IPPOG Resource Database
Making Particle Physics outreach & education available worldwide

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Outline

- Why outreach in particle physics and related sciences matters?
- IPPOG - strategic pillar for worldwide outreach – EPPSU context
- IPPOG Resource Database (RDB)
  - What? Who for?
  - Development of new RDB
  - Curation
- Invitation for audience to take part!
Challenges of HEP / science community

Main challenges of scientific community

- Challenged financial support of large experimental endeavours
- Falling interest of young people to study physics and STEM
- Mistrust in science

Reasons

- Misperception of physics / science in society – complicated, abstract, disconnected from real life
- Lack of awareness and understanding
Why is physics & basic research misperceived?

Scarce exposure of society to modern physics

✓ School curricula – mostly no modern physics
✓ Media – misinformation and disinformation

Cell phones and computers were sewn into reality thanks to fundamental science.

Despite this:
Most students finish high school believing that there are only:

- 3 elementary(?) particles (electron, proton, neutron)
- 2 types of forces (gravitational and electromagnetic)
Why exposure of society to HEP matters?

Exposure to modern physics, like HEP and its technological applications increases the interest of students in physics and their perception of its role in society and sustainable development.

Study in Germany and UK:
General interest in physics at schools has increased strongly thanks to inclusion of extra-curriculum activities in HEP (exhibitions, Physics Masterclasses, teaching)!
Importance to update physics curricula is now officially recognised by full HEP community
The International Particle Physics Outreach Group (IPPOG) has been making concerted and systematic efforts to present and popularise particle physics and related sciences across all audiences and age groups since almost 25 years.

Today, HEP and scientific community has in IPPOG a strategic pillar in fostering long-term, sustainable support for fundamental scientific research around the world.
IPPOG Collaboration

International Scientific Collaboration
- Active Researchers with Experience in Education & Outreach
- Experts in Communication & Education

Physics topics
- Particle Physics beyond LHC and related sciences
- Neutrinos
- Astro-particle physics
- Heavy ions

Organise Global Activities
- International Particle Physics Masterclasses
- World-Wide Data Day, Global Cosmics, etc.

Support Local Activities
- Sharing of expertise, best practices, outreach material database
- Resources to support events, kick-start activities

See POSTER session tomorrow:
“IPPOG Reaching Across Globe With Science”
by IPPOG co-chair Pedro Abreu
https://tinyurl.com/93r59jrz
IPPOG Website & Resource Database

IPPOG is an ideal platform for:

- sharing, developing and improving
- explanatory and teaching materials, strategies, methods, activities and tools
- to reach broader audiences

“IPPOG wants the new website to become more open to students, teachers and the general public, and for the RDB to become the primary source of particle physics outreach material in the world.”

- strengthen IPPOG online presence by creating a new website including a new RDB
- greatly broaden the audience type and use of the webpages & available resources
New IPPOG website under development

Coming soon!
From wonders to excitement

Example of test (might be changed in the future)
We contribute to global efforts in strengthening cultural awareness, understanding and support of particle physics and related sciences and in developing the next generation of researchers. More specifically, IPPOG's purpose is to raise standards of public outreach and science education efforts.
Idea born in 2009: transformation of EPPOG (former IPPOG) from a "discussion forum" to a possible world leader in informal science activities for HEP and related fields: IPPOG.

Initially “EPPOG Best Practice Database” meant to be used by science institutions and laboratories for outreach and informal science education purposes.

Self-sustaining, users vote on highest quality & most useful items to be best practice.

First version released in 2011

Today about 370 items collected over last 10 years.
New IPPOG Resource Database is / will be…

- online platform to facilitate the exchange of HEP E&O resources across the globe
- collection of high-quality engaging materials (e.g. videos, posters, talks, hands-on activities, tools, brochures and more)
- content recommended by experts
- to share wonders and excitement of HEP with teachers, students and general public
- readily understandable and regularly updated to reflect the latest discoveries in HEP
- primary source of HEP outreach material in the world
New IPPOG Resource Database

REVIEW and REDESIGN of Resource Database

• Several years of discussions, efforts and feedback
• New improved Resource Database proposal in 2017
• Intense collaboration with high school teachers ("IPPOG Friends" group)

GOALS

• Broaden audiences
• Improve functionality and user-friendliness for both users and contributors
• Simplify categories
• Full coverage of relevant topics
• Keep the content up-to-date
• Continuous feedback and improvements
IPPOG Resource Database Challenges

TECHNICAL
- Dedicated submission form at CDS
- Interface between CDS and Drupal (external company)

CONTENT
- Curation of existing / “old” items
- Collection of new / up-to-date best items
- New content development

In-kind contribution from CERN
IPPOG RDB Curation

RDB CURATION group (since summer 2020)

~ 40 experts from around the world: - physics teachers, scientists and science communicators

Alberto Ruiz Jimeno
Andreas Delannoy
Ani Torres
Anna Marie Wolf
Carlos Cunha
Cassondra McHugh-Lowther
Cédric Vanden Driessche
Claire Adam-Bourdarios
Claire Bonnot-Chevalier
Daniela Ambar Gayoso Miranda
Dario Menasce
Despina Hatzifotiadou
Enrique Arce-Larreta
Harry Stuckey
Ian Bearden
Ivan Melo
Jean-Christophe Pelhate
Joel Klammer
José María Díaz Fuentes
Julia Woithe
Kevin Martz
Kevin Mosedale
Lucia Battistella
Luís Afonso
Maria Niland
Marla Glover
Michael R. Fetsko
Michael Wadness
Miki Otsuka
Moritz Springer
Patricia Teles
Pierluigi Paolucci
Ram Krishna Sharma
Richard Dower
Robert Nickson
Soleiman Rasouli
Spencer Pasero
Stefania Della Sciucca
Yury Ivanov

CRITERIA

✓ Is the physics right?
✓ Is it a topic of interest?
✓ Is it related to particle physics or associated fields?
✓ Is it up-to-date or has it been superseded?
✓ Are you aware of a similar resource in the same language?
✓ Do you consider this resource as really outstanding?

Special Curation tool developed – launched Dec ‘20

366 resources: each evaluated by 2-3 experts =>

> 800 items to curate by end of summer 2021!
IPPOG RDB Curation tool

GREAT FUNCTIONALITIES

(impossible with google docs)

- SECURITY: users sign in with their account and can edit only their entries
- SECURITY: editable (only new tags) and non-editable fields
- SEARCH & FILTERING: each tag / column can be filtered with chosen values
- DROPDOWN MENUS with predefined lists
- MULTIPLE CHOICE when entering values
- CLEAR: red line - taken by somebody else; blue line - mine
- UNDO / CLEAR OPTION
- VIEW and EXPORT options
- PLAN: TO BE USED (at least partly) to help populating new RDB…
## NEW

**Link to school physics curriculum**

### 7. SCHOOL TOPIC

The blue part is just to lead the people to the next level, which are in Maki!

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Curriculum topic</th>
<th>Sub-topic</th>
<th>Particle Physics topic</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature of Science</td>
<td>Scientific Inquiry</td>
<td>all</td>
<td>E.g. theory vs experiment, comparing predictions and observations for Higgs discovery</td>
<td></td>
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<tr>
<td>Measurements &amp; Uncertainties</td>
<td>Sensors</td>
<td>Detectors</td>
<td>expanding the human senses</td>
<td></td>
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<tr>
<td>Matter</td>
<td>Structure of Matter</td>
<td>Particles</td>
<td>Elementary particles, Particle systems up to atoms, molecules, vacuum 4 presence of matter</td>
<td></td>
</tr>
<tr>
<td>States of Matter</td>
<td>Chalky-glassy-plastics</td>
<td>E.g. phases, transitions, LHC cooling with liquid helium 4 temperature</td>
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</tr>
<tr>
<td>Phase Transitions</td>
<td>Detection, Interactions</td>
<td>E.g. in-detection technique (caged and bubble chambers)</td>
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</tr>
</tbody>
</table>

### 9. ADDITIONAL KEYWORD/TAG

**Free text**

### 10. RELATED RESOURCES

Choose from all other items/resources!

### 11. COMMENT

**Free text**

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**IPPOG Resource Database**

Keep It? | IPPOG's best? | Topic | Subtopic | Type | Audience | Language | School topic | Online usage | Additional Keyword/Tag | Related resource | Comment |
<table>
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</table>

**LHCP 2021, 9 June 2021, online**
IPPOG RDB curation time evolution

Cumulative for all curators
- committed / selected
- curated
- goal / plan

Please, help and join the effort!
New IPPOG RDB website preview

**SEARCH:**

1) Choose physics topic (from picture)

2) Filter in search engine

Hover on 1 from 4 main topics:
- Subtopics shown
- Random selection changing at each refresh shown below

LHCP 2021, 9 June 2021, online
Random Selection

Enjoy the random selection of featured resources in English below. Search the database by clicking on topic tabs above or filter on the right.

1) Choose physics topic (from picture)

2) Filter in search engine

Order of items according to rating

LHCP 2021, 9 June 2021, online
USER FRIENDLY SUBMISSIONS:

- Clear instruction
- Form for contributors
IPPOG Resource Database Challenges

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In-kind contribution from CERN
Collecting new resources for RDB

- Collecting efforts since December 2020 (google doc)
- New RDB Working Group (May 2021):
  - Complete
  - Wrap up
  - Evaluate
  - Assign new tags - with help of dedicated curation tool

```
RUIZ JIMENO, Alberto
SHARMAZANASHVILI, Alexander
STRANDBERG, Jonas
WOZNIAK, Krzysztof Wieslaw
WETZLER, Susan
WEGNER, Jeremy
KLAMMER, Joel
GLOVER, Marla
COYLE, Helen
PAOLUCCI, Pierluigi

KIRILOVA, Galina
KLEIN BOESING, Christian
BEARDEN, Ian Gardner
GAMEIRO MUNHOZ, Marcelo
GORISEK, Andrej
HADJIISKA, Roumyana Mileva
HATZIFOTIADOU, Despina
MELO, Ivan
PRICE, Darren
BARDEEN, Marge
ADAM BOURDARIOS, Claire
```

Open to join!

7 members also in RDB curation group

Later we will create RDB standing committee
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In-Kind contribution from CERN
IPPOG Working Groups

- Explaining PP to Lay audience
  - Analogies, images, examples, stories…
- Outreach of Applications for Society
  - Stories with human touch

Tool for community to shape attitude and perception of physics and fundamental research by decision makers, funding bodies, media and public and even motivate young people to undertake physics studies.
TAKE PART!

✓ STAY TUNED!!! New IPPOG websites coming up end 2021
✓ BECOME RDB CONTRIBUTER! Submit resources (2022)
✓ PROPOSE RDB ITEMS Now!
✓ JOIN CURATION GROUP and/or RDB WG!

Contact barbora.gulejova@cern.ch
Learn more ....

IPPOG - Bridging the gap between science education at school and modern scientific research


Private zoom room for further discussion

https://cern.zoom.us/j/64513997002

Meeting ID: 645 1399 7002
Passcode: same as this session passcode

THANK YOU
BACKUP SLIDES
Outreach for future PP endeavours

Future projects (FCC) will require a long-term, world-wide commitment of significant monetary resources and human expertise.

For success of such an endeavour are needed:

- the establishment of broad public support, as well as the commitment of key stakeholders and policy makers throughout Europe and the world
- New generation of technically skilled specialists, physicists and engineers…

Current, well-focused concerted and global outreach and communication efforts to engage the public are already today of vital strategic importance.

IPPOG Collaboration, Input to EPPSU 2019
Today, PP and scientific community has in IPPOG a strategic pillar for fostering long-term, sustainable support for fundamental scientific research around the world.

IPPOG is already laying down the ground work for this de-facto through its mission:

- **Establish Understanding** of scientific process
- **Instil Appreciation** of fundamental research and importance of evidence-based reasoning
- **Build Trust** with communities
- **Train Next Generation** of scientists

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IPPOG: Global Network

- Asia
- Africa
- Australia
- Europe
- The Americas
- International Labs and Collaborations

37 Members:
- 30 Countries
- 6 Collaborations / Experiments (ATLAS, ALICE, Belle II, CMS, HAWK, LHCb)
- 1 International Lab (CERN)

2 Associate Members:
- 2 National Labs (DESY, GSI)
Activities with global reach

International Masterclasses in Particle Physics
• Flagship activity for high schools students (15–18 y.)
• Real Data from ATLAS, CMS, ALICE, LHC-b, Belle-II, MINERvA, Hadron therapy

Worldwide data Day

Global Cosmics
• Network of Cosmic Rays Projects for Schools
• International Cosmic Day and International Muon Week

... and many other projects, competitions, campaigns and activities...