



Report to ECFA, November 24<sup>th</sup> 2011

**Dave Barney**, Michael Kobel: IPPOG Co-chairs

# IPPOG 2011 - Overview



- IPPOG Expansion
  - Definition of who we are, what we do etc.
  - Invitations in the pipeline
- International Masterclasses
  - Using LHC data!
- Education & Outreach Database
- “Discovery Packages”
- IPPOG @ International Conferences
- IPPOG Meetings in 2011, 2012, 2013
- Funding.....



***Discovering Particle Physics Together***

# IPPOG Expansion (1)



- Reminder from 2010 ECFA Report:
  - Comment: ***“I think the main challenge will be getting the IPPOG membership right and of the right size. It will be important to be open to reasonable representation from e.g. major laboratories and other countries around the world. However if the numbers are too big then I suspect it will be less effective”***
  - Comment: ***“It seems to me that in view of expansion of our activities we may have to set up a few working groups in the near future”***

# IPPOG Expansion (2)



- At Spring 2011 IPPOG meeting (in Kosice, Slovakia)
  - Formed a working group of 10 IPPOG members who met monthly via EVO, with the following objectives:

## IPPOG Identity

- To clarify what it means to be an IPPOG member
  - types of involvement in IPPOG
  - typical member activities
- To clarify who IPPOG is and what we do (in writing!)

## IPPOG Membership

- To clarify selection and prioritization process
- To clarify procedures for bringing in new members
- To produce an information packet for prospective new members

- Outcomes presented at Autumn IPPOG meeting (CERN)
  - stay predominantly LHC-biased, but start expanding to related subjects

# IPPOG Expansion (3)



Defined a title for people regularly attending IPPOG meetings & contributing to its objectives, but who are not “Members”

IPPOG Member	IPPOG Associate
Officially delegated	Not delegated
Has voting rights	Has no voting rights
<i>Vote: 1 per country/institute</i>	<i>encouraged to advise!</i>
Participation on-going  (duration determined by country/institute)	Involvement project/interest based  (duration determined by interest & availability)

# IPPOG Expansion (4)



Outcome of a survey of IPPOG members – what do we do?



Used to prepare an “IPPOG is....” document (<http://cern.ch/go/d6zR>)

# IPPOG Expansion (5)



<http://ippog.web.cern.ch>  
<http://facebook.com/IPPOG>

## WHO ARE WE?

We are a network of scientists, researchers, science educators and explainers engaged in informal science education and outreach for particle physics across the globe. Our membership currently includes representatives from each member state of CERN, each major experiment at CERN's Large Hadron Collider (LHC) and prominent labs and institutions in the USA and Europe. And, we have plans to include more countries and laboratories in the future.

## WHAT IS OUR AIM?

Our aim is to contribute to global efforts in strengthening cultural awareness, understanding and support of particle physics and related sciences.

## HOW DO WE DO THIS?

By facilitating and contributing to outreach and informal science education initiatives for particle physics across the globe; and sharing this experience and expertise with others.

## WHO DO WE SERVE?

Anyone who wants to know more about particle physics, especially educators and students (from school to university).

## HOW CAN IPPOG HELP YOU?

### You, the student IPPOG can...

tell you about our outreach programs in your area and how to get involved  
point you to recommended learning resources on-line

### You, the scientist IPPOG can...

share with you recommended tools and materials to effectively engage your community during talks, presentations, discussions.

put you in touch with current and science education programs.

help you explore opportunities for your own outreach initiatives  
practical advice from our members

### You, the teacher/science explainer IPPOG can...

share with you our recommendations and materials for your classroom audience.

put you in touch with current and science education programs.

Offer you ways to get involved in science outreach through various programs (see reverse of this brochure)

## IPPOG Brochure

## SAMPLE IPPOG ACTIVITIES



International Masterclasses provide an opportunity for high school students to be "scientists for a day." 16- to 18-year-old students in countries around the world are invited to one of about 120 nearby universities for a day in order to take part in an authentic research process. Lectures from active scientists give insight in topics and methods of basic research in matter and forces, enabling the students to perform measurements on real data from the LHC. At the end of each day, like in an international research collaboration, the participants join in a video conference with CERN for discussion and combination of their results. International Masterclasses offer students the chance to close their textbooks and experience modern science first-hand!



### HOW YOU CAN GET INVOLVED

IPPOG encourages newcomers to join the International Masterclasses, either institutes willing to host a Masterclass or schools eager to participate in one. We will provide you with the information and material necessary to either organize or take part in an event that students and staff will never forget.

For more information, please see [www.physicsmasterclasses.org](http://www.physicsmasterclasses.org) or contact [masterclasses@physik.tu-dresden.de](mailto:masterclasses@physik.tu-dresden.de)



### Outreach Database

A new IPPOG initiative, the outreach database is the first-ever global database for materials related to particle physics outreach and informal education. It houses videos, brochures, posters, talks, ideas for hands-on activities and more, in a variety of languages! Items stored here are shared by members and partners of the IPPOG network.



### HOW YOU CAN GET INVOLVED

Although relatively new and evolving, the database already contains over 200+ entries. Besides additional content, the database needs a more user-friendly and attractive interface.

So, what can you do to help the database become a super useful tool? Browse it. Use it. Contribute content! Make concrete suggestions for improvements!

For more information, please see <http://ippog.web.cern.ch/ippog/IPPOGdatabase.html> or contact [ippog.admin@cern.ch](mailto:ippog.admin@cern.ch)

## HOW CAN YOU HELP IPPOG?

### You, the student can...

enroll in an International Masterclass and tell your friends!

tell us about great learning tools for particle physics that you like

### You, the scientist can...

get involved with an IPPOG International Masterclass, either at CERN or in your institute!

share suggestions for outreach tools and materials via our [Outreach Database](#).

Follow us on Facebook and share ideas

### You, the teacher/science explainer can...

participate in an International Masterclass!

browse our [Outreach Database](#) and add your own items to share with others

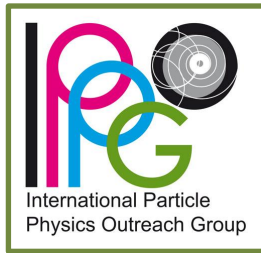
Follow us on Facebook and share suggestions for new classroom tools and materials to be developed



Discovering Particle Physics Together

Aim to distribute this to all teachers visiting CERN (funding permitting)

# IPPOG Expansion (6)



Suggestions for countries to invite to join IPPOG



IPPOG Member Survey results



# IPPOG Expansion (7)



Suggestions for institutes/experiments to invite to join IPPOG



IPPOG Member Survey results

# IPPOG Expansion (8)

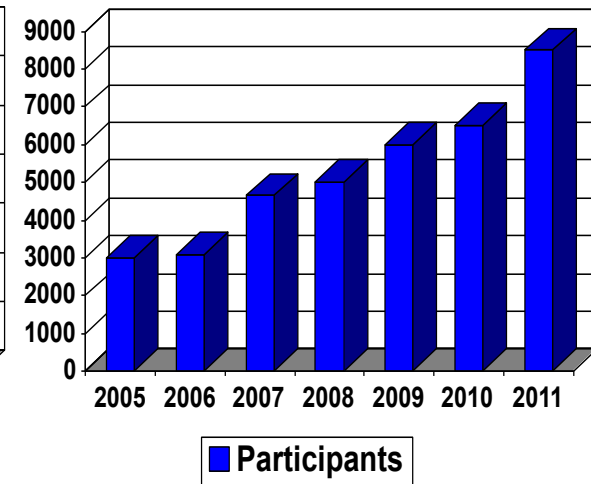
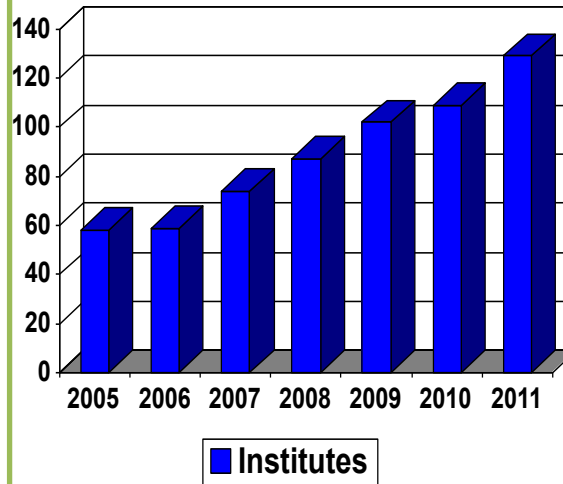


- Summary

- Better understanding (inside & outside IPPOG) of who we are, what are our aims, what we do, how we work together
- New documents & brochure produced
- Although initial expansion will be largely LHC-centric, expansion to other (related fields) will happen too...
- Will invite TOTEM, ISRAEL and KEK to join (as a first step)
- No progress in defining who IPPOG reports to...

# International Masterclasses (1)

- International Particle Physics Masterclasses
  - High school students become “scientists for a day” at a local University/Institute
  - Really “world-wide” now
  - “enquiry-based learning exercise” on real data – now from LHC!
  - Discussion of results via video conference with other participants & CERN – just like we do!



# International Masterclasses (2)



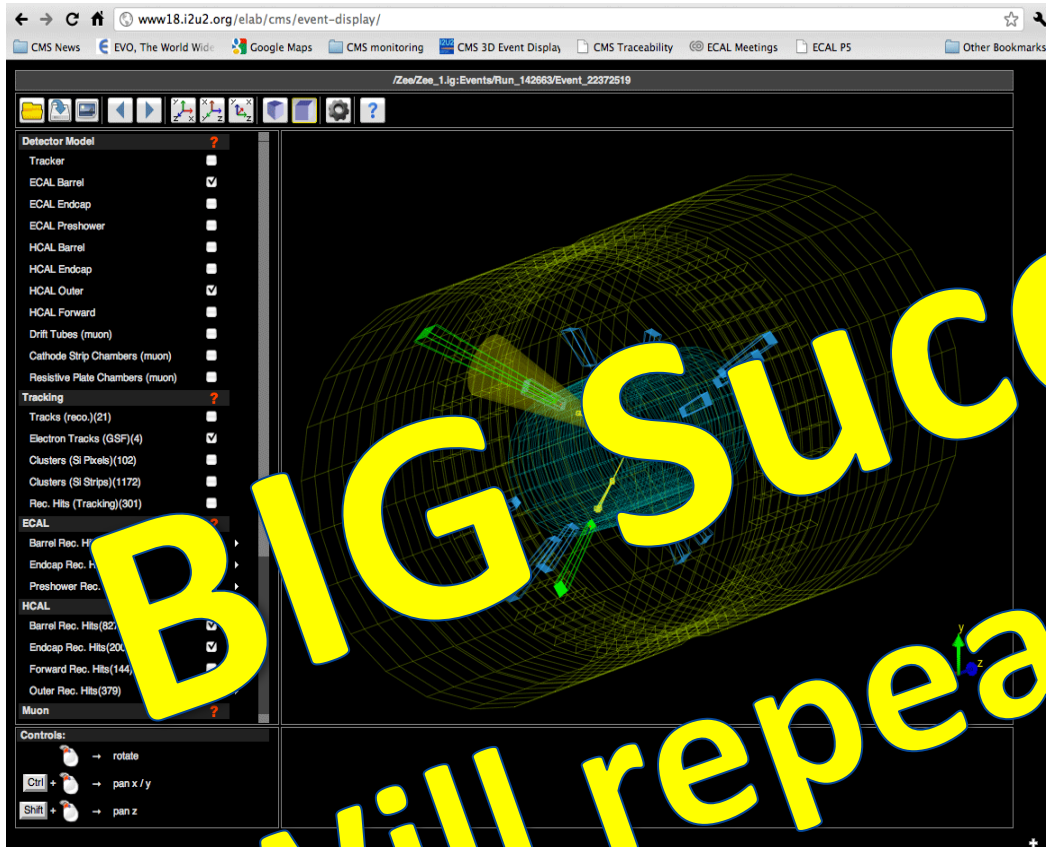
- New for 2011: Real LHC data from:



- Students' tasks:

- Reveal the inner structure of the proton / search for Higgs
- Rediscover the Z-Boson and measure its mass / discover Z'
- Study decays containing muon pairs to determine J/ψ candidates
- Identify  $K^0$ ,  $\Xi$ ,  $\Lambda$  based on topology of decay, and calculate invariant mass

# International Masterclasses (3)



"I was truly pleased with how quickly the students were able to "get to the physics." There were the 7 minutes of necessary questions like:

"How do I load an event?"

"What is the zoom?"

"Can I rotate the display?"

They quickly started asking about the physics. It was very good. Then they asked each other:

"Are those the same charge?"

"That doesn't look global to me. What do you think?"

"Are those muon tracks even leaving the same point?" (Tom Jordan, QuarkNet)

"The kids took the data analysis like ducks to water.....after a few practice events with the entire group they were turned loose."

# IPPOG E&O Database & Web Site (1)



- Developed first-ever global database of materials for particle physics E&O
  - Provides materials and ideas for public talks, exhibitions and informal education activities
  - Already has around 300 “items”, each of which may contain many individual files
  - Videos, photos, presentations, descriptions of physics goals of LHC etc., ideas for educational activities
  - Multiple languages
  - All items carefully tagged to facilitate finding the “right stuff”

# IPPOG E&O Database & Web Site (2)



## BOOKS & ARTICLES

# IPPOG E&O Database & Web Site (3)



## BOOKS & ARTICLES

IPPOG Document 230-v1

### LHCb Photo Book

**Document #:**

IPPOG-doc-230-v1

**Document type:**

[New IPPOG Document](#)

**Submitted by:**

[Bolek Pietrzyk](#)

**Updated by:**

[Bolek Pietrzyk](#)

**Document Created:**

17 Feb 2011, 12:29

**Contents Revised:**

17 Feb 2011, 12:29

**Metadata Revised:**

28 Mar 2011, 16:03

[Update Document](#)

**Abstract:**

**Purpose:**

To raise awareness of the LHCb Experiment on the Large Hadron Collider at CERN, Switzerland

**Description:**

Titled "LHCb - the Collaboration in Photos," this 77 page color photo book describes the LHCb experiment and its collaboration. Readers enjoy a straight forward written explanation with photos of how this international endeavor became a reality. Topics covered include how the idea for the experiment was born, design and laying the groundwork (the LHCb cavern), the LHCb detector's major parts and functions, experiment operations, and the historical experiment start-up. The book concludes with a chapter on how individuals can get involved in this cutting-edge adventure.

Published: Autumn 2010

Price: 10 CHF

Sales: Available from the LHCb Secretariat at CERN, Switzerland.

Copyright CERN, for the benefit of the LHCb collaboration, September 2010

## LHCb Photo Book



# IPPOG E&O Database & Web Site (4)



## COACHING RESOURCES FOR SCIENTISTS

### Presenting science

15 December 2010

#### Abstract:

**Purpose:**  
To improve scientists' presentation and public speaking skills

**Description:**  
The book is for any scientist wishing to effectively present her or his work and thoroughly engage audiences when speaking to both scientific and non-scientific audiences. It gives straight-talking practical advice right down to the level of where to place the microphone, how to use a laser pointer effectively, how to position yourself to the audience, how to recognise and counteract the drawbacks of your own personal style (for example, if your voice doesn't carry well), and how to deal with nerves.

**Publishing Date:** 22 Feb, 2010  
**Publisher:** Oxford University Press  
**Authors:** Cigdem Isserver and Ken Peach  
**Price Hardcover:** \$42.42  
**Price Paperback:** \$29.58  
**Available for sale on Amazon.com**

#### Files in Document:

- [ATLAS e-news article on book \(Presenting Science.pdf, 507.6 kB\)](#)

Get all files as [tar.gz](#), [zip](#).

#### Topics:

- [A. Item Type:Books / Articles:Books](#)
- [B. Properties:Related Institution/Experiments:CERN & Experiments based at CERN:ATLAS](#)
- [B. Properties:Language:English](#)
- [A. Item Type:Coaching Resources for Scientists](#)

#### Authors:

- [Cigdem Isserver](#)
- [Ken Peach](#)

#### Publication Information:

[http://www.amazon.com/Presenting-Science-practical-guide-giving/dp/0199549095/ref=sr\\_1\\_1?s=books&ie=U](http://www.amazon.com/Presenting-Science-practical-guide-giving/dp/0199549095/ref=sr_1_1?s=books&ie=U)



Cigdem and Ken pose on the cover of their book, Ken wearing an ATLAS tie!

## Presenting Science

# IPPOG E&O Database & Web Site (5)



## EXHIBITS & EXHIBITIONS



## Die Weltmaschine- Sand Boxes

# IPPOG E&O Database & Web Site (6)




- Database contents will be migrated from DocDB to CDS in the coming months
- New web site being developed with CERN and external company
  - Database will be at the forefront of this site
  - Funding (for first major steps of site development) obtained from “Pathway to Enquiry-Based Learning” EU Project (CERN is a partner)

# IPPOG E&O Database & Web Site (7)



European Laboratory for Particle Physics

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

**International Particle Physics Outreach Group**

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

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### Global Learning Resources

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aenean non erat nec purus fermentum blandit. Nunc magna diam, mattis non tempor in, vulputate nec lorem. Integer pellentesque magna vel diam pellentesque vitae tempus quam venenatis. Nullam massa erat, dictum varius scelerisque id, egestas in eros.

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#### Draw Me a Physicist

To raise school children's awareness of and enthusiasm for the world of physics and life as a physicist



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### Latest Resources / Featured




#### Particle Masses...

To illustrate the importance of the specific particle mass values for our own existence

0 comments

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#### Draw Me a Physicist

To raise school children's awareness of and enthusiasm for the world of physics and life as a physicist

0 comments

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#### Presenting Science



To improve scientists' presentation and public speaking skills

2 comments

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[HOME](#)      [ABOUT](#)  
Sub page test  
Sub page test 2      [RESOURCES](#)

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 The Global Learning Resources is supported by the **CERN**. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Donec nec metus elit, sit amet viverra mi. Fusce sed enim eget turpis dictum hendrerit vel ac nibh 

# IPPOG E&O Database & Web Site (8)



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

[HOME](#) > [RESOURCES](#)

## Resources

**Item Types**

- Programs & Activities
- Forums & Events
- Media
- Professional Development & Program Guides

**Welcome !**

**What is this?**  
This is a database that holds recommended tools and materials to be used in bringing the exciting world of particle physics to students of all ages and the general public. Here you can find videos, brochures, posters, talks, ideas for...

**Join** our database user group and share your ideas too!

**Learning Topics**

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

**Search**

**Learning Topic**  
- Any -

**Audience**  
- Any -

**Language**  
- Any -

**Item Type**  
- Any -

**Use**  
- Any -

**Key Words**

**LATEST** **FEATURED**

**How would the universe have turned out if the elementary particles had slightly different masses?**

In four episodes, this animation shows the development of our own universe and three alternative scenarios.

**Book**

**Particle Masses, what if they would have been different? / Teilchenmassen – Was wäre wenn sie anders wären?**

To illustrate the importance of the specific particle mass values for our own existence

**Languages**

[English](#) [French](#) [German](#)

# IPPOG E&O Database & Web Site (9)



HOME | ABOUT | RESOURCES

HOME > MEDIA > PRINT MEDIA > BOOK

## Item Types

Programs & Activities

Forums & Events

### Media

Print media

Book

Professional Development & Program Guides

### Use

To build

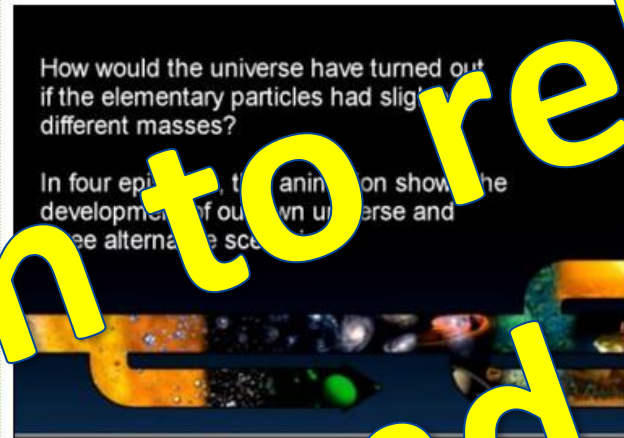
To give away (for free)

To show or read

To buy

Concept only

## Particle Masses, what if they would have been different Teilchenmassen – Was wäre wenn sie anders wären



How would the universe have turned out if the elementary particles had slightly different masses?

In four episodes, the animation shows the development of our own universe and three alternative scenarios.

Created by Tricklabor, Science advocate

### Rankings

Average: 2 (1 vote)

### Language

English  
German

### INFORMATION RESOURCES

The organizers of the German exhibition *Welt Maschine* (2008), the German Executive LHC Outreach Group (GELOG), had to explain to exhibition visitors why it is necessary to understand the origin of mass. The animation studio Tricklabor was brought in to help develop a concept for an exhibition display about the subject. The result is this short video depicting 4 different scenarios of how the universe would have turned out if the elementary particles had slightly different masses. Also available in German with the title "Was wäre, wenn...?"  
English language video: <http://www.tricklabor.com/en/portfolio/what-if-particle-masses/>  
German language video: <http://www.tricklabor.com/de/portfolio/was-waere-wenn/>

### Add comment

[Log in](#) to post comments

Aim to release by end 2011

# IPPOG Discovery Packages (1)



- One-stop-shop for people wanting to know everything about a “discovery” or important measurement
- Proposed a matrix-like web-site structure to house this material, including background text/images/videos as well as items surrounding the breakthrough

	Fact sheets	Animation	Photographs	Plots & Diagrams	Contact persons	Quotes	Presentations	Data files
Why is it important?	X	X			X	X	X	
How was it discovered?		X		X				
Who discovered it?			X	X	X			
What happens next?		X			X	X	X	
How does this affect me?	X							
Practical implications?	X				X			
Teaching materials	X	X						X
How do I become involved?								X

# IPPOG Discovery Packages (2)



- First and foremost “user” of these packages is the News media
  - Other audiences will follow soon after!
- IPPOG’s role has – so far – been limited
  - Working Group formed at IPPOG#1 meeting in Kosice in April 2011
- Much of the content production falls on CERN & the experiments (with significant input from US-LHC)
  - Much of which will be at the time of the discovery!
  - But much can also be prepared in advance.....



# IPPOG Discovery Packages (3)



- Texts to accompany 8 possible discoveries/major measurements
  - Written by Kathryn Grim and Lauren Rugani (US-LHC)
  - Edited by IPPOG members
  - Published on CERN and US-LHC web-sites
    - E.g. <http://press.web.cern.ch/press/background/index.html>

## Backgrounders

### English version

[Higgs](#)

- [Higgs Limit FAQ](#)

[Supersymmetry](#)

[Dark matter](#)

[Extra dimensions](#)

[Matter/antimatter asymmetry](#)

[W prime and Z prime](#)

[Compositeness](#)

[Fourth generation](#)

### Other languages

[FR](#)

[FR](#)

[FR](#)

[FR](#)

[FR](#)

[FR](#)

[FR](#)

[FR](#)

[FR](#)

Watch this space!

# IPPOG Discovery Packages (4)



- Now working on:
  - Interviews (with CERN & US-LHC Communications Groups)
    - 2-3 minute video interviews with theorists and leading experimentalists on the eight topics, answering questions such as:
      - *What is this phenomenon?*
      - *How will it be found in <experiment>?*
      - *How will our understanding of the Universe change if you find it? And what will be the next step?*
      - *What happens if you don't find it?*
      - *How will this discovery change everyday life?*
  - Animations (with CERN Education & Communications Groups)
    - Draft “BBC Interview” text created to understand the need for short animations during a 2-minute news item on the Higgs Discovery (as an example)
    - New “animations group” at CERN, working on defining storyboards for animations etc.
    - Will have increased IPPOG involvement in coming months

# IPPOG @ Conferences



- Invited to present IPPOG in “Broader Impacts” session at ICATPP Conference (Como, Italy, October 2011)
  - Well received and good discussions afterwards
  - Increased visitation to the IPPOG web site, database, Facebook page etc.
  - Many thanks to CERN DG for funding to attend this conference
- Application to present IPPOG & Masterclasses at the ESOF Conference (Dublin, Ireland, June 2012)
  - Accepted for a 2-hour session

**Proposal** to get increased visibility of IPPOG (and E&O in general) at other International Conferences, such as ICHEP 2012 (Melbourne, Australia, July 2012) and 1<sup>st</sup> World Conference on Physics Teaching (Istanbul, Turkey, July 2012)  
But funding is not obvious.....

# IPPOG Meetings 2011 (1)



- Spring Meeting at Slovak Technical Museum, Kosice, Slovakia



Included an official audience with the Deputy Major of the City of Kosice!



Foto: Bartolomej Cisár

The meeting included a debriefing of the Masterclasses and the formation of Working Groups (who did work IN the meeting and afterwards!)

# IPPOG Meetings 2011 (2)



- Autumn Meeting at CERN
  - Half-day meeting of the Masterclass Working Group
  - Half-day discussing IPPOG internal issues (membership, expansion etc.)
  - Half-day joint session with EPPCN
    - Closer collaboration is beginning
    - E.g. Planning for the “Brussels event” to go with the new European Strategy for Particle Physics
  - Half-day summary of new country/experiment activities

**Proposal:** all future IPPOG meetings at CERN will feature an “Open” session to inform others of IPPOG activities and E&O in general

# IPPOG Meetings 2012/2013



- Spring 2012
  - Innsbruck, Austria
    - Site of museum of Hess' cosmic ray experiments (100<sup>th</sup> anniversary in 2012)
- Spring 2013
  - Fermilab, USA
    - To develop further the “International” flavour of IPPOG
    - Announce well in advance to facilitate funding for some members

# IPPOG: Summary (1)



- First year for IPPOG has been exciting and successful
- Much progress and additional activities in 2011
- Working Groups active between meetings
- Expansion will start soon
  
- Plans for 2012:
  - Expansion of IPPOG
  - Organization of International Masterclasses
  - Participation in International Conferences
  - Further development of web-site and database to “package” materials for teaching purposes

# IPPOG: Summary (2)



- **Funding** (at a relatively modest level) is invaluable for many of our activities. Currently we are extremely thankful to:
  - Masterclasses: **Helmholtz Institute, TU Dresden, EPS-HEPP, QuarkNet, I2U2, FNAL**  
(funding from Germany ends at the end of 2012)
  - 60% FTE @ CERN for database, organization: **CERN DG**  
(funding assured until end 2011) + some from **PH-EDU**
  - Participation in ICATPP Conference: **CERN DG**
  - New IPPOG web site: **Pathway Project (EU)**