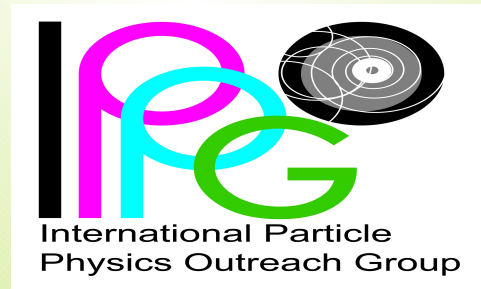
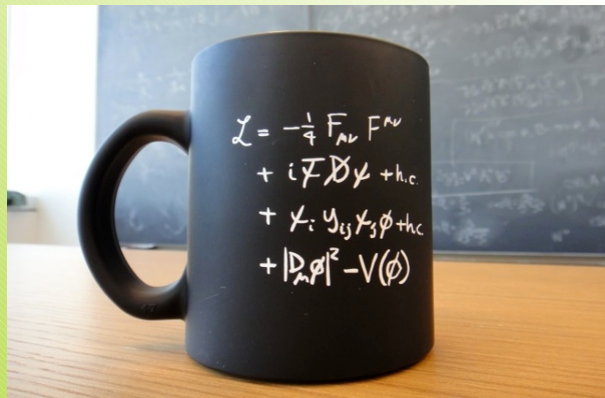


IPPOG - bringing particle physics into classrooms



*Ivan Melo on behalf of IPPOG network
University of Žilina, Slovakia*



Complexity
of physics



Beauty of physics

IPPOG

Interest of public

IPPOG - International Particle Physics Outreach Group

Network of scientists, informal science educators and communication specialists active in outreach in particle physics



1997: started under joint auspices of ECFA and European Physical Society

2011: European → International

Membership includes CERN member states (21)

+ Ireland, Romania, South Africa and the United States

+ five major experiments at CERN's Large Hadron Collider

+ CERN, DESY, Fermilab



Foto: Bartolomej Cisár



1st international meeting in Kosice, Slovakia, 2011

- *Who do we serve?*

*Anyone, especially **educators and students** (from school to university).*

- *What is our aim?*

To raise standards of global outreach and informal science education efforts.

- *Our vision for the future?*

Understanding and enthusiastic support of particle physics and related sciences from all audiences.



Watching 3D ATLAS movie



2012 Innsbruck meeting

*Initially a discussion forum with information exchange,
IPPOG has become proactive organizing its own outreach projects*



Working groups in action

Three examples:

International Particle Physics Masterclasses

IPPOG resources database

Cascade projects competition

Particle Physics Masterclasses:

Started in Great Britain 18 years ago

Expanded by IPPOG to International Masterclasses in 2005



Universities around the world open their gates to welcome high school students who become particle physicists for one day

- *Lectures*
- *Data analysis/computer exercises*
- *International videoconference*



2014: 41 countries, 183 institutes, 10 500 students

LHC events 2011 - 2014

ATLAS and CMS

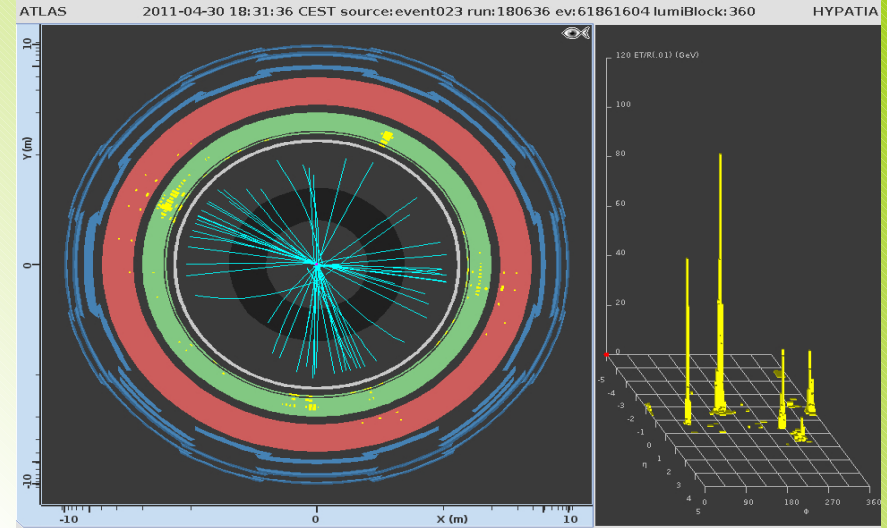
- *W bosons and Higgs boson*
- *proton structure $R^+ = W^+ / W^-$*
- *Z bosons and Higgs boson*

ALICE

- *Strange particles (V_0 decays), QGP*

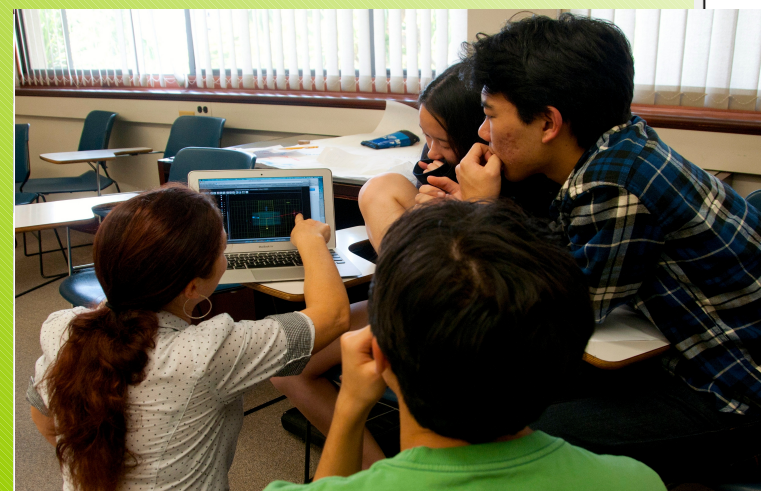
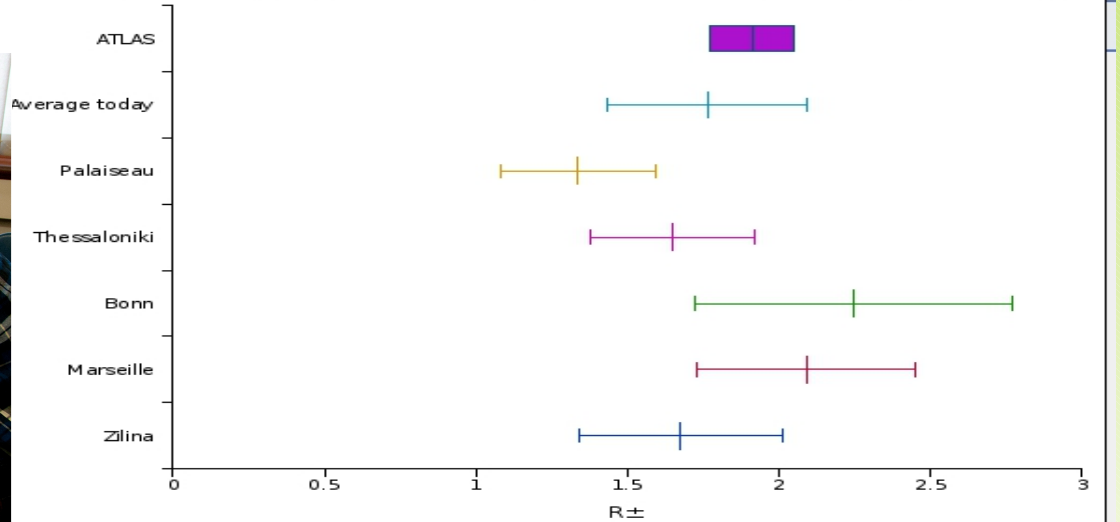
LHCb

- *Measurement of D_0 lifetime*

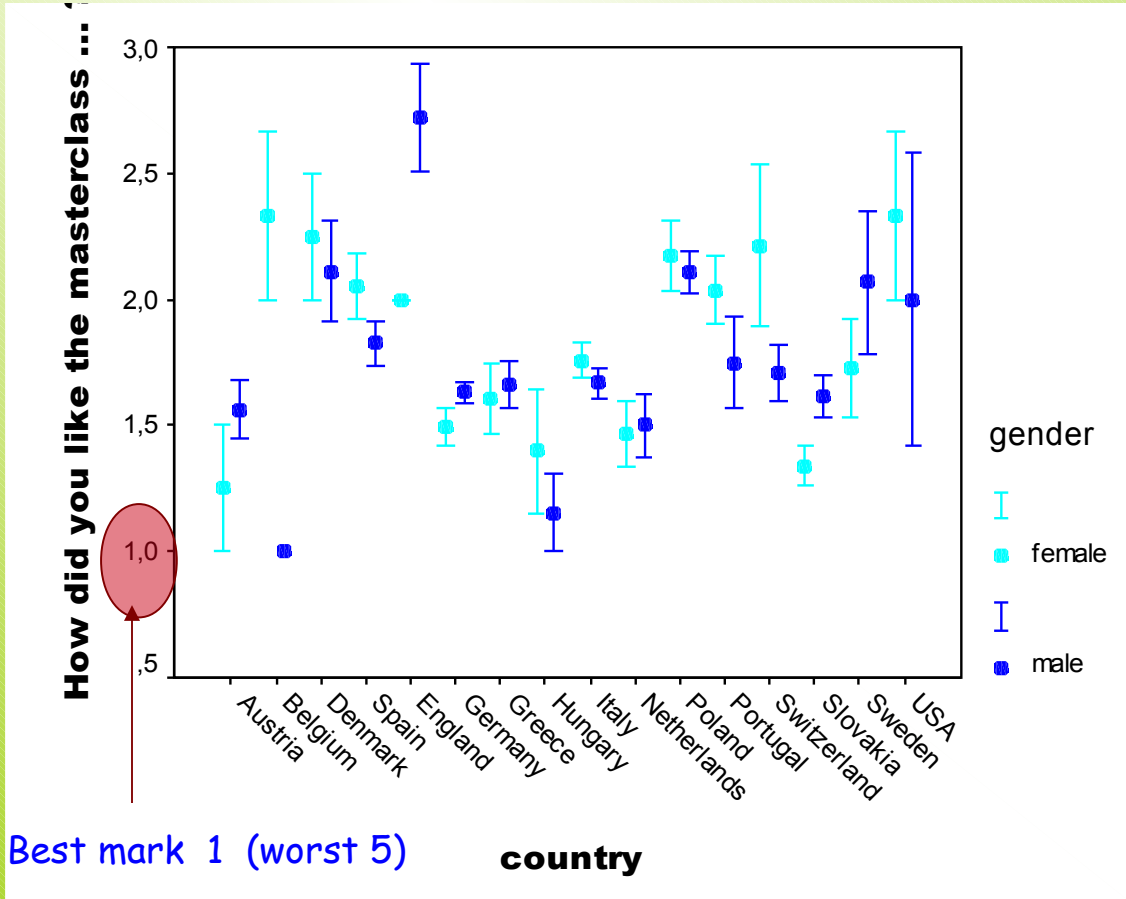


17.3.2011

Global daily combining of R_{\pm} of the Masterclasses W measurement

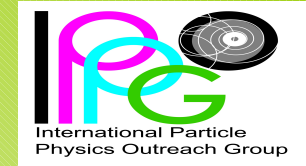


Global evaluation (2007)



1. Collaboration
2. Involvement of researchers
3. Real experimental data
4. Format (lectures, data analysis, videoconference)

Cascade projects



U of Birmingham: teams of 3-6 high school students make 20 min presentations at their schools and send videos to organizers

UNIVERSITY OF BIRMINGHAM **New National competition for 2007-8** **STFC**
a Cascade of Particle Physics in schools & colleges

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

Slovakia *4 teams in 2009*
15 -20 teams in 2010-2013

Total audience 500 -600 students/year

Time to prepare projects: ~ 4-5 weeks

Mentors - volunteers from all HEP community

Cascade projects cont'd

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



Cascade projects cont'd

The format is very successful. Students love to work in teams and present things.

The particle physics community in Slovakia responded very well and volunteered to become mentors

Masterclasses (MC) seem to be a good spring board for Cascade. MC are a 1 day thing, in Cascade we invite curious minds for a deeper adventure

Cascade is relatively easy to organize.

Best Cascade presentations have the qualities we had hoped for. Team members are interested in pursuing scientific career



IPPOG resources database

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



Videos, brochures, posters, talks, programs, tips for exhibits, hands-on activities,...

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

International Particle Physics Outreach Group

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

[HOME > RESOURCES](#)

Resources

Activities

- Cart Demonstration
- Display
- Classroom Activity
- Facilitated Activity
- Presentation
- Game

Programs & Events

Media

Professional Development & Coaching

Exhibits

- Permanent Exhibitions
- Portable Exhibitions
- Exhibits

Souvenir / Novelty Item

FAQs

Welcome !

What is this?

Who is this for?

Want to share items, leave comments and

Learning Topics

- ▶ Physics
- ▶ Technology
- ▶ International Collaboration
- ▶ Broader Impacts

Search by

Learning Topic
- Any -

Audience
- Any -

Item Type
- Any -

Availability
- Any -

Duration
- Any -

Language
- Any -

Key Words

Resources in your language

[English](#) [French](#) [German](#)
[Italian](#) [Portuguese](#) [Spanish](#)

The 2006 and 2013 European Strategy for Particle Physics

"Fundamental physics impacts both scientific and philosophical thinking, influencing the way we perceive the universe and our role in it.

It is an integral part of particle physics research to share the wonders of our discoveries with the public and the youth in particular.

Outreach should be implemented with adequate resources from the start of any major project

Personal engagement of scientists in outreach and communication must be recognised with equal importance as scientific research as such"

IPPOG resources database cont'd

First-ever global database for materials related to particle physics outreach and informal education.

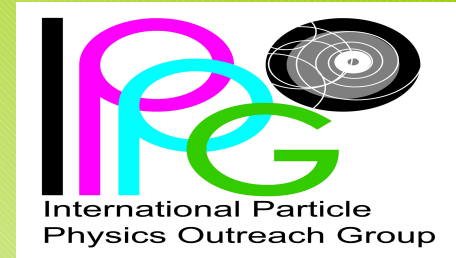
It houses videos, brochures, posters, talks, programs and events, media, exhibits, ideas for hands-on activities in a variety of languages.

The aim of the collection is to help physicists, communicators and teachers find new ways and tools to teach particle physics in their classes and in public.

New items can be submitted after registration by anyone. The database can be searched by the learning topic, audience, item type, topic and language. A rating system enables users to give credits to the popular items.

The database is still in its early stages (~ 300 items) and we invite users to make suggestions that could help improving it .

3 IPPOG funding eras (M. Kobel)



Before mid 2008: ~zero funding
- individual personal efforts

Mid 2008 - today: patchwork funding

- IMC and upgrade for LHC:

Various in-kind contributions from institutes and CERN

German Helmholtz Alliance, Gentner and Research Ministry BMBF

- Database and IPPOG organisation:

Synergy with other projects (PATHWAY)

50% FTE for two years from CERN

Future: must be secured

- Some fundings ending (Helmholtz, German BMBF)

- Some fundings uncertain (CERN, Gentner)

- safer and more reliable perspective (less patchwork) critical to the effectiveness and sustainability of IPPOG

- task for new IPPOG chairs from 2013 !