Retour d'expérience du HST Program

Konrad Jende, French Teacher Programme 2014

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Outline

1. History of the High School Teacher Programme
2. HST Resources
3. Experiences from 17 editions
4. CERN Resources in Education
5. Outlook

1. History of the High School Teacher Programme

first row (from left to right):
organizers Jose Salicio Diez & Michelangelo Mangano

1. History of the High School Teacher Programme

morning: Summer Student Lecture Programme

afternoon: discussion sessions, physics teaching resources of the world wide web, workshops on how to great webpages, design lesson plans, compare syllabi of countries

2002: http://indico.cern.ch/event/334159/overview
2003: http://indico.cern.ch/event/a031572/
2004: http://indico.cern.ch/event/a042016/
2005: http://indico.cern.ch/event/a051051/
2006: http://indico.cern.ch/event/3324/
2007: http://indico.cern.ch/event/16623/
2008: http://indico.cern.ch/event/35996/
2009: http://indico.cern.ch/event/61942/
2010: http://indico.cern.ch/event/96344/
2011: http://indico.cern.ch/event/144034/
2012: http://indico.cern.ch/event/193928/
2013: http://indico.cern.ch/event/257353/
2014: http://indico.cern.ch/event/318730/

1. History of the High School Teacher Programme

High School Teachers 2014

chaired by Konrad Jende (CERN, Education Group)

from Sunday, 6 July 2014 at **17:00** to Saturday, 26 July 2014 at **08:00** (Europe/Zurich)
at **CERN**

Material:
- **Derivation of momentum and energy - Gron1**
- **Energy and Momentum Units in Particle Physics**
- **Neutrino data - Gron4**
- **Photon energy and the expanding universe - Gron3**
- **Relativistic mechanics and mass - Gron5**
- **Slides**

Video Services Vidyo public room : High_School_Teachers_2014 More Info | **Join Now!**

Administrative Support: Maureen Prola-Tessaur (33-R-028) ***Email:*** maureen.prola-tessaur@cern.ch ***Telephone:*** +41 76 487 5947

Go to day

Sunday, 6 July 2014

17:00 - 17:45 **Welcome Reception** *45'* (Restaurant 1)
Speakers: Rolf Landua (CERN), Mr. Konrad Jende (CERN, Education Group), Maureen Prola-Tessaur (CERN), Julia Woithe (CERN & Universitaet Kaiserslautern (DE))

17:45 - 19:15 **Discover CERN Treasure Hunt** *1h30'*
Speaker: Mr. Konrad Jende (CERN, Education Group)

19:15 - 20:30 **Dinner**

20:30 - 21:15 **Introducing remarks** *45'* (60-6-015 - Room Georges Charpak (Room F))
Speaker: Mr. Konrad Jende (CERN, Education Group)
Material: **Slides**

1. History of the High School Teacher Programme

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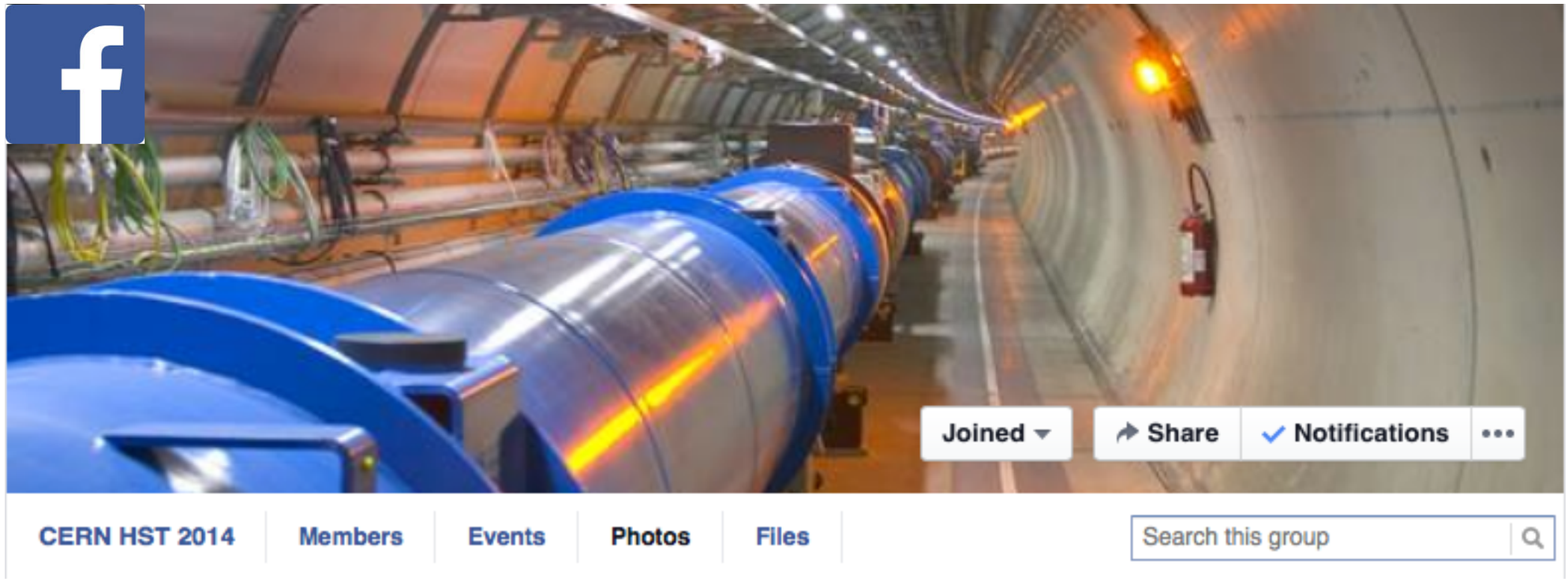

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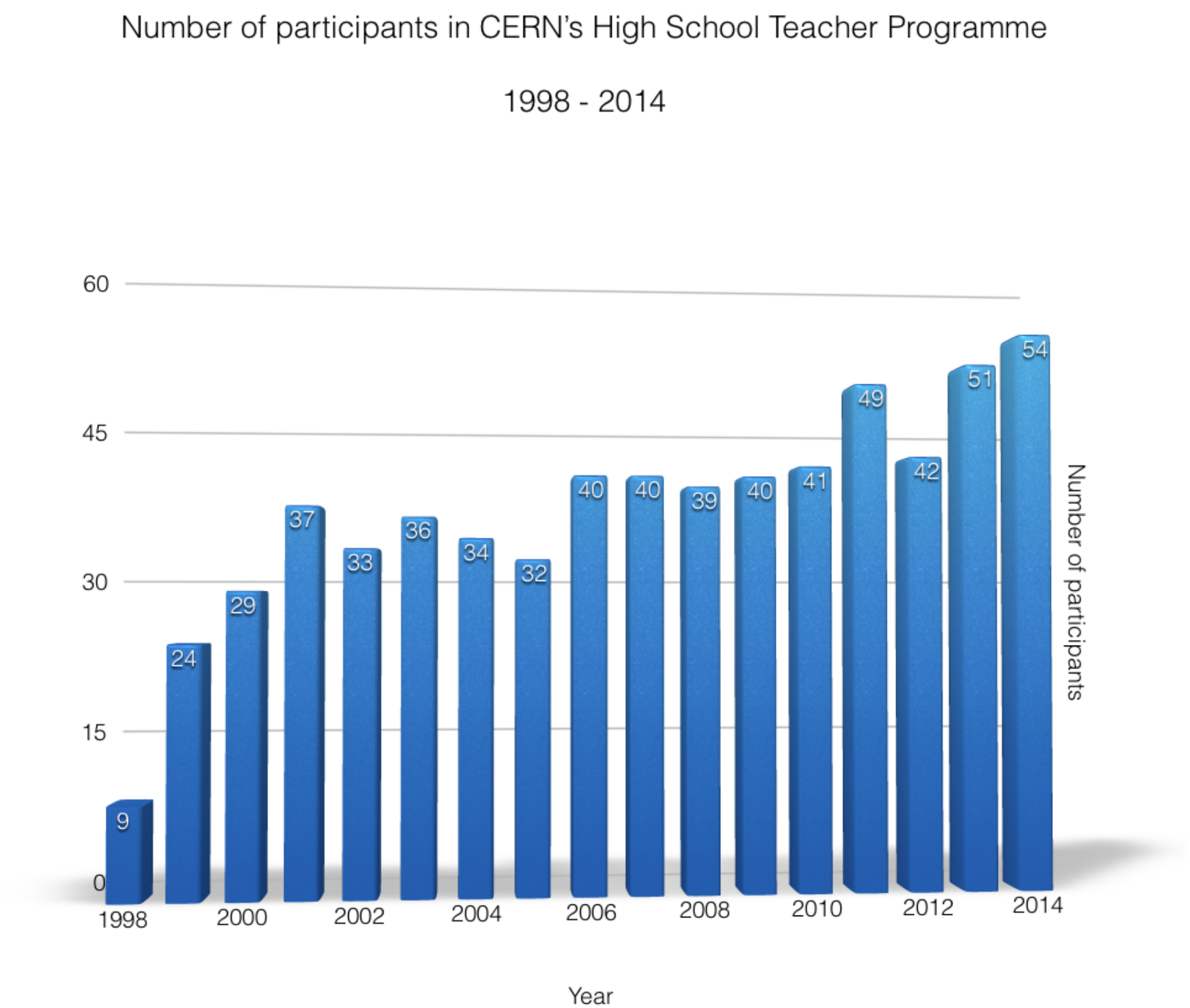

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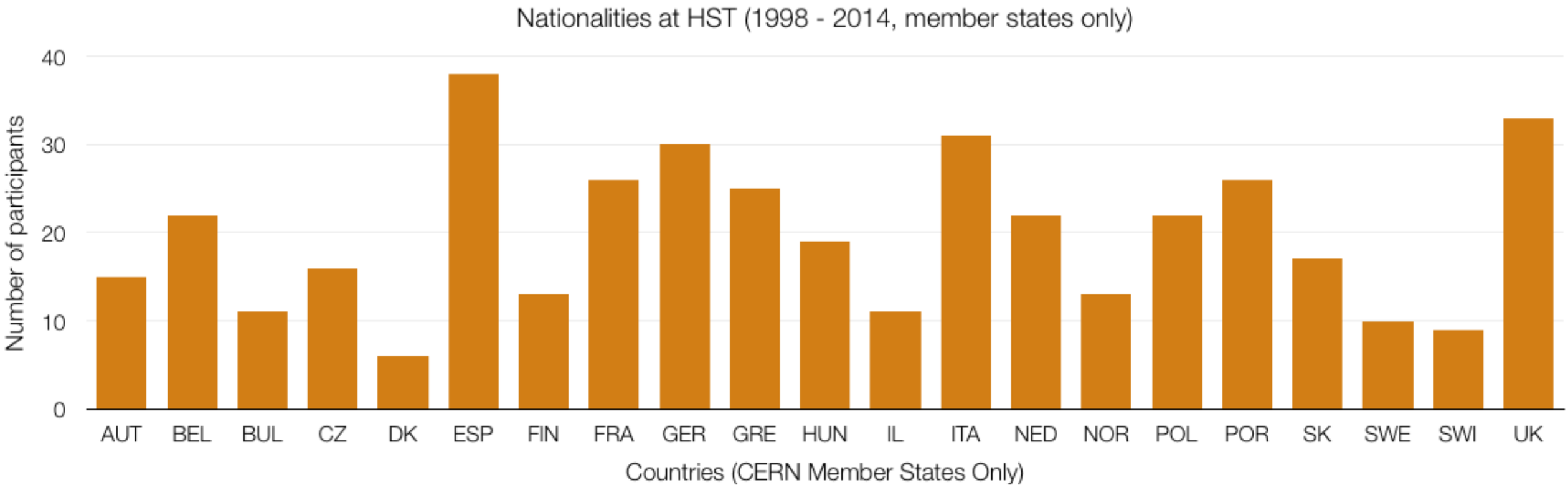

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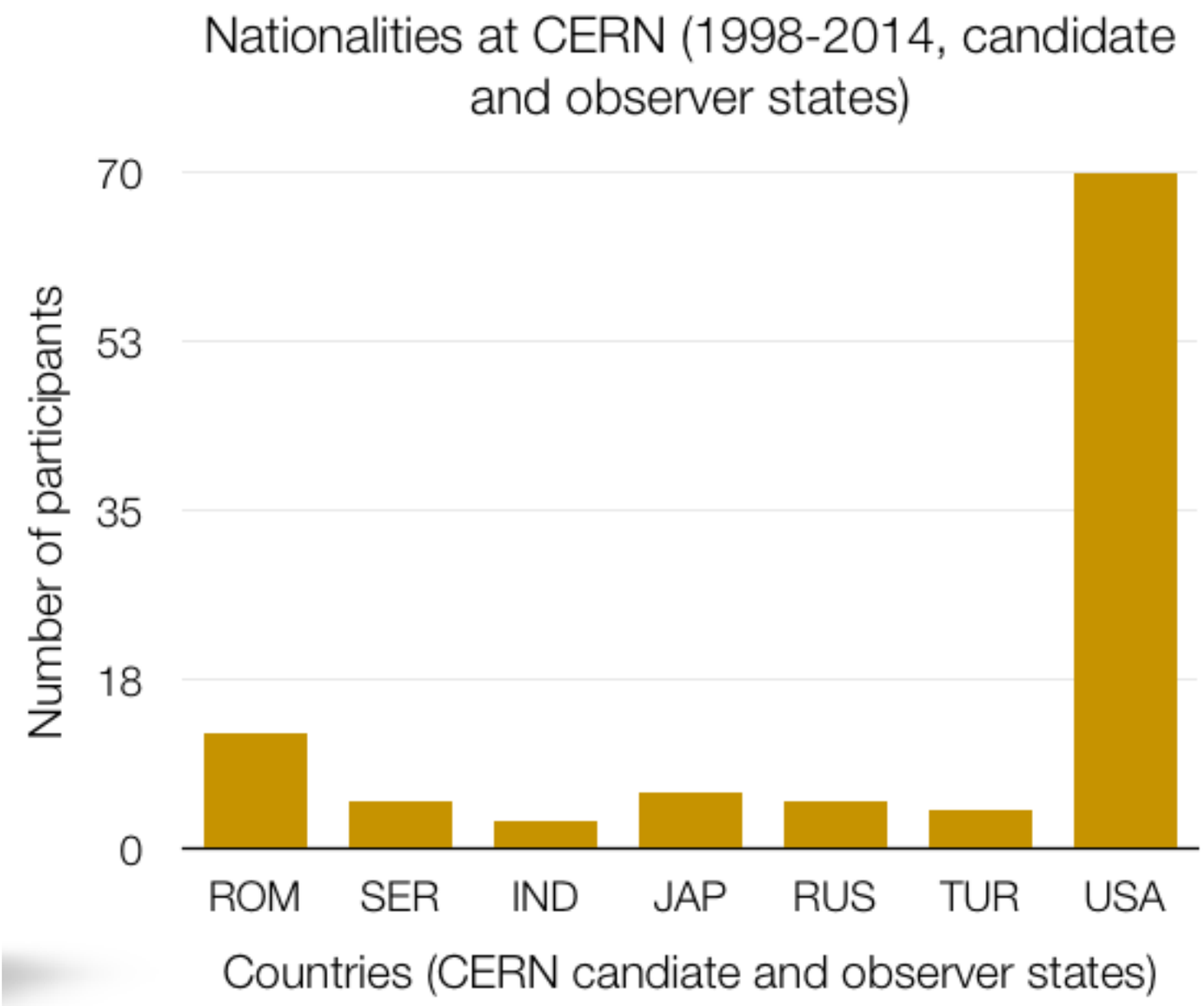

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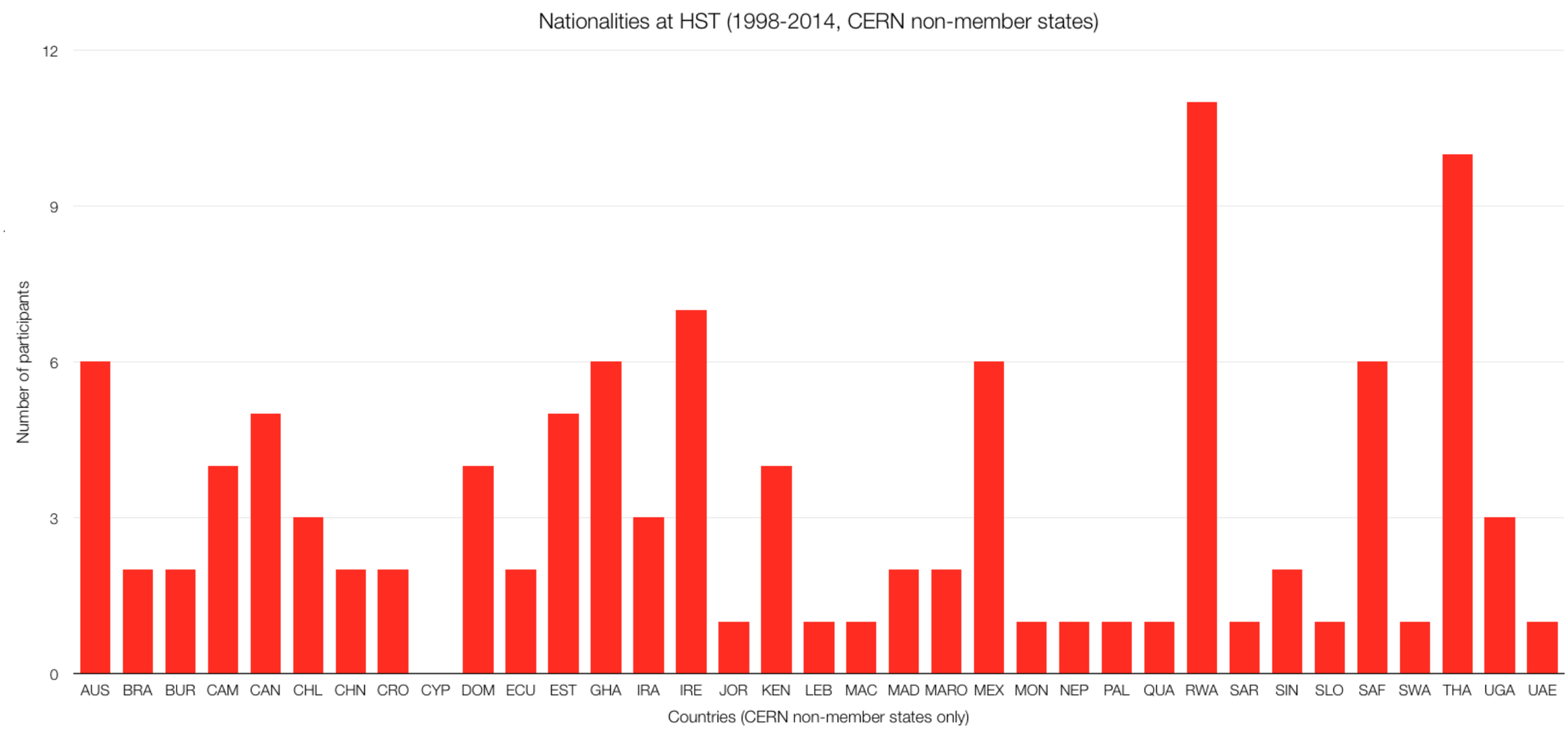


1. History of the High School Teacher Programme

Publications

1998: http://teachers.web.cern.ch/teachers/hst/1998/1998.htm

1998: http://bullarchive.web.cern.ch/bullarchive/9833/art1/Text_E.html

2000: http://bullarchive.web.cern.ch/bullarchive/0031/Art1/Text_E.html

2000: http://arxiv.org/abs/physics/0005021v1

2001: http://cds.cern.ch/record/45182?ln=en

2009: http://cds.cern.ch/journal/CERNBulletin/2009/32/News%20Articles/1195729?ln=en

http://www.scienceinschool.org/print/1043

http://www.scienceinschool.org/repository/docs/issue13_cernhst.pdf

2014: http://cds.cern.ch/journal/CERNBulletin/2014/31/News%20Articles/1743537?ln=en

2014: http://home.web.cern.ch/students-educators/updates/2014/07/inspiring-science-education-middle-east

2. HST Resources

2. HST Resources

TASK 1

In the LHC ring there are 2835 bunches in each ring which will collide with each other once in each detector. How many collisions of bunches are there in

a) one second,

b) one run which will last about 10 hours.

2. HST Resources

Solution 1

The bunches travel at nearly the speed of light so they meet every $\frac{\frac{27 \cdot 10^3 m}{2835}}{3 \cdot 10^8 m/s} = 3.175 \cdot 10^{-8} s$

so the frequency of collisions is $\frac{1}{3.175 \cdot 10^{-8} s} = 32 MHz$

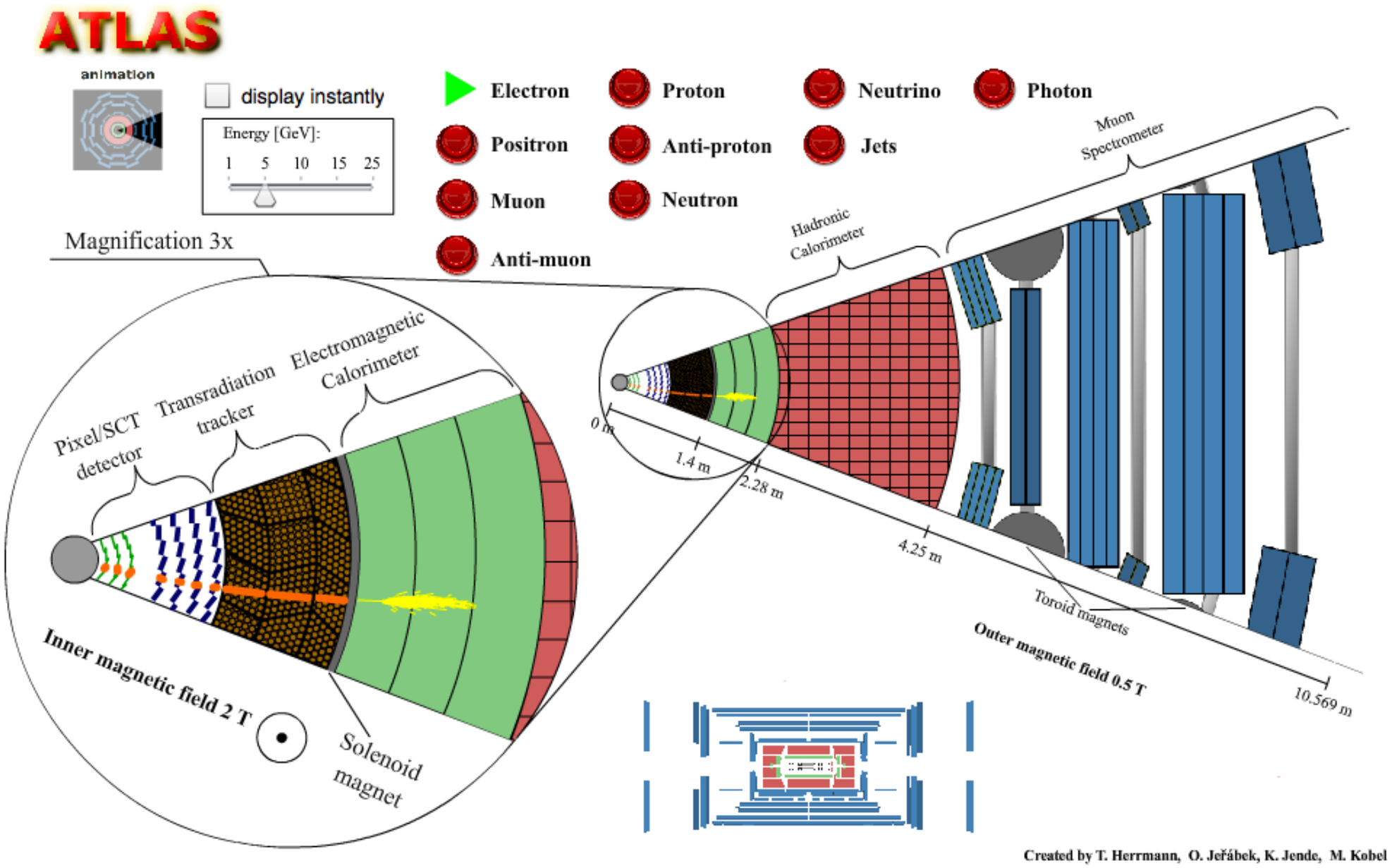
It should be 40 MHz, but there are some holes in the beam in other words some bunches are missing. This is the reason for the pacman effect, that will be eating the beam little by little, because those bunches that are not colliding will behave in a strange way and somehow eat the other bunches or make more holes to the beam.

And in 10 hours there will be about $32 \cdot 10^6 \frac{1}{s} \cdot 10 \cdot 3600 s \approx 1{,}2 \cdot 10^{12}$ *collisions*

.

The data that will be collected from the collisions corresponds to the amount of about 10000 Britannica Encyclopaedia per one second.

2. HST Resources



2. HST Resources

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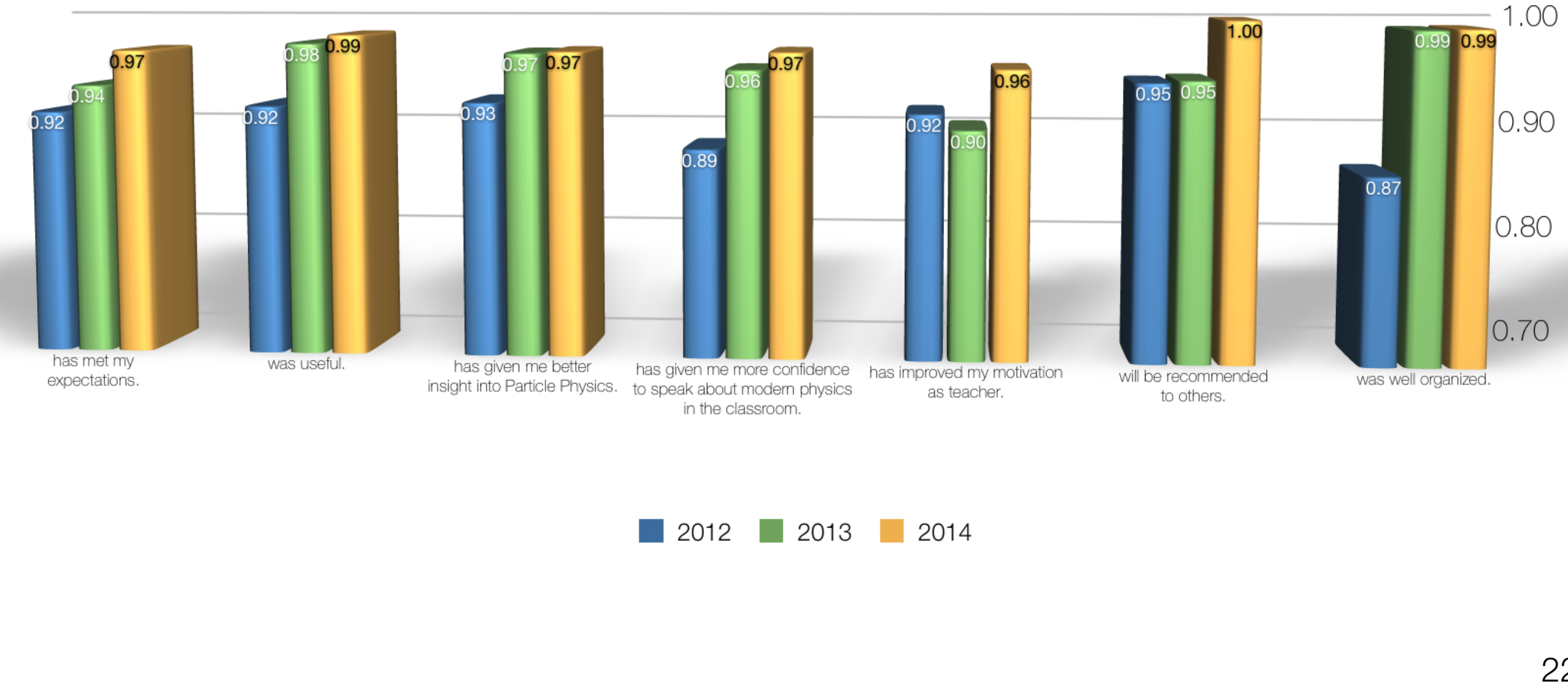
3. Experiences from 17 editions

The High School Teachers Programme



3. Experiences from 17 editions

Teachers want to come back!!!

Teachers want to stay connected!!!

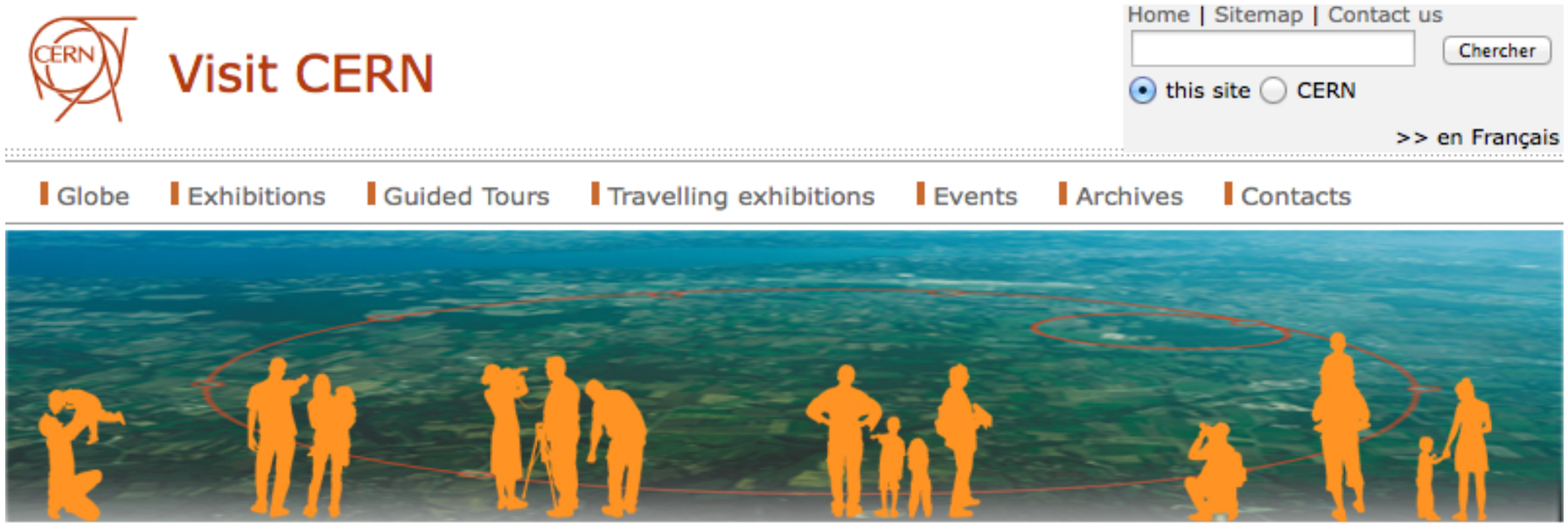
Teachers want to share knowledge!!!

3. Experiences from 17 editions

Teachers want to come back!!!

But how?

3. Experiences from 17 editions



Come and learn about fundamental research and see inside the world's largest particle physics laboratory. Feel free to visit our permanent exhibitions and experience CERN's scientific adventure on your own. Book and take part at one of our guided tours and discover the secrets of matter.

Exhibitions

The Microcosm exhibition near the CERN reception tells the story of CERN's scientific adventure.

Guided tours

Come and learn about fundamental research by looking inside the world's largest particle physics laboratory.

3. Experiences from 17 editions

1/2 day visit

simple formula:

presentation (1h) + 2 visits +

exhibition (Microcosm+Globe)

+

(for school groups only and as of 2015)

S'Cool LAB visit

Magnettest Facility (SM18), Low Energy Ion Ring (LEIR), Antiproton Decelerator (AD), ATLAS Visitor Centre (AVC), Data Centre, CERN Controll Center (CCC), Alpha Magnetic Spectrometer POCC, COMPASS, CMS visitor centre, LHCb exhibition + CAST, ALICE exhibition

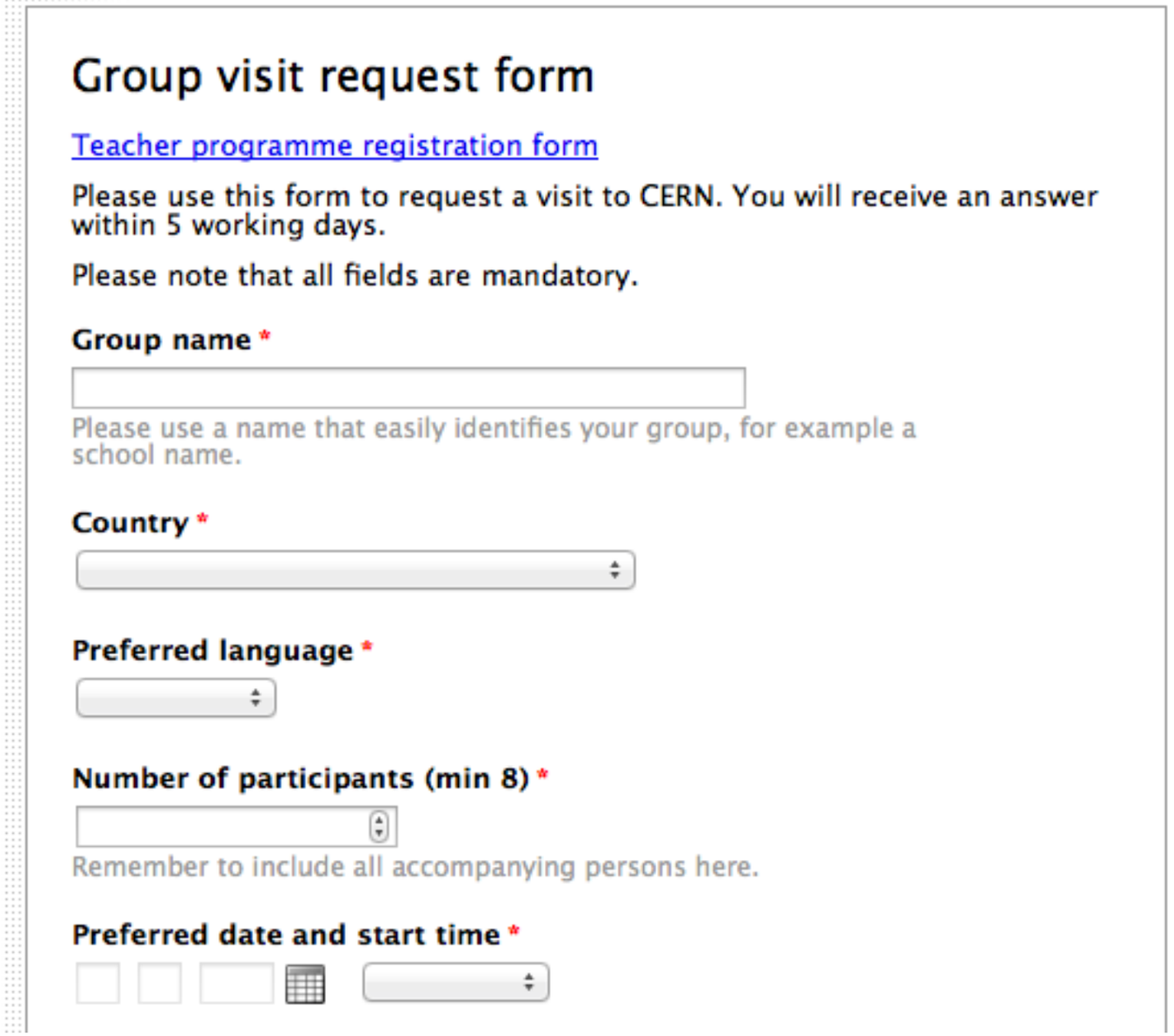
3. Experiences from 17 editions

FAQ

1. Can we use the CERN hotel? NO!

2. Where to go instead? Geneva Youth Hostel

3. Experiences from 17 editions



Group visit request form

Teacher programme registration form

Please use this form to request a visit to CERN. You will receive an answer within 5 working days.

Please note that all fields are mandatory.

Group name *

Please use a name that easily identifies your group, for example a school name.

Country *

Preferred language *

Number of participants (min 8) *

Remember to include all accompanying persons here.

Preferred date and start time *

3. Experiences from 17 editions

Teachers want to stay connected!!!

But how?

3. Experiences from 17 editions

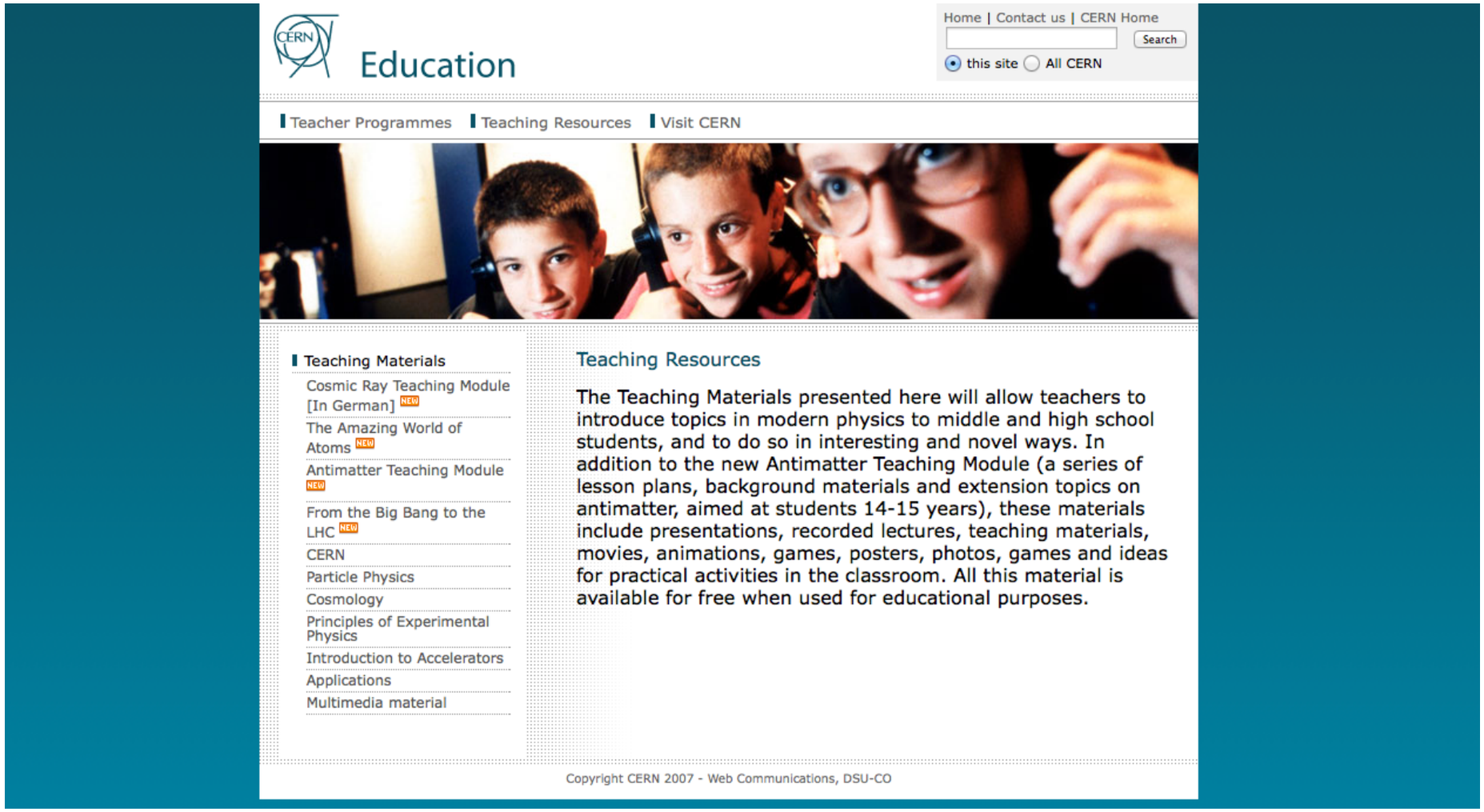
Through mailing lists, facebook groups, e-mail, website(s), activities, events, follow-up activities, conferences …

3. Experiences from 17 editions

Teachers want to share knowledge!!!

But how?

4. CERN Resources in Education

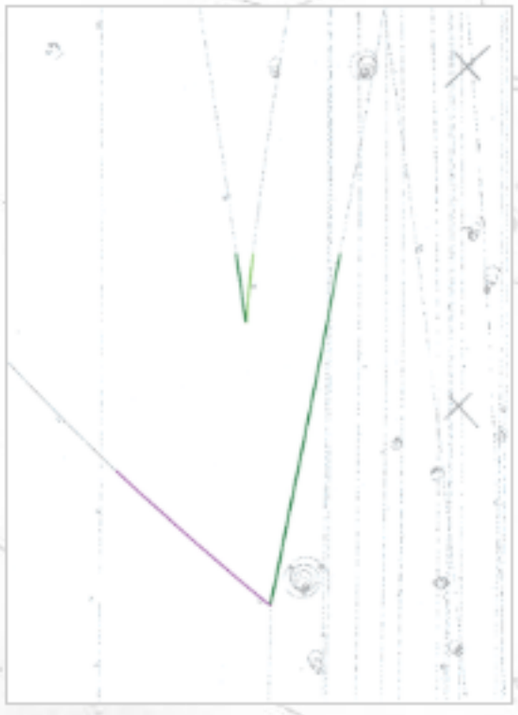


4. CERN Resources in Education

4. CERN Resources in Education

Introduction to the BC site
Tutorial on how to read BC Pictures
Gallery of BC Pictures
BC Teaching Materials

glossary | FAQ | documents | links | credits | sitemap



Introduction to the BC site

Bubble chamber photographs provide an insightful introduction to the exotic short-lived particles that emerge from all high energy accelerator experiments. When they study proton-proton collisions at the LHC, most of the particles that the physicists will pick up in their modern electronic detectors will be ones first identified in bubble chambers and their precursors, cloud chambers and photographic emulsions.

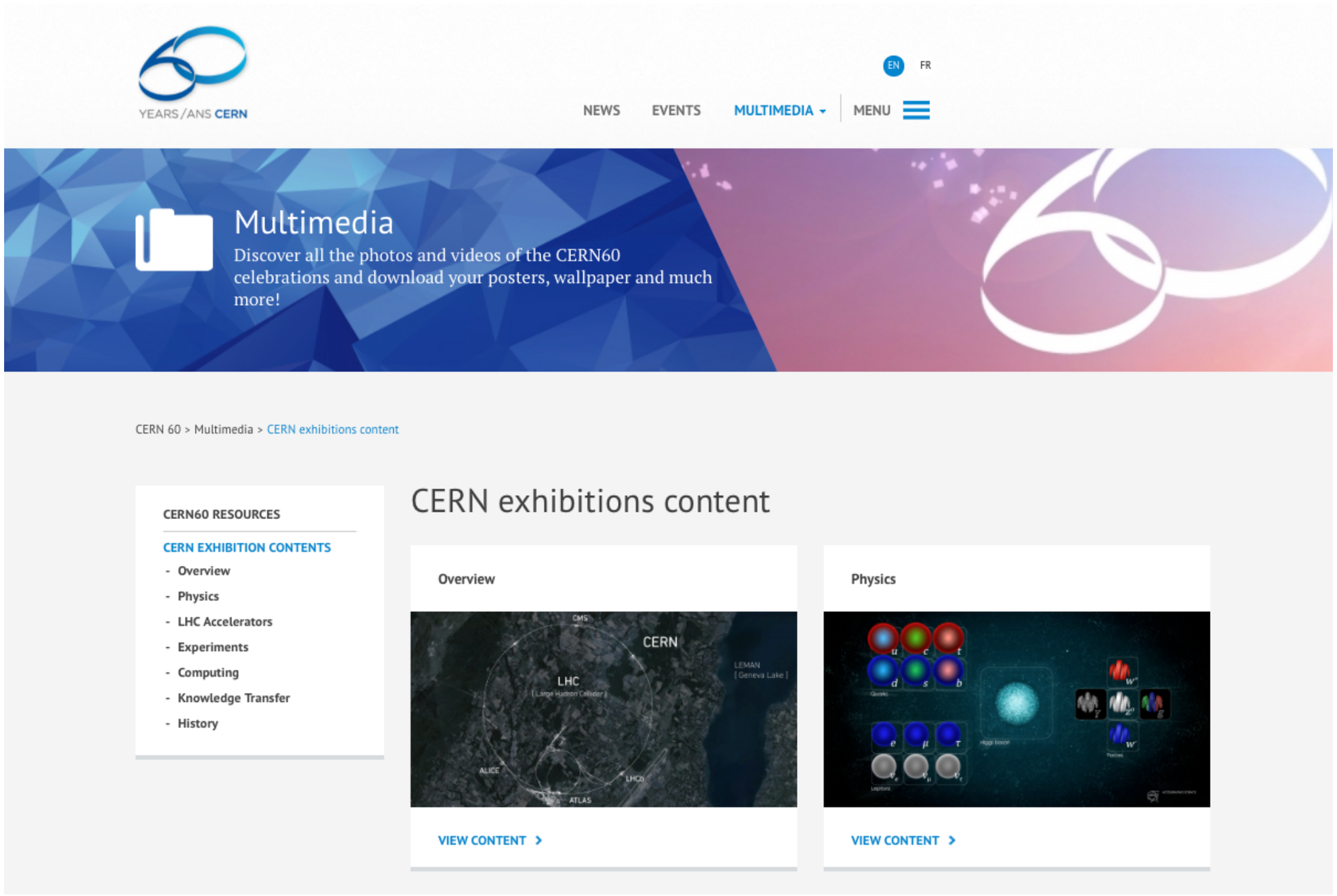
Since they show actual trails of bubbles that are formed as charged particles force their way through an unstable liquid, bubble chamber pictures are perceived by non-particle physicists as real, and therefore a good way to introduce particle physics. The pictures themselves are quite often easy to understand in an intuitive, qualitative way.

The pictures, moreover, possess a mysterious, cosmic beauty that is particularly appealing to the non-scientist.

Stimulated by the work of participants at the CERN High School Teachers' Summer School over the last few years, this is a limited mini version of a Website aimed at teachers world-wide. Eventually it is hoped that it will be extended and will appear in many languages.

- What is particle physics ?
- How does a bubble chamber work?
- How does one 'read' bubble chamber pictures? A step-by-step tutorial.
- A 'Would you like to see a … ?' gallery of pictures with descriptions. showing examples of many of the particles that come out of particle collisions. Some of these are very simple and illustrate ordinary concepts such as momentum conservation and charge conservation in an esoteric setting.
- A glossary of terms used.
- Frequently asked questions.

4. CERN Resources in Education



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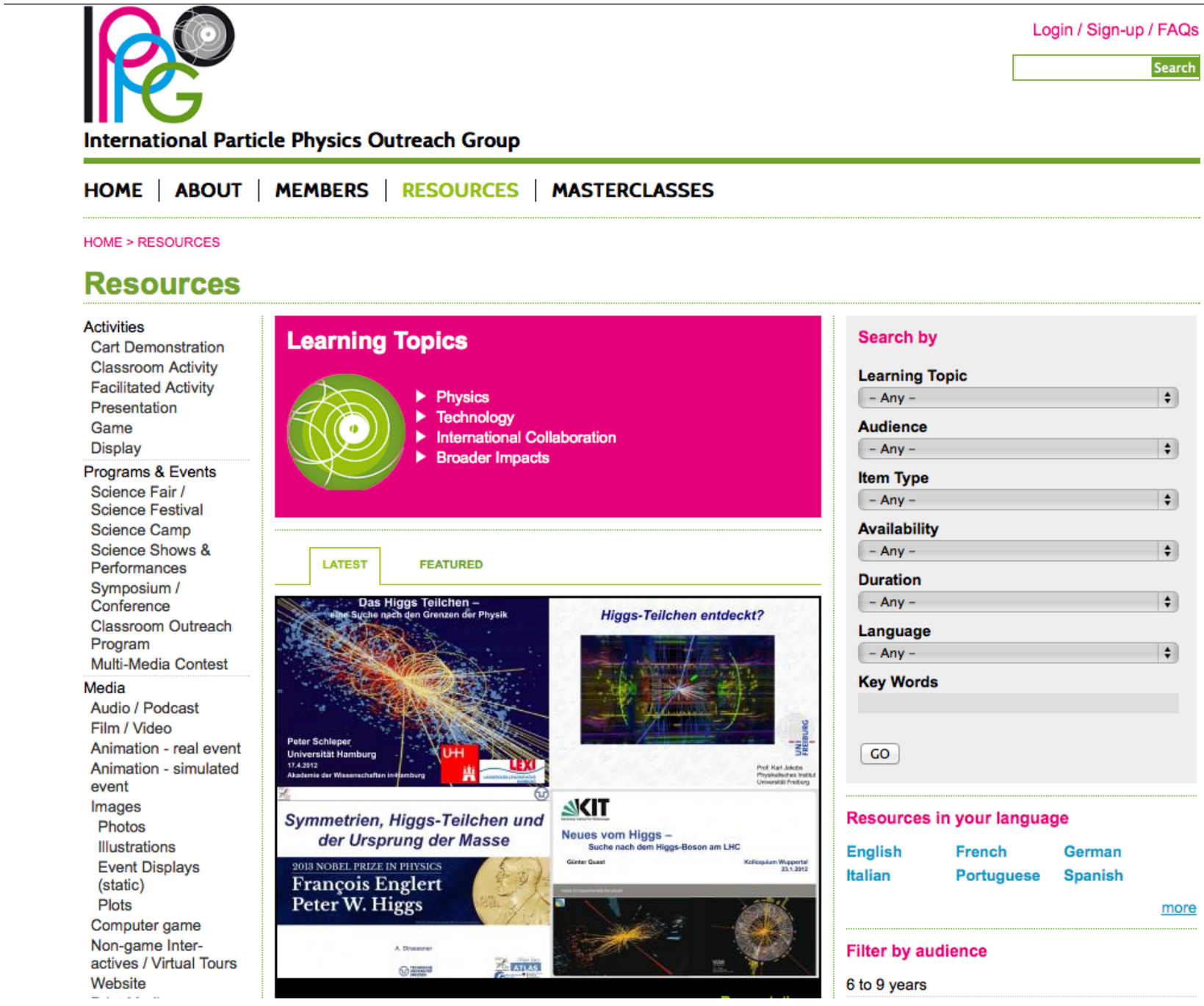

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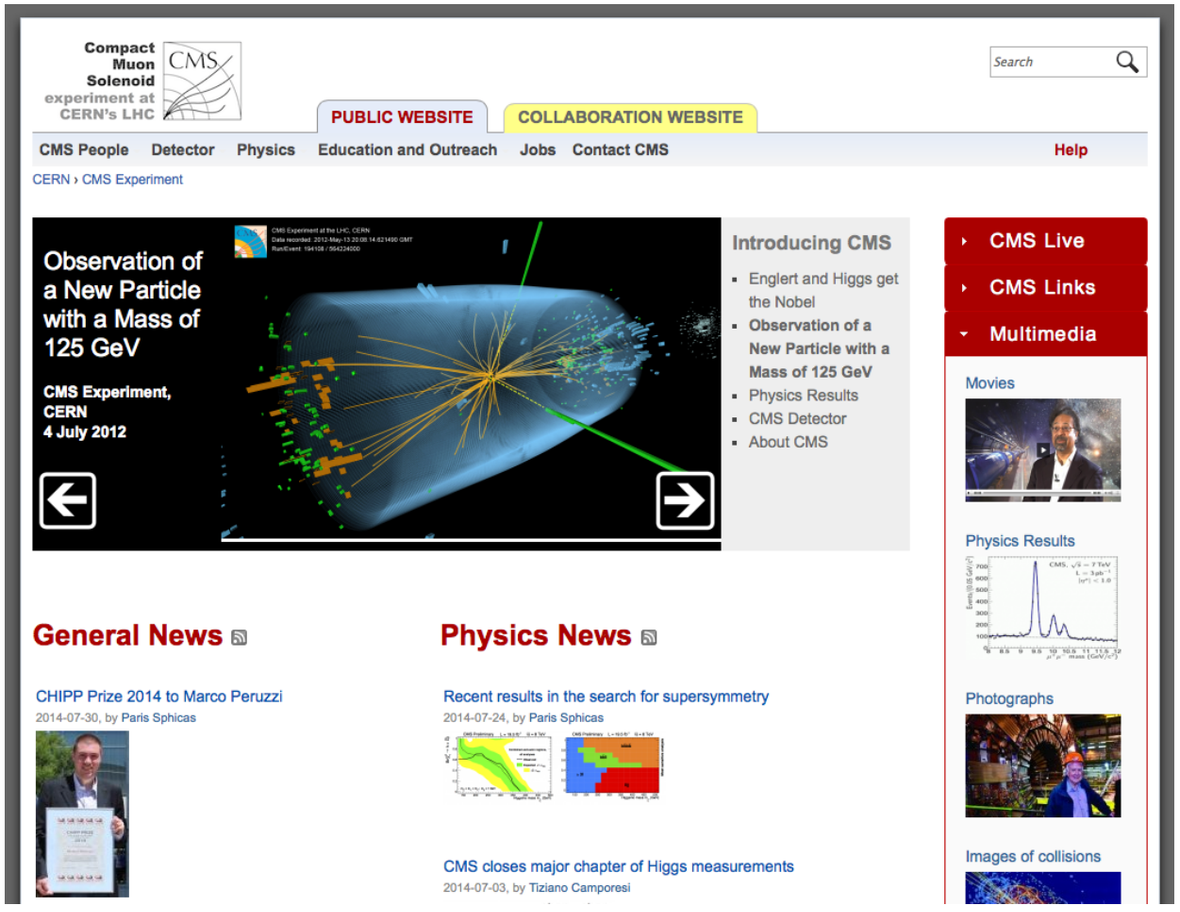

5. Outlook


Save the dates!!!
programme dates: 5 - 25 July 2015
application period: 1 Dec 2014 - 15 Feb 2015

Des questions?

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