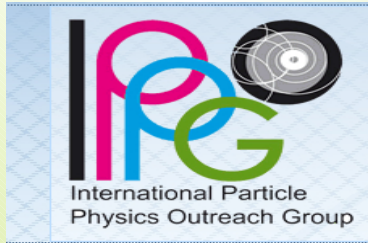


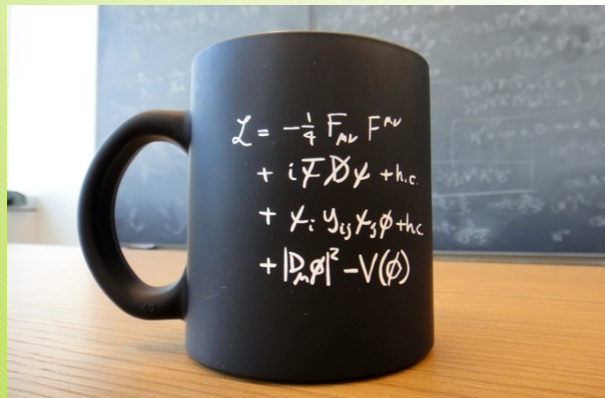
Banská Bystrica, 11.4. 2013



Masterclasses v časticovej fyzike

... ako priblížiť aktuálny špičkový výskum s jeho krásou aj zložitost'ou stredoškólákom

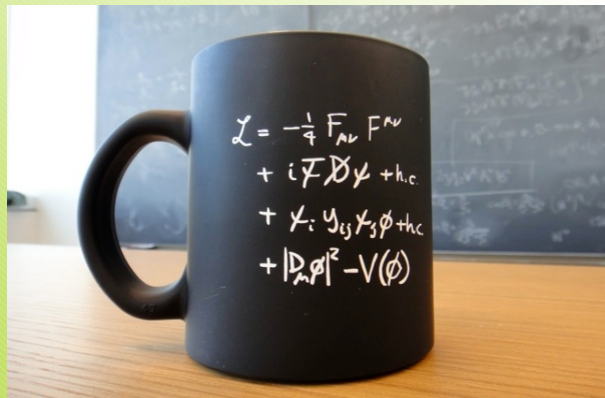
Ivan Melo
(Žilinská univerzita)



krása fyziky



záujem verejnosti

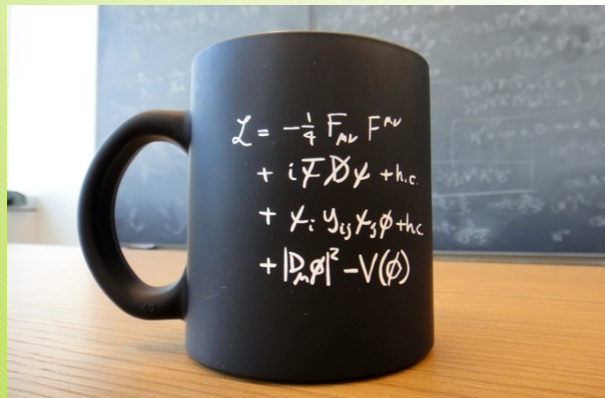


krása fyziky

zložitosť
fyziky



záujem verejnosti



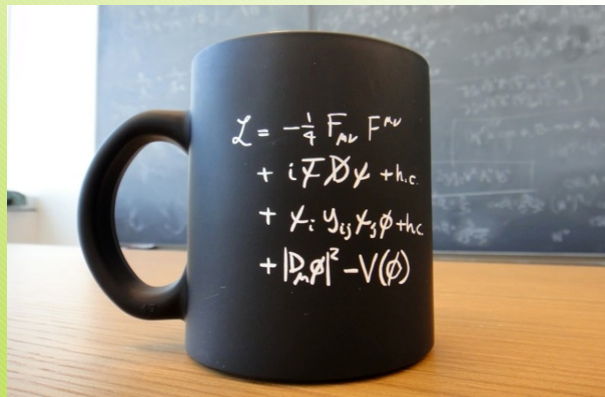
zložitost'
fyziky



krása fyziky

záujem verejnosti

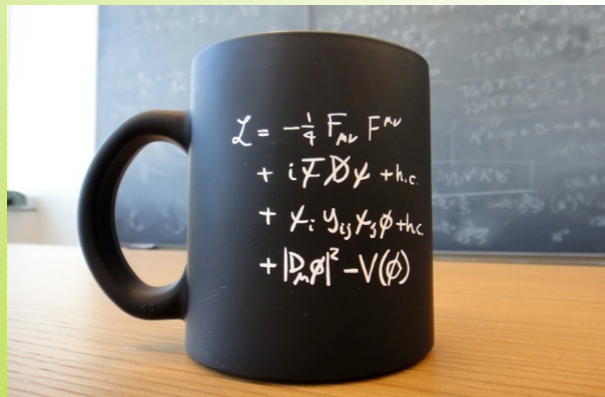




krása fyziky



záujem verejnosti



zložitosť
fyziky



krása fyziky

Masterclasses

záujem verejnosti

Global Language Monitor (GLM) makes statistical analysis of language usage in the worldwide print and electronic media, the Internet, and the blogosphere, as well as **social media**

Meno roka

2012
Newtown and Malala Yousafzai (tie)
Xi Jinping
Kate Middleton
President Obama
Mitt Romney
London Olympics
Higgs boson
Europe (EU/Eurogeddon)
Felix Baumgartner
Senkaku Islands

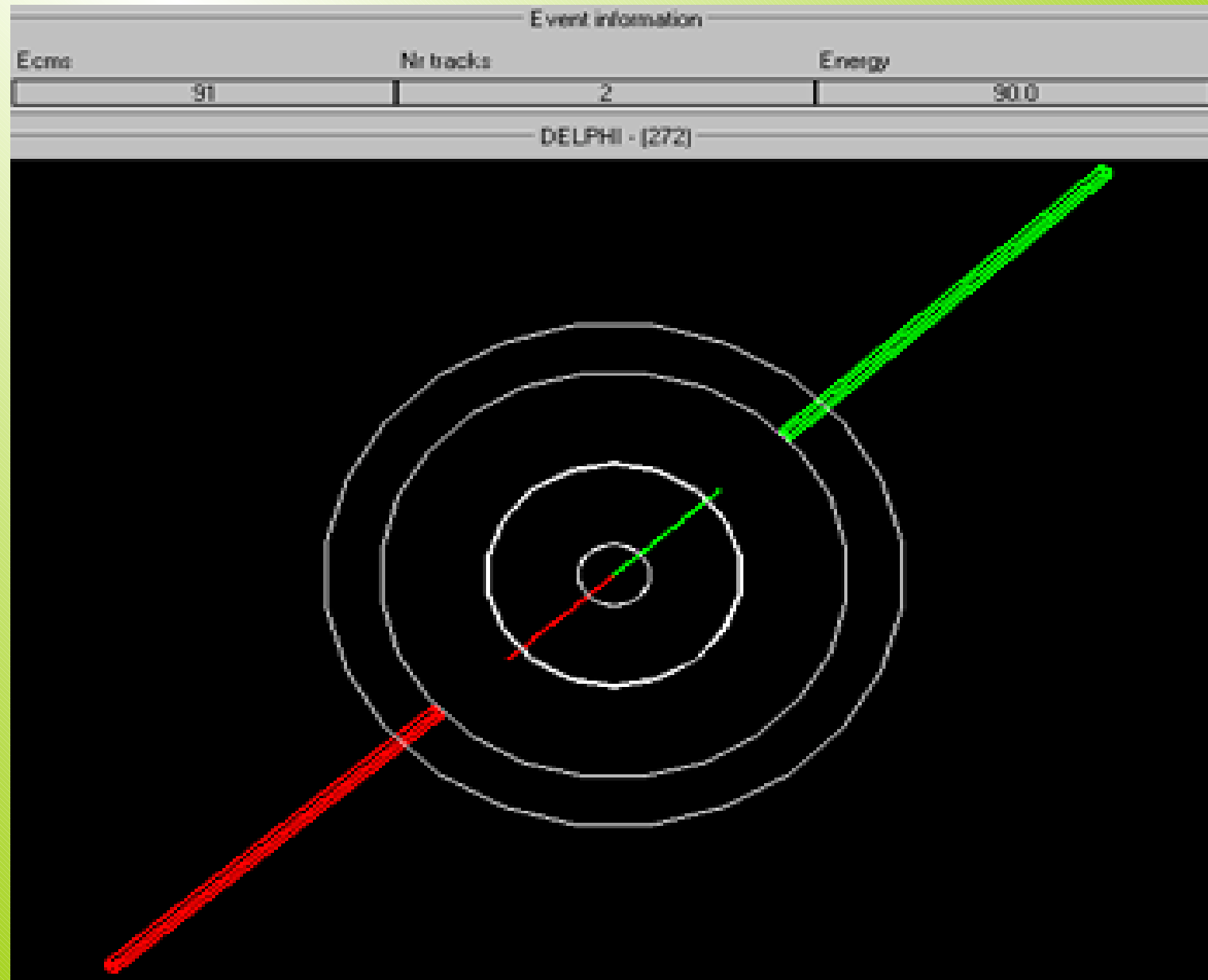
Fráza roka

2012
Gangnam Style
Global warming/climate change
Fiscal cliff
The Deficit
God particle
Rogue nukes
Near-Earth Asteroid
Binders full of women
Arab Spring
solar max

Najpoužívanejšie slovo

2009
twitter
Obama-
H1N1
stimulus
vampire
2.0
deficit
hadron
healthcare
transparency

LEP eventy (2005 - 2010)

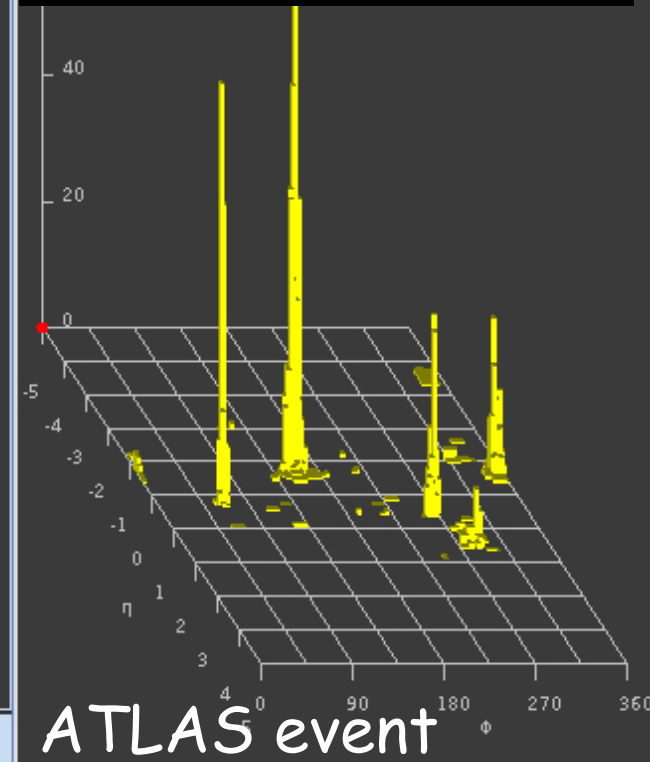
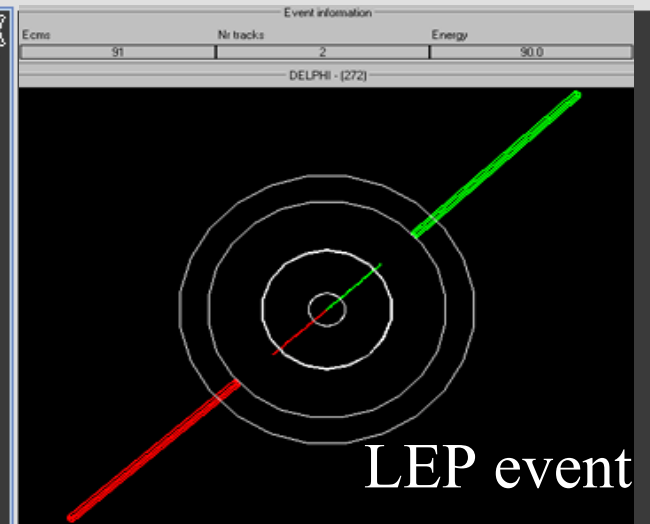
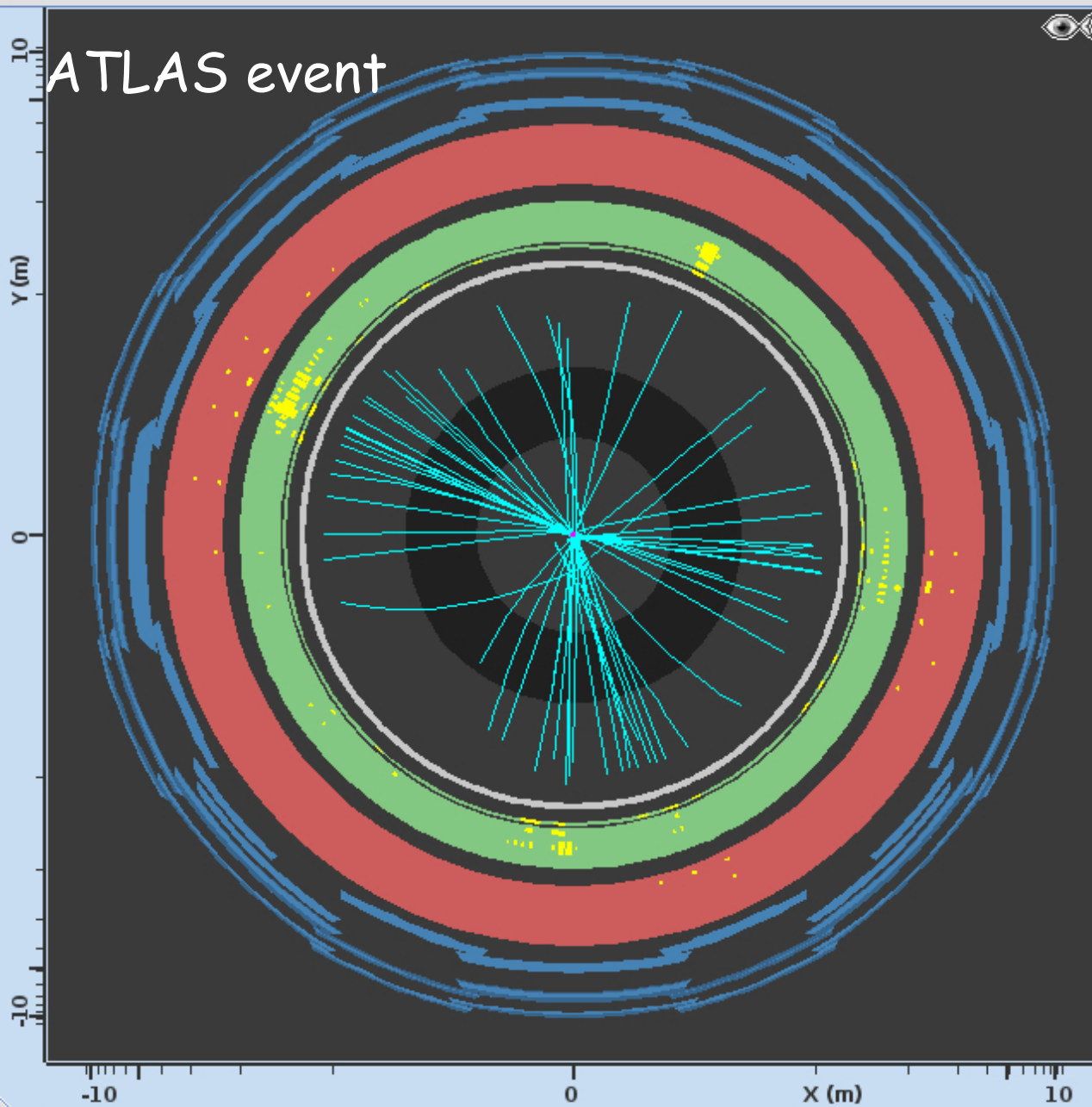


LHC eventy 2011 - 2013

ATLAS

2011-04-30 18:31:36 CEST source:event023 run:180636 ev:61861604 lumiBlock:360

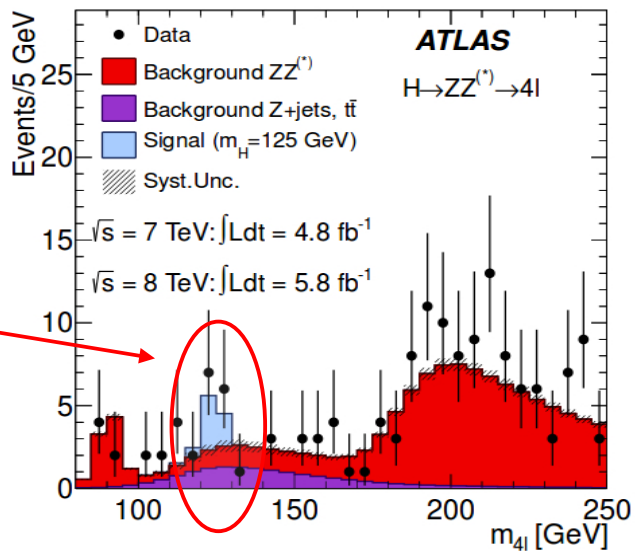
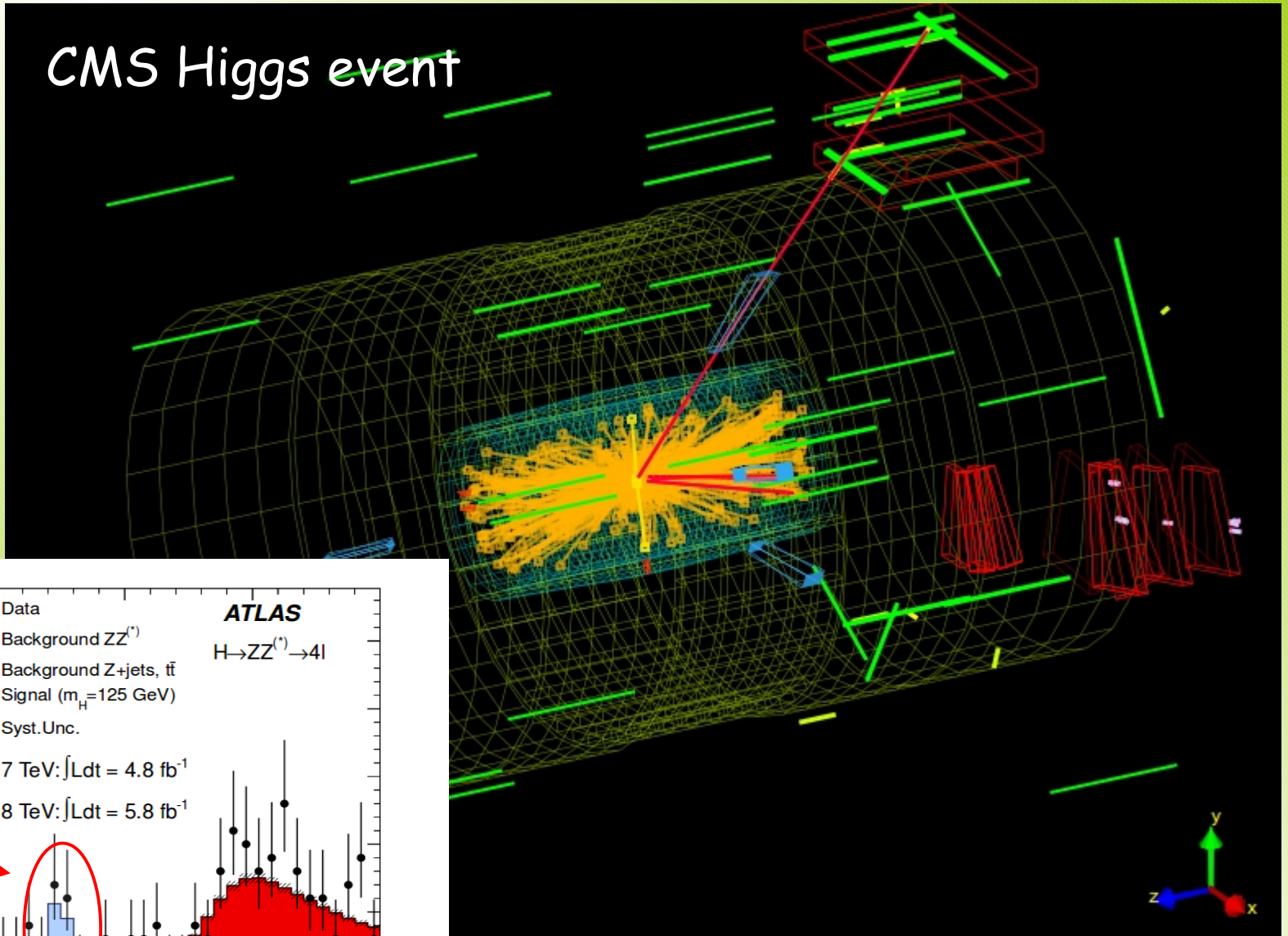
HYPATIA





... bude to
katastrofa!

CMS Higgs event



Paráda!



Particle Physics Masterclasses:

Začali vo Veľkej Británii pred 17 rokmi

Rozšírené vďaka IPPOG na Internat
Masterclasses v r. 2005



Univerzity na celom svete hostia stredoškóľákov, ktorí sa na 1 deň stanú
časticovými fyzikmi



- Prednášky
- Analýza dát/počítačové cvičenia
- Medzinárodná videokonferencia

1. W bozóny

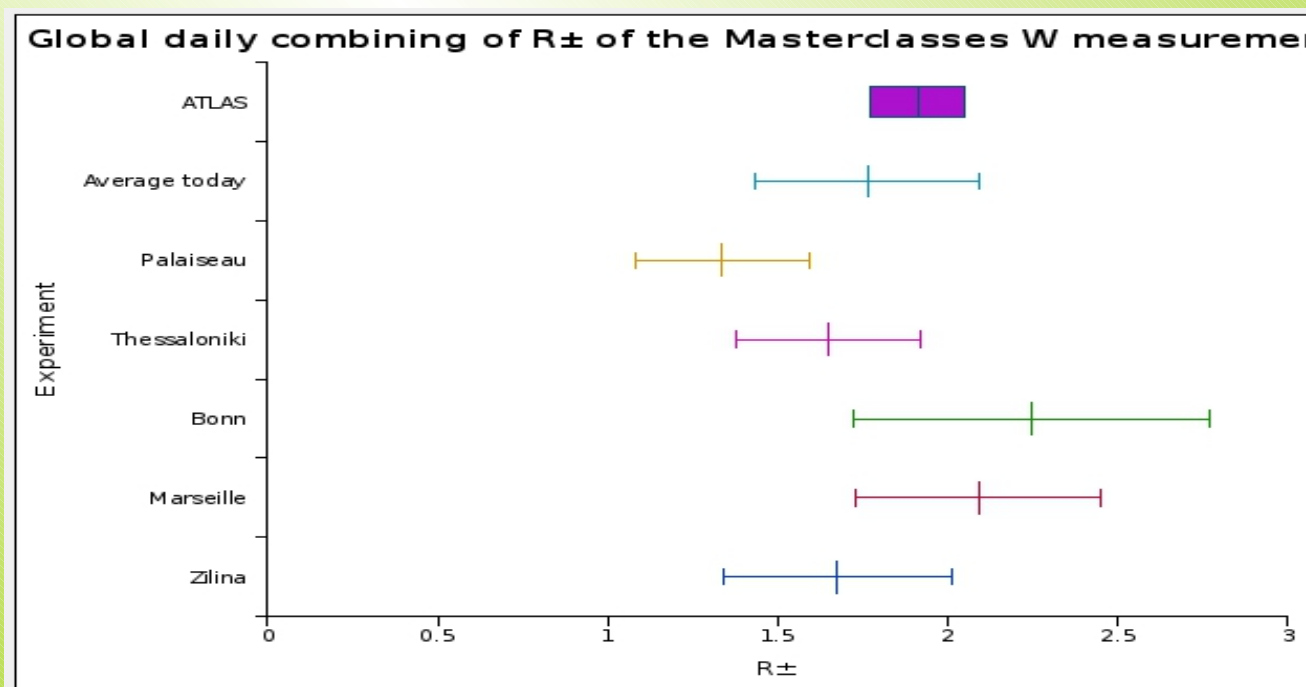
- štruktúra protónu $R^+ = W^+/W^-$

2. Z bozóny

3. Higgsov bozón



17.3.2011



2013: 37 krajín, 167 univerzít, 10 000 žiakov



MC 2010 na Slovensku

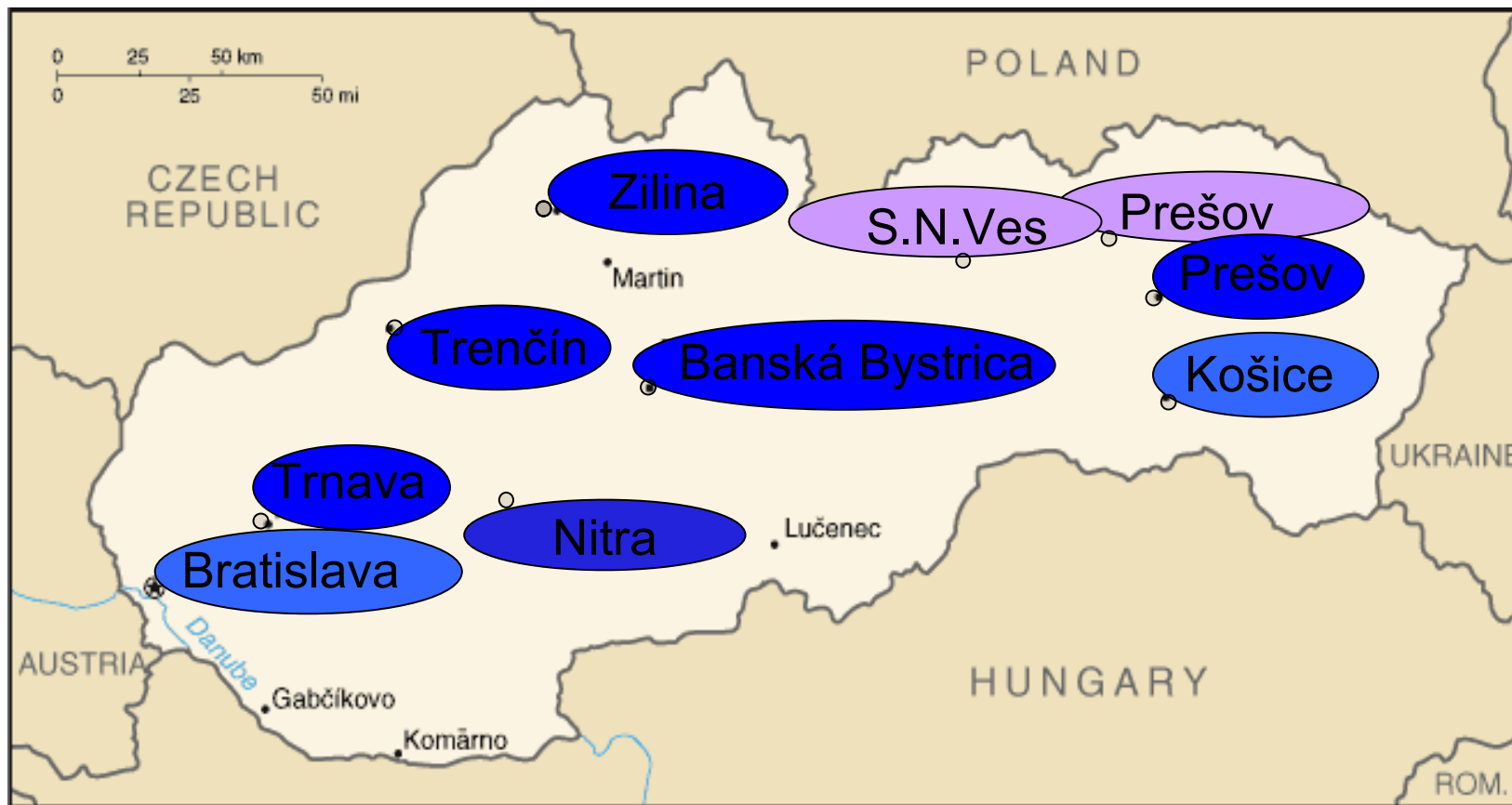
355 študentov a 37 učiteľov z 52 gymnázií



International MC



Regionálne MC

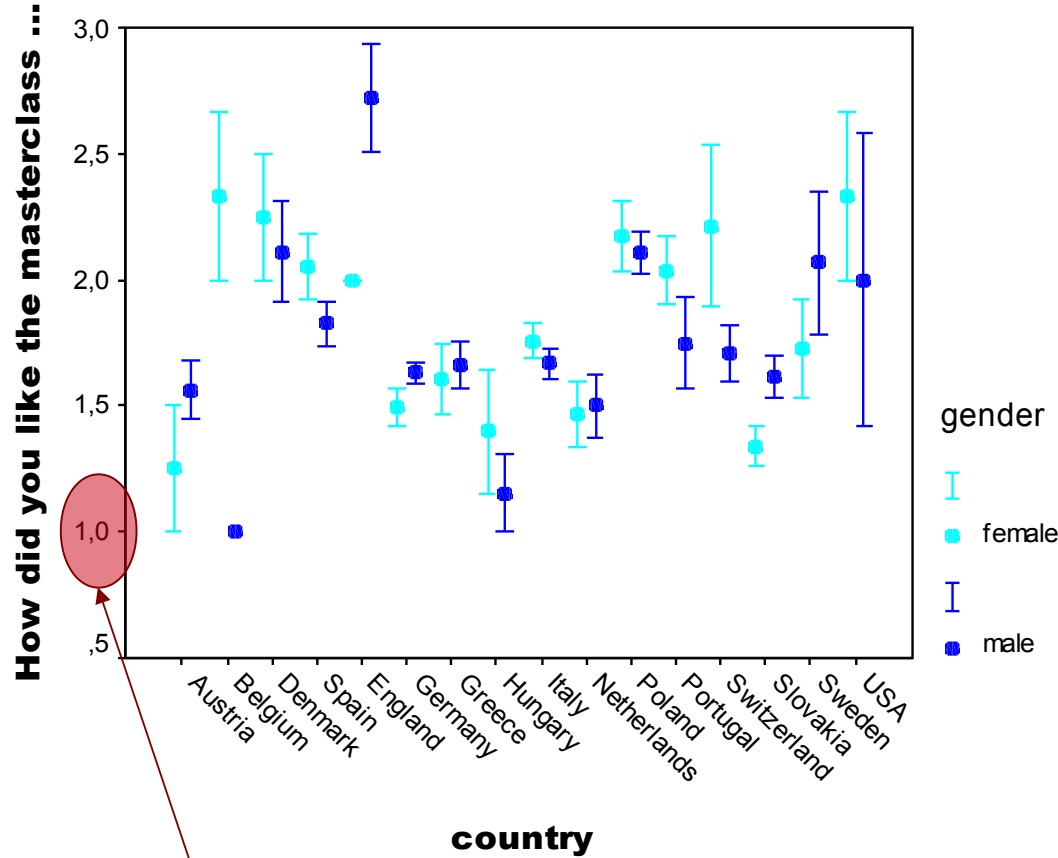


Ministerstvo školstva

Žilina: zo 40-50 účastníkov ----> plná aula v 2013



Did they like it ?



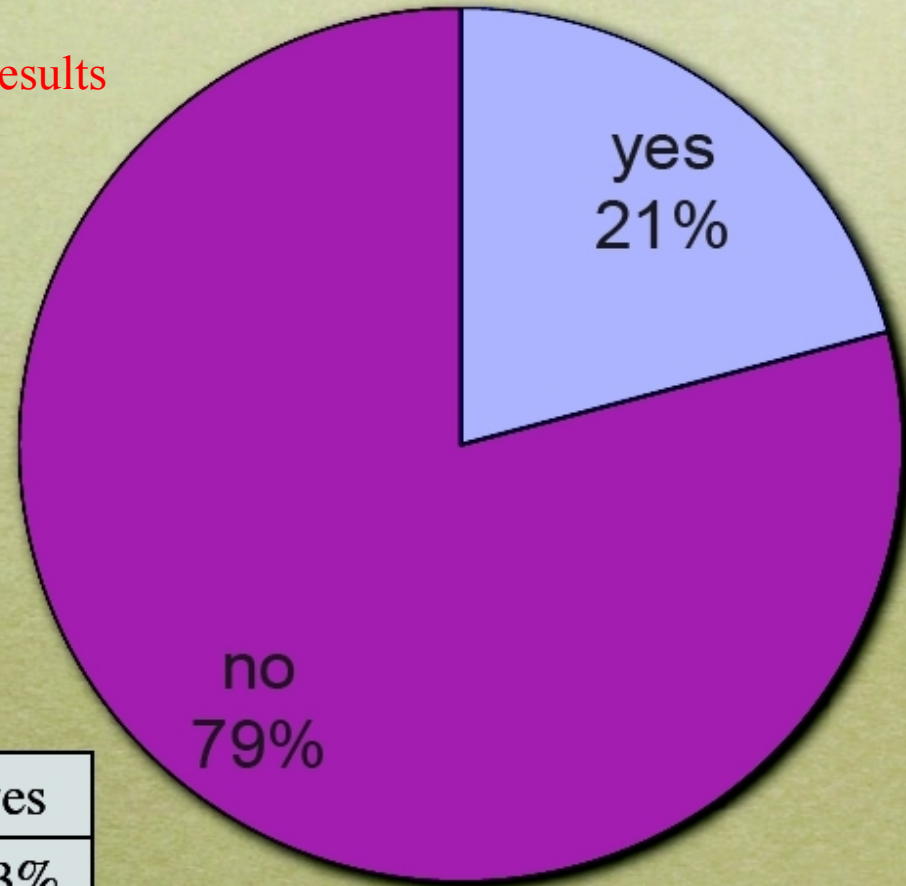
Best mark 1 (worst 5)

Influence of Masterclasses

2011: 176 questionnaires - new LHC data

Did the
Masterclasses
influence your
decision about
university study?

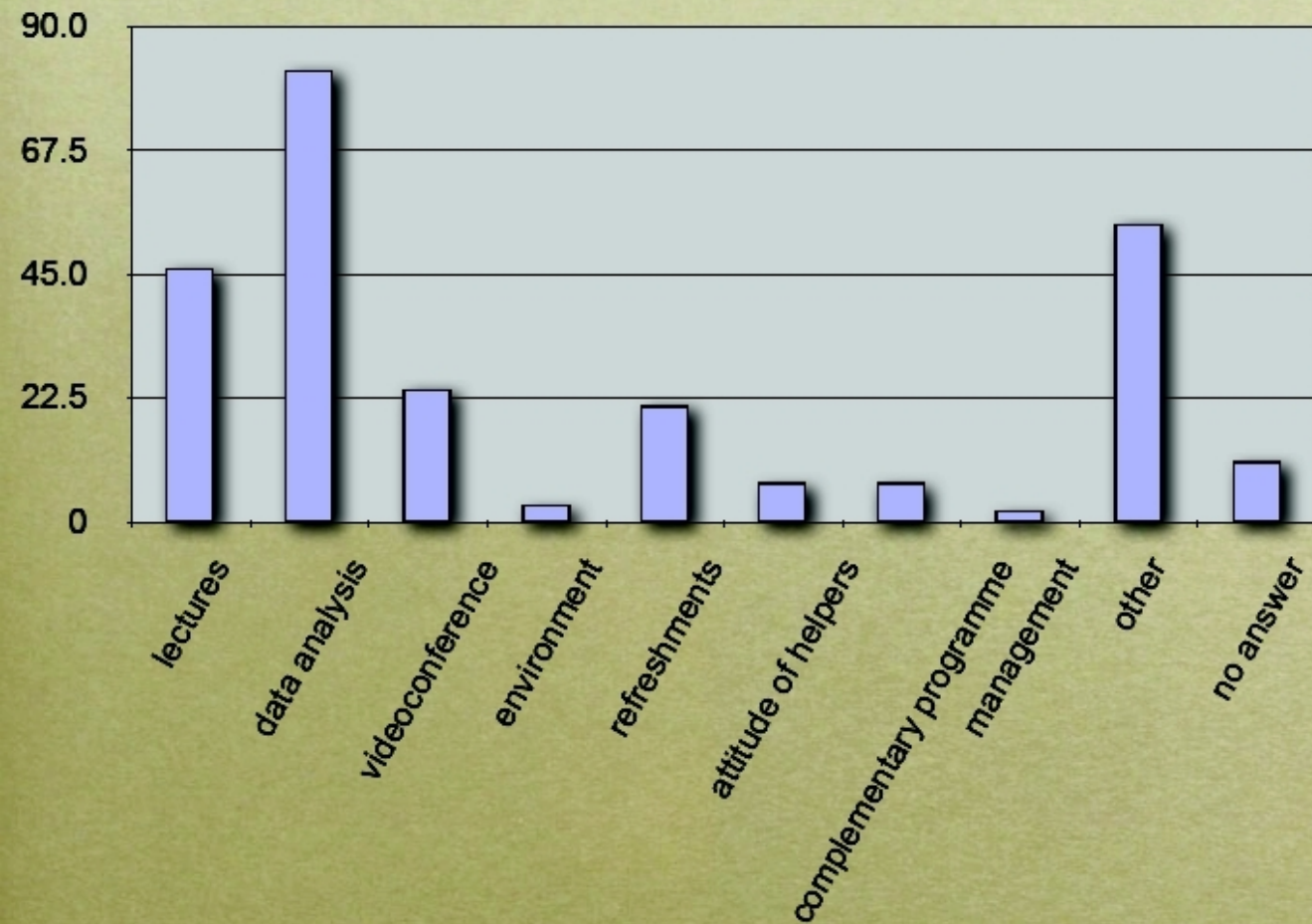
Click for [Full results](#)



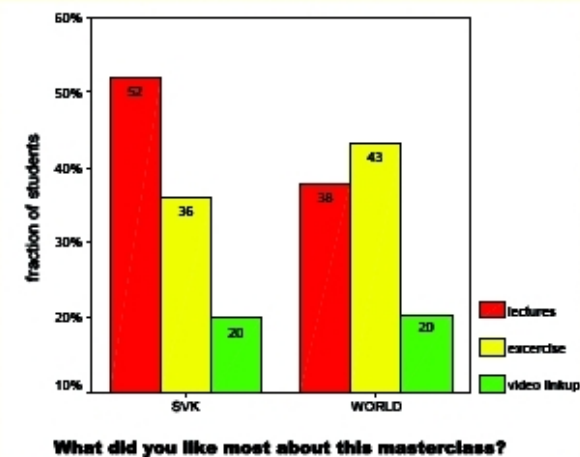
Influence of MC	no	yes
Study physics in combination	19%	43%

Obzory mat.,fyz. a inf. 1/2013

What did you like?



2008



MC - media coverage

National radio Slovenský rozhlas: live interview

Local TV

National and local newspapers

Science magazine Quark

US Symmetry magazine with photos from Slovak MC



symmetry dimensions of particle physics

LHC

search GO

Table of Contents volume 03 issue 06 august 06

Looking for Leptons in All the Right Places

by Jennifer Lauren Lee


In a typical high school physics textbook, says science education specialist Beth Marchant, only the last chapter is devoted to all the developments since 1900—the stuff that physicists are actually working on today. “For teachers who go by the textbook,” says Marchant, “the class never gets there.”

Marchant is part of a multinational team, from programs in Europe and the United States, collaborating to transform the way physics is taught. They offer kids the chance to close their textbooks and experience modern science first-hand.

A program organized and run by Michael Kobel of the Technical University in Dresden, Germany, gives 16- to 18-year-old students the chance to be “physicists for a day,” teaching them to identify subatomic particles from real data collected by detectors at the European laboratory CERN. The European Particle Physics Outreach Group supports Kobel’s EPPOG “Masterclass.”

Based on a smaller-scale program in the United Kingdom, Kobel’s Masterclasses include 60 institutions from 18 countries and a total of 3000 students, all analyzing the same sets of data. The students gather at local institutions for one intensive day, with lectures from scientists on performing measurements with particle detectors. At the end of the day, all join in a videoconference to share and discuss their results, just as physicists would at one of their own conferences.

“You can talk about this kind of thing in the classroom, but when you’re actually sitting beside a kid from Greece who’s asking the same question, that’s a different thing,” says Ken Cecire. Along with Marchant, Cecire is working to invigorate US high-school physics through QuarkNet, supported by the National Science Foundation and the Department of Energy’s Office of Science. QuarkNet centers are connected to high-energy-physics experiments at CERN, Fermilab, SLAC, and other research institutions.



Above: Tania Entwistle’s team of students from Ward Melville High School in New York. Front from left: Stephen Bohlman, Sammi Qin. Back from left: Ram Gupta, Lucas Janson, Ari Richman, Josh Steinberg. Below: Students around the world participate in videoconferences, lectures, and analysis of particle physics data.

Photos: Ken Cecire, Hampton University; Ivan Melo, Žilinská universite, Slovakia; and Christine Kourkoumelis, University of Athens, Greece

CERN Courier

Contest of student essays:

2010 winner published in CERN Courier July/August 2010

INSIDE STORY

Reflections on a Masterclass

High-school student **Slávka Marcinová** attended the Hands On Particle Physics Masterclasses 2010 at her local university in the Slovak Republic and was pleasantly surprised. In this essay she describes in English her experience.

It was on an ordinary March day when I did something that was way out of character. A friend of mine, who is admittedly a physics geek, told me about something called a Masterclass and suggestively handed me a leaflet with big, friendly "Hands On Particle Physics" on it. Now, I must say that I am the kind of student who would normally like to get her hands OFF particle physics – but then I noticed something that sparked my interest. "A videoconference", the leaflet read, "a chance to analyse real experiment results with foreign universities and the CERN scientists". I said, yes, that sure was something. Then I said that I would come.

My entire preparation consisted of revising what I knew about particle physics (note, that it really wasn't much...) and repeatedly assuring myself that I won't be meeting a roomful of Einstein-like geniuses and therefore look quite stupid; that they will be ordinary high-school students with an interest in physics, looking forward to learning new things... just like me. At least, I hoped so.



The 2010 Masterclass under way in Košice. The annual masterclasses introduce high-school students to particle physics and now attract more than 5000 participants. (Courtesy P J Šafárik University.)

classes and wrote down notes. The second, a lot more technical lecture, offered us a look into modern physics, something that we definitely didn't know from physics classes, something that got me genuinely interested, as did the still unanswered questions of

International dialogue

After lunch it was time for the videoconference to begin. Without any technical problems, we connected with universities in Debrecen, Budapest, London and with the scientists in CERN. We

Leading national daily SME, March 2011

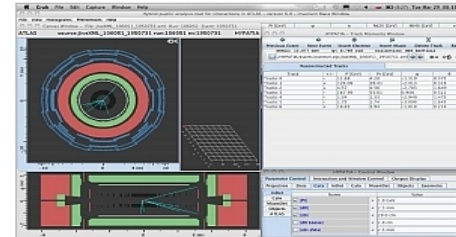
Stredoškólcáci analyzovali dáta z CERN-u

Veľký hadrónový urýchľovač v CERN-e prináša od minulého roku nové výsledky. V uplynulých troch týždňoch si analýzu niektorých výsledkov vyskúšalo aj približne dvesto slovenských stredoškólcákov. Stali sa na jeden deň časticovými fyzikmi.

BRATISLAVA. Šesť slovenských univerzít sa medzi 15. a 25. marcom zapojilo do medzinárodného podujatia o časticovej fyzike určenej žiakom stredných škôl.

„Majstrovské kurzy o časticovej fyzike“ (Particle Physics Masterclasses) im dali možnosť stretnúť sa s fyzikmi, ktorí sa časticovej fyzike venujú v rámci svojho výskumu.

Cieľom podujatia je umožniť žiakom siahnuť si na reálne dáta a vyskúšať si - aj keď len v malom - ako skutočne vyzereá práca výskumníka.



Takto vyzereá zrážka dvoch protónov v analyzačnom prostriedku HYPATIA, s ktorým účastníci pracovali.

Foto: REPROFOTO - Boris Tomášik

Inzercia

Najlepšie omny na Slovensku, vína už od 1,46 €



Korzar.SK

Košický | Prešovský | Zemplínsky | Spišský | Tatranský | Gemerský | Humenský | Lubovniansky

večer

Stredoškólcáci analyzovali údaje z urýchľovača v CERN-e „Majstrovské triedy“ v Košiciach i Prešove

Už po siedmy raz sa tohto roku uskutočnili tzv. Masterclasses (voľne preložené majstrovské triedy), ktoré študentom stredných škôl v mnohých krajinách na celom svete približujú prácu fyzikov pracujúcich v oblasti časticovej fyziky a umožňujú im priamo sa podieľať na vyhodnocovaní reálnych experimentálnych údajov. Študenti tak majú možnosť stať sa na jeden deň členmi vedeckých tímov a aspoň čiastočne spoznať „ako sa robí veda“.

Viac ako 8-tisíc študentov

Projekt Masterclasses organizuje Európska skupina pre popularizáciu časticovej fyziky EPOG a Európska fyzikálna spoločnosť EPS. V tomto roku sa na medzinárodných Masterclasses v časticovej fyzike zúčastnilo viac ako 8 000 študentov na vyše 110 univerzitách a výskumných centrách v 24 krajinách.



Masterclasses sa zúčastnili aj dievčatá. Vladka a Simona z košického gymnázia Opatovská pri vyhodnocovaní údajov z CERN-u.

Foto: archív

Cascade projects 2011

Teams of 3 students make 20 min presentations at their schools

UNIVERSITY OF
BIRMINGHAM

New National competition for 2007-8
a Cascade of Particle Physics in schools & colleges

STFC

An exciting Opportunity to....

Enhance your A Level studies

Develop Key Communication Skills

• *Make personal links with Research staff at a leading University*

• *Win money to help finance a trip to CERN*



CERN accelerator control room

4 teams in 2009

15 teams in 2010

21 teams in 2011

Mentors - volunteers from all HEP community

Cascade projects 2011

- What are we all made of ? Atoms - Quarks - ?
- Particle Accelerators - How do they work?
- Medical Applications of Particle Accelerators - What are they?
- Recreating the Early Universe at the LHC
- Antimatter
- Dark matter
- Quantum nature of elementary particles
- Neutrinos
- Are there more than 3 spatial dimensions?
- Search for new particles. Higgs boson
- History of the Universe

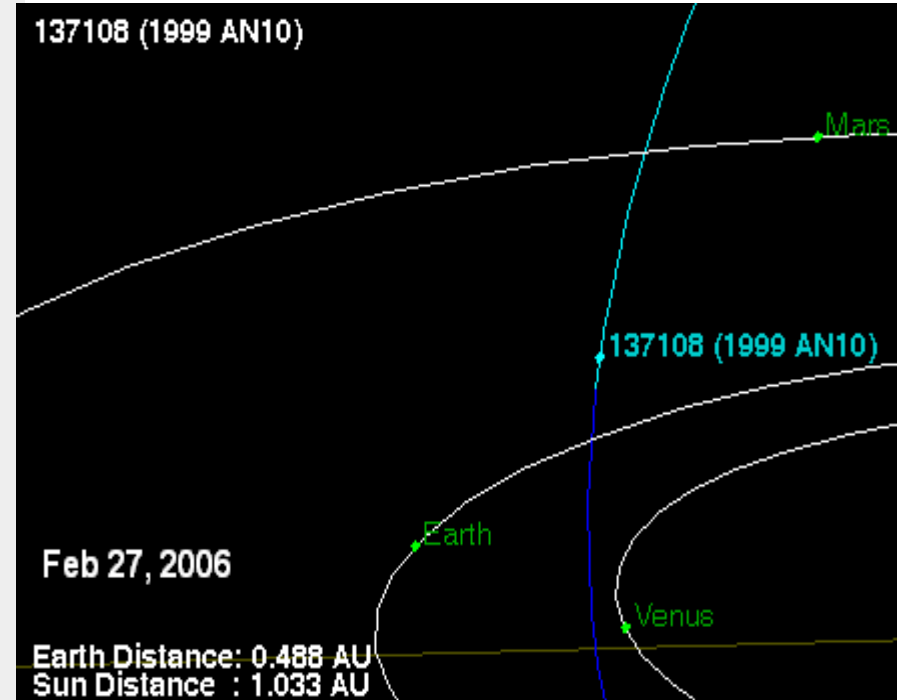
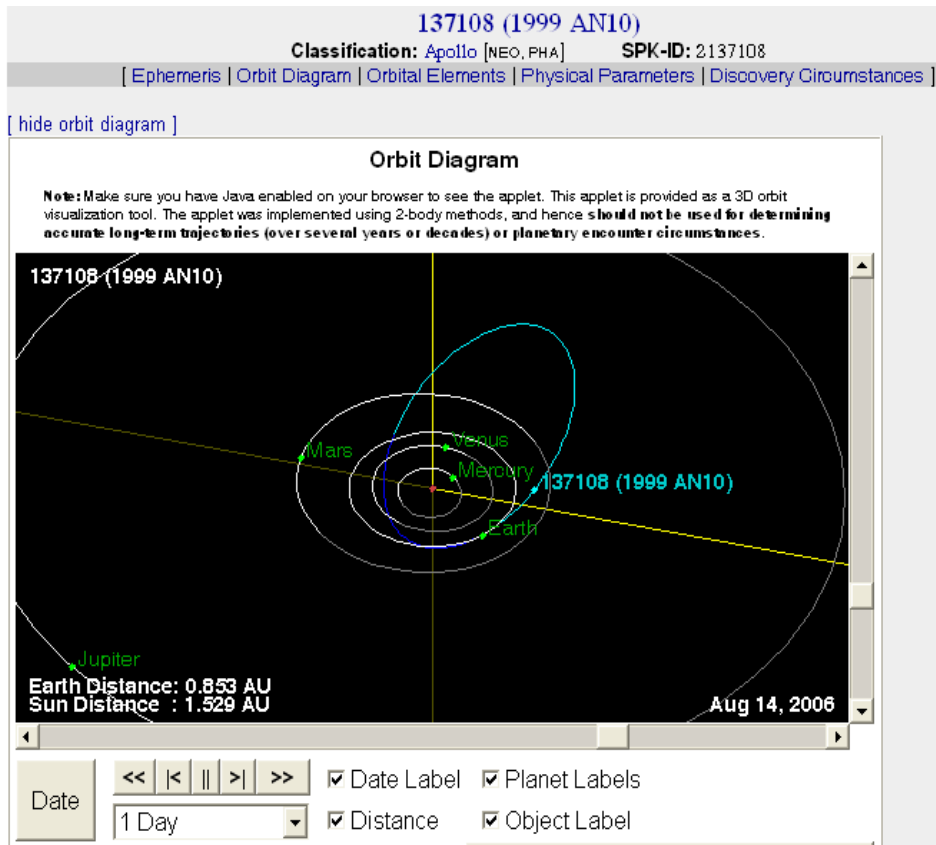
Grand finals at Sucany high school, May 31, 2011

Cascade Grand Finals



Follow-up: Astronomy Masterclasses

Asteroids, their trajectories and possible threat to Earth



Computer exercise: <http://neo.jpl.nasa.gov/orbits>

Čo od nás potrebujú učitelia (dotazník)

Odpovedali 10 učitelia:

- DVD z Masterclasses
- Cascade projekty
- Vzdelávacie moduly (e-learning kurz UPJS Kosice)



„všetky vaše materiály môžeme použiť pri učení“

„ďakujeme za všetko, čo pre nás robíte“

Úspech Masterclasses

1. Spolupráca
2. Účasť výskumníkov
3. Aktuálne experimentálne dáta
4. Formát (prednášky, analýza dát, medzinárodná konferencia)





Čo ďalej?



1. financovanie Masterclasses (APVV, KEGA, CERN výbor)
2. posilnenie účasti stredoškolákov v organizácii
3. spolupráca s učiteľmi SŠ
4. portál časticovej fyziky na Slovensku
5. učebné texty pre SŠ a VŠ

e-learning course Windows to modern physics

LMS Moodle, 10 modules

Atom
Nucleus
Forces
Standard Model
Accelerators
Detectors
CERN, LHC
Quark-gluon plasma
Medical physics
OPAL Masterclass

The screenshot shows a Moodle course interface. The main content area is titled 'Okna do modernej fyziky' and contains a welcome message in Slovak. The message addresses students and participants of the course, mentioning that they will be working with 10 modules. It highlights a 'prezentčné stretnutie' (presentation meeting) and encourages active participation in experiments. The interface includes a left sidebar with navigation options like 'Ludia', 'Aktivity', and 'Administrativa'. On the right, there are sections for 'Najnovšie správy' (latest news) and 'Aktuálna činnosť' (current activity).



EPPOG/IPPOG connections

The European Particle Physics Outreach Group (EPPOG) is a network of people who undertake outreach and informal education initiatives. EPPOG was formed in 1997 under the joint auspices of ECFA and EPS-HEPP.

"the particle physics community has a moral obligation to inform the public on its activities. To do this well, experiences must be shared among countries in view of the need to optimize the use of resources."

Director General Mr. Llewellyn Smith at the first-ever EPPOG meeting

2011: EPPOG → IPPOG
European → International



Foto: Bartolomej Cisár





