Swiss Institute of Particle Physics

CHIPP Outreach Report

30 June 2014

CHIPP Plenary

Fribourg

HP Beck

CHIPP Outreach activities

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)

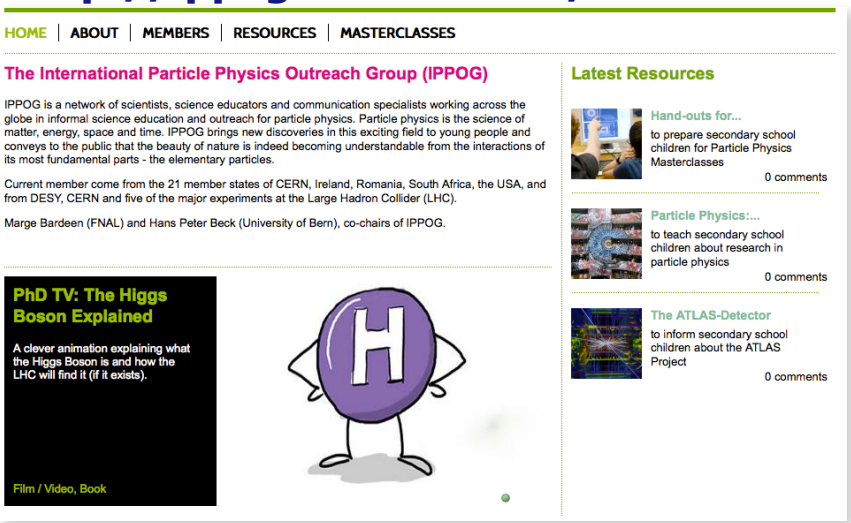
Quite a wealth of activities

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

I will give a focus on CHIPP activities

Masterclasses 2014 – CHIPP participation

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



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

brings Masterclasses to many countries

International Particle Physics Outreach Group

INTERNATIONAL MASTERCLASSES
hands on particle physics

recognized by
- the European Startegy report
- ICHEP invited plenary

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)

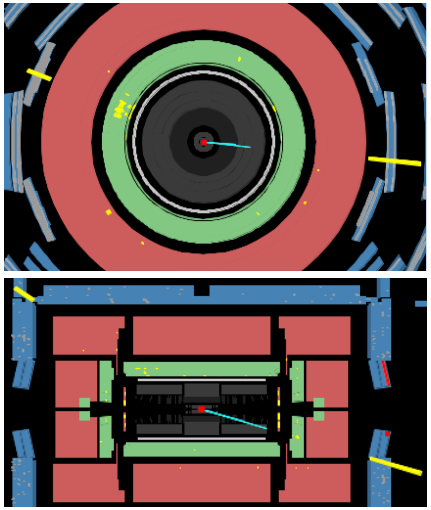
btw
Masterclass activities for LHCb are defined and used in 2014
Good opportunity for **EPFL** to participate in 2015

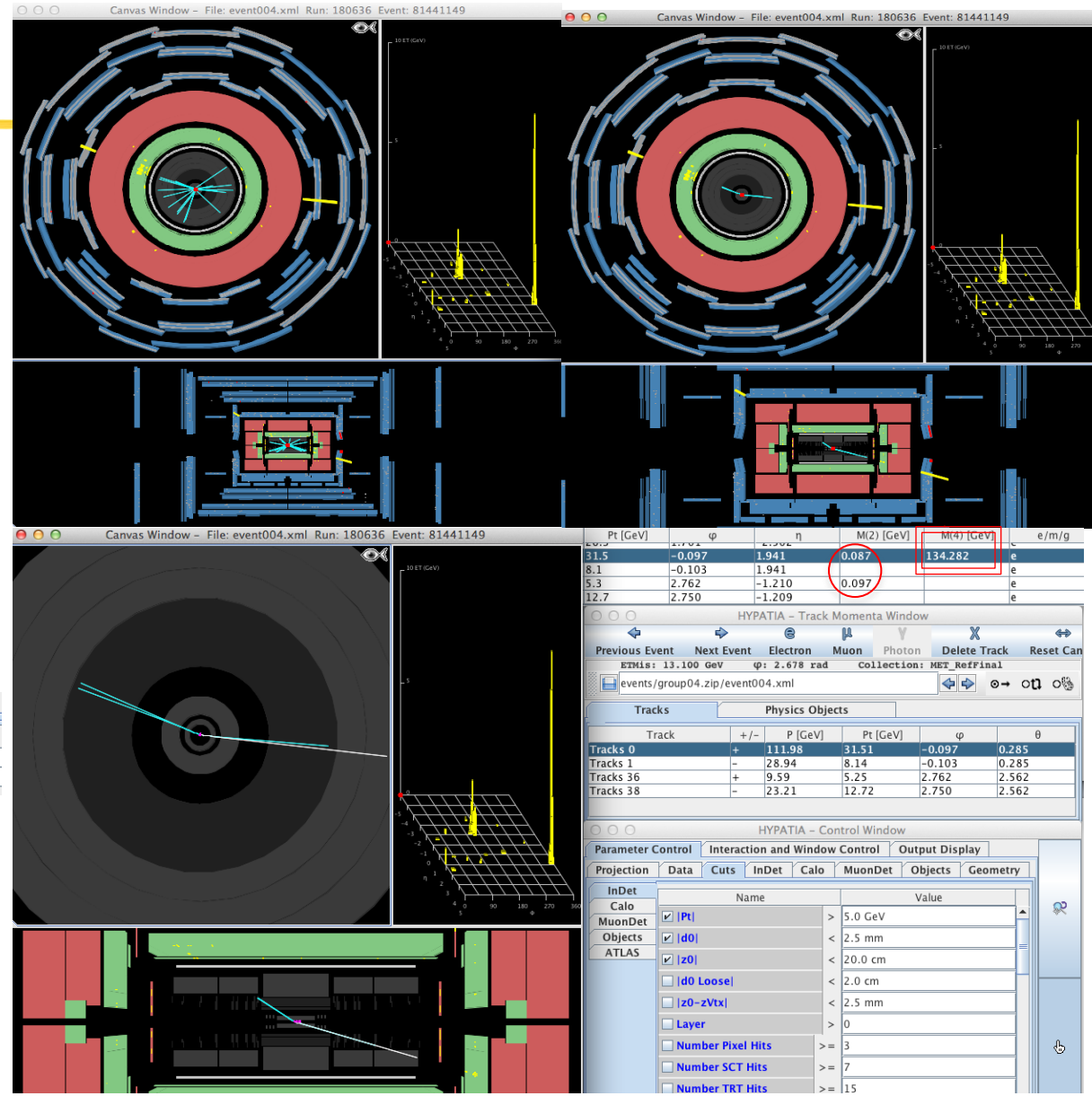
©©or e^+e^-?

- Left: p_T>1GeV; right p_T>5 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 ~0.1 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 ~134 GeV [square]
- Calorimeter object information

Tracks | Physics Objects

Track	P [GeV]	Pt [GeV]	φ	θ
Object 0	111.67	31.42	-0.099	0.285
Object 1	23.58	12.92	2.755	2.562





- 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 γγ

Masterclasses 2014

CERN Courier June 2014

Education

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

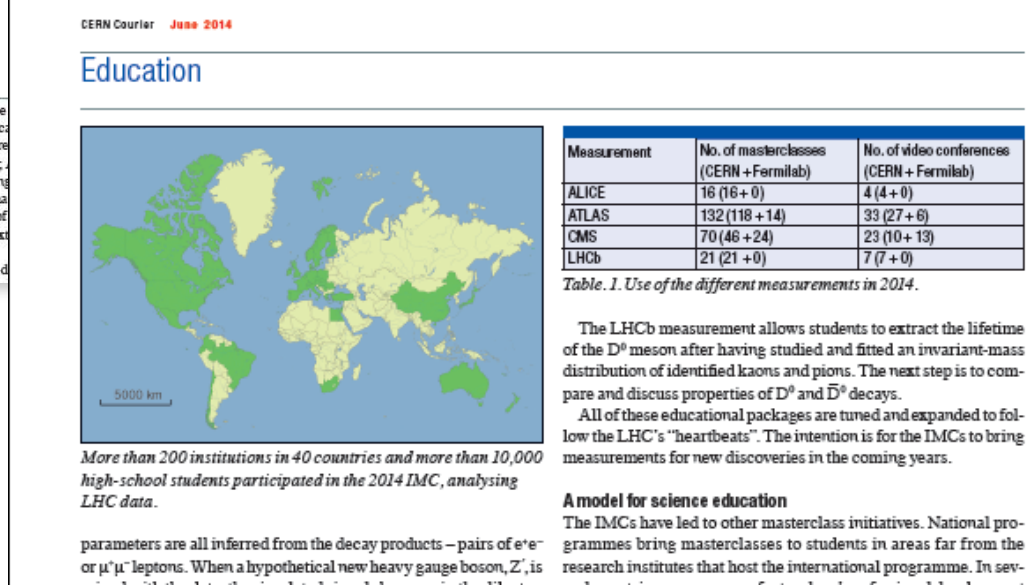
Each year in spring, the International Particle Physics Outreach Group organizes the International Masterclasses, which give students the opportunity to analyse data from the LHC.

The International Masterclasses (IMCs) began in 2005 as an ini-

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

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

200 institutions in 40 countries participating.



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.

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.

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

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-

CERN Courier
June 2014 edition

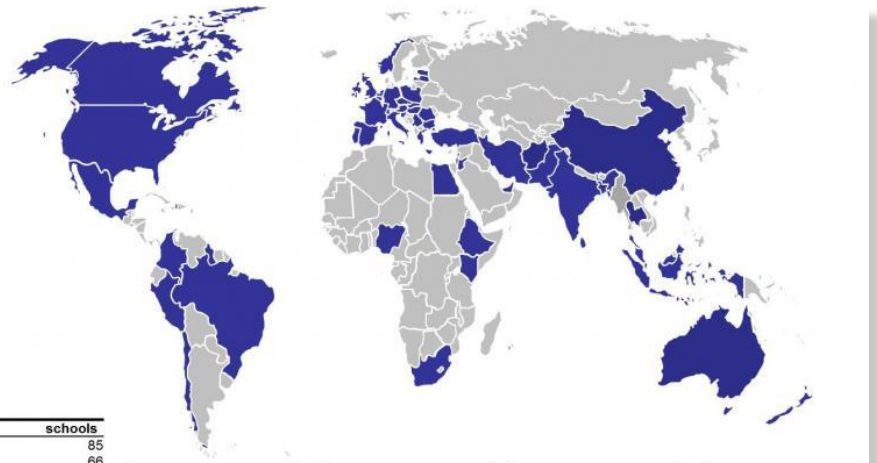
Competition: a beam line for schools

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/μ/π

IPPOG acted as local contacts to schools in many countries.



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

Hangout with CERN special: Beam line for schools (S04E01)

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.

Swiss physicists in dialog with the society

Funding through SERI, SCNAT and SNF/AGORA

http://www.teilchenphysik.ch http://www.physiquedesparticules.ch
http://www.fisicadelleparticelle.ch http://www.particlephysics.ch

Project only possible with the professional help of two journalists:
Dr. Benedikt Vogel and **Christine Plass**

Swiss physicists in dialog with the society

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 eduaction

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 Isotpen 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 Projekts '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

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

http://www.teilchenphysik.ch/lebendige-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 societé

1 October, Technorama Winterthur – Particle Feever

CERN Swiss Teacher Programme

http://education.web.cern.ch/education/Chapter1/Page3_CH.html

Lehrerfortbildung: 8 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 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 nahmen18 Lehrerinnen und Lehrer aus der Kantonsschule Ausserschwyz,

lern eines der faszinierendsten Forschungszentren der Welt kennen zu lernen.

Im Herz von CERN, der Protonenquelle. Am Modell erklärt Mick Storr, 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

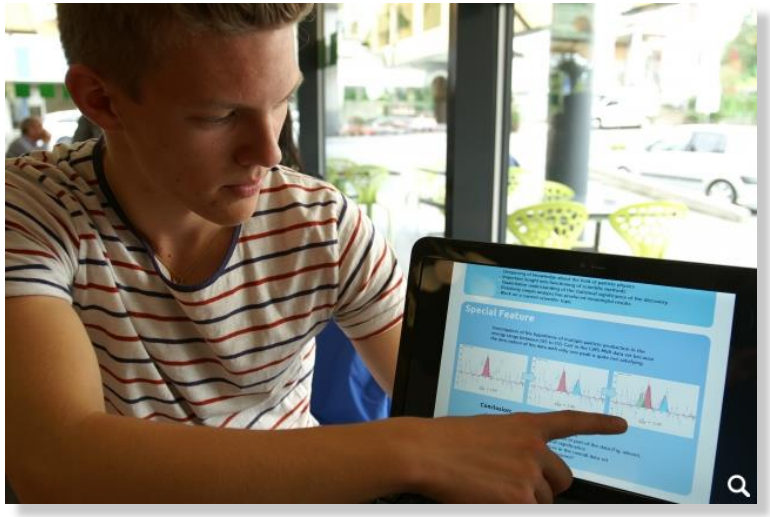
http://www.teilchenphysik.ch/im-herz-von-cern

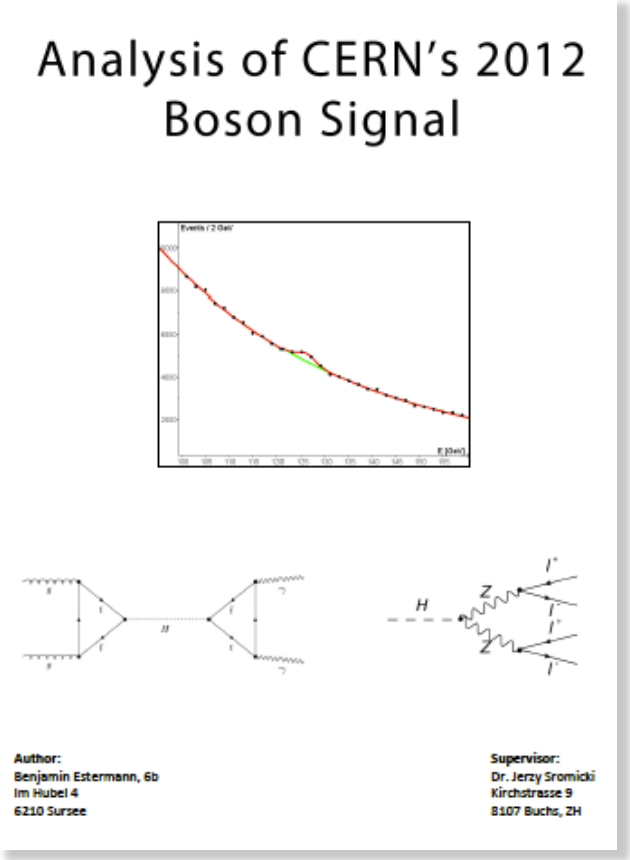
Schweizer Jugend Forscht

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"**.





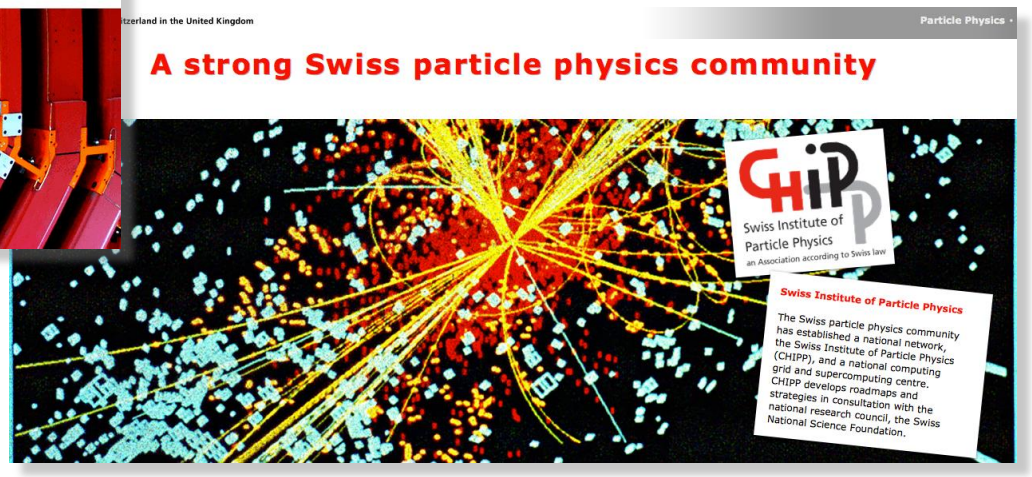
Analysis of CERN's 2012 Boson Signal

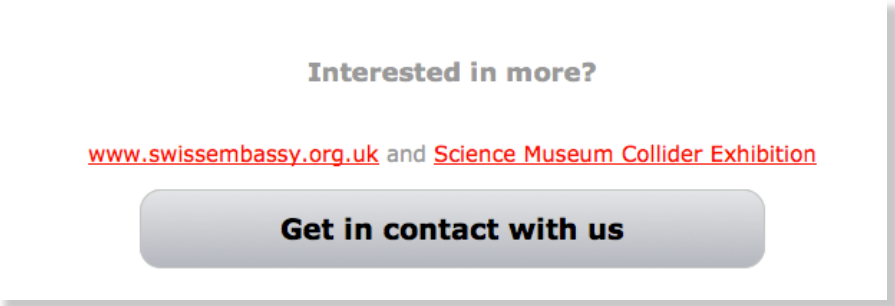
Author:
Benjamin Estermann, 6b
Im Hubel 4
6210 Sursee

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

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

Swiss Embassy in London and the LHC



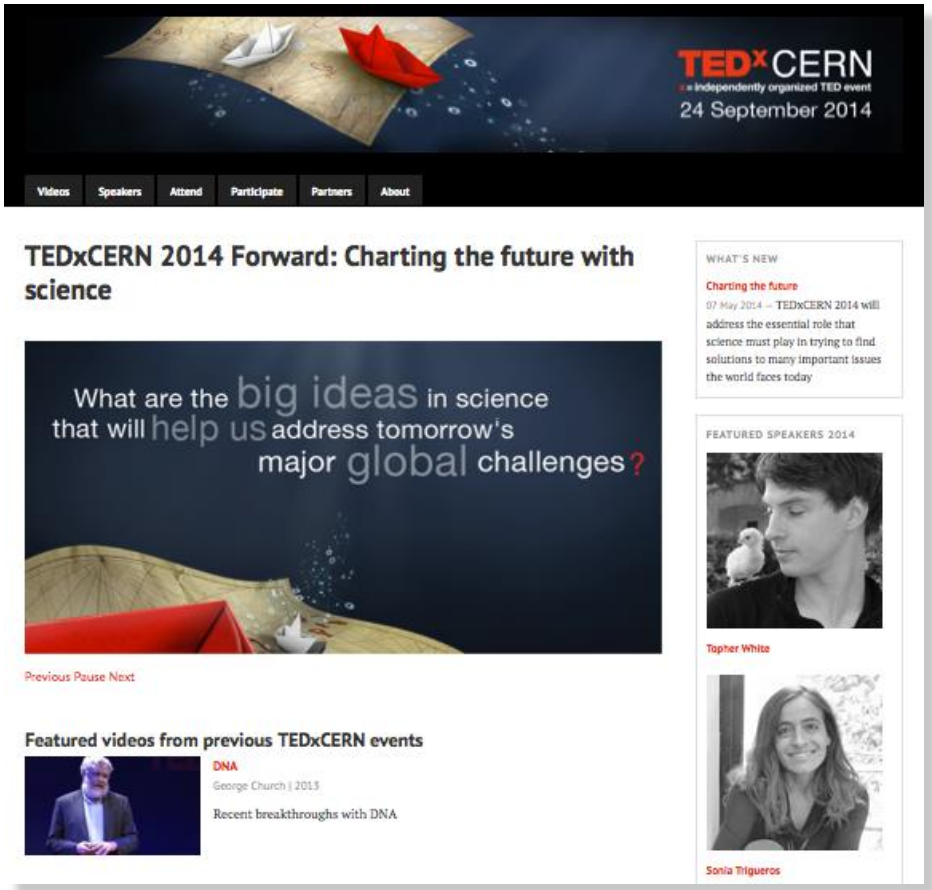


http://www.switzerlandbigscience.org

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 @ your institute



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

CERN 60

CERN 60 activities across all memeber 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 Tournee 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 live!

Naturwissenschaften erlebbar nah

New SCNAT project team

Marcel Falk

Projektleitung a.i. Jubiläum SCNAT 2015

Tania Kyburz

Stv. Projektleitung Jubiläum SCNAT 2015