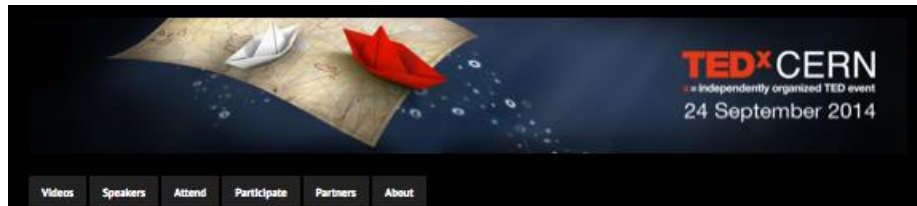
[www.swissembassy.org.uk](http://www.swissembassy.org.uk) and [Science Museum Collider Exhibition](#)

Get in contact with us

<http://www.switzerlandbigscience.org>

## The Swiss Embassy in London

- supported the **Collider Exhibition in London**
- prepared a web site to mark the importance of Big Science in a Small Country
- Organized „**An Evening at the Collider**“ on **20 January 2014** at the **Smith Centre** of the **Science Museum**
- Podiumsdiscussion** with **the curator of the collider exhibition** and **HPB**



## TEDxCERN 2014 Forward: Charting the future with science



Previous Pause Next

### Featured videos from previous TEDxCERN events



**DNA**  
George Church | 2013  
Recent breakthroughs with DNA

### WHAT'S NEW

**Charting the future**  
07 May 2014 – TEDxCERN 2014 will address the essential role that science must play in trying to find solutions to many important issues the world faces today

### FEATURED SPEAKERS 2014



Topher White



Sonia Trigueros

After the success of the first TEDxCERN last year, CERN has decided to organize another event this year on 24 September 2014 under the theme **Forward – Charting the Future with Science** (<http://tedxcern.web.cern.ch/>).

Encourage all the institutes involved in the research programme at CERN to stream the event live.

Last year more than 10,000 viewers were watching the event through live webcast either from our homepage or from one of the viewing parties which were organized by 24 CERN associated institutes around the world.

**Anyone interested in hosting a TEDxCERN@Yourinstitute should please contact:**  
[webcast@tedxcern.ch](mailto:webcast@tedxcern.ch)



**CERN 60 activities across all member states**

**Fribourg is chosen to host the Swiss celebration**

**See the SPS programme for details.**

A **colloquium** at **CERN's Globe of Innovation** is in preparation by the **Swiss Federal Department of Foreign Affairs** and **CERN**.

On 17 September distinguished international experts will discuss the **political and societal impact of CERN on peace, in international collaborations astride cultural and national boundaries, and in technological innovations and spin-offs.**

This colloquium also defines the starting point of a **PhD studentship** which will be co-funded by the **Swiss Federal Department of Foreign Affairs** to **investigate the societal impact CERN is generating.**

# SCNAT 200 years bicentennial event in 2015

SCNAT Bicentennial largely descoped and new project management.

e.g. no tour across Switzerland with circus Knie...

SCNAT found new company to organize the event(s) and has funds secured for a realistic smaller scale bicentennial.

<http://www.scnat.ch/d/jubilaeum/>

Académie des sciences naturelles

## Übersicht

Home > Jubilaeum > Uebersicht

### «forschung live!»

Die Kampagne für die Naturwissenschaften im Jahr 2015 hat drei Schwerpunkte:

- Eine Erlebnisausstellung geht mit dem Circus Knie auf Schweizer [Tournée](#) und wirbt für die hiesigen naturwissenschaftlichen Angebote.
- Im Jahr 2015 wird eine «[App der Naturwissenschaften](#)» als Trip Advisor für die naturwissenschaftlich orientierten Angebote initiiert.
- Ein [Geschichtsprojekt](#) reflektiert ausgewählte Aspekte der naturwissenschaftlichen Forschung anhand von Forschern der Schweiz.

# forschung<sup>+</sup>live!

Naturwissenschaften erlebbar nah



**New  
SCNAT project team**

**Marcel Falk**

Projektleitung a.i.  
Jubiläum SCNAT 2015

**Tania Kyburz**

Stv. Projektleitung  
Jubiläum SCNAT 2015