



International Particle
Physics Outreach Group

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IPPOG Outreach of Applications WG

Barbora Bruant Gulejova & Yiota Foka

Conveners

Outline

- ❑ WG mandate & original guidelines
- ❑ Work in progress
- ❑ Strategy
- ❑ First example close to ready
- ❑ Special guest: “Spreading interest in particle physics – what matters?”

Reminder

WG Outreach of Applications

- ❑ In addition to quest for knowledge and satisfying curiosity....
- ❑ ... there is a **growing pressure** from taxpayers **for justification of fundamental research** funding requesting tangible examples of return to society
- ❑ Working group established in 2018 based on need for stories, which was identified by KT experts
- ✓ Short stories with clear message connecting science to everyday lives of citizens
- ✓ Show importance of fundamental research (PP and related sciences) for global sustainable development
- ✓ Inspire the young generation
- ✓ Provide a powerful tool when approaching different non-scientifically educated stakeholders
- ❑ **Conveners:** Barbora Bruant Gulejova, Yiota Foka
- ❑ **Advisory / Reading Board:** Daniela Antonio, Beatrice Bressan, Manuela Cirilli, Manjit Dosajnh, Verania Echaida, James Gillies, Thomas Naumann

Beatrice BRESSAN, Djurdjina BULATOVIC, Catia PEDUTO, Carola POMPLUN, Jon-Ivar SKULLERUD, Jose Ruben ALFARO MOLINA, Nicolas ARNAUD, Ralf AVERBECK, Atanas Ivanov BATINKOV, Hans Peter BECK, Manuela CIRILLI, Manjit DOSANJH, Andrej GORISEK, Despina HATZIFOTIADOU, Christine KOURKOU MELIS, Katharina MUELLER, Thomas NAUMANN, Darren PRICE

WG meetings and reports:

[May 2019](#) at GSI ([report](#))

[November 2019](#) at CERN([report](#))

[May 2020](#) online ([report](#))

[July 2020](#) online

[February 2021](#) (online)

Original guidelines

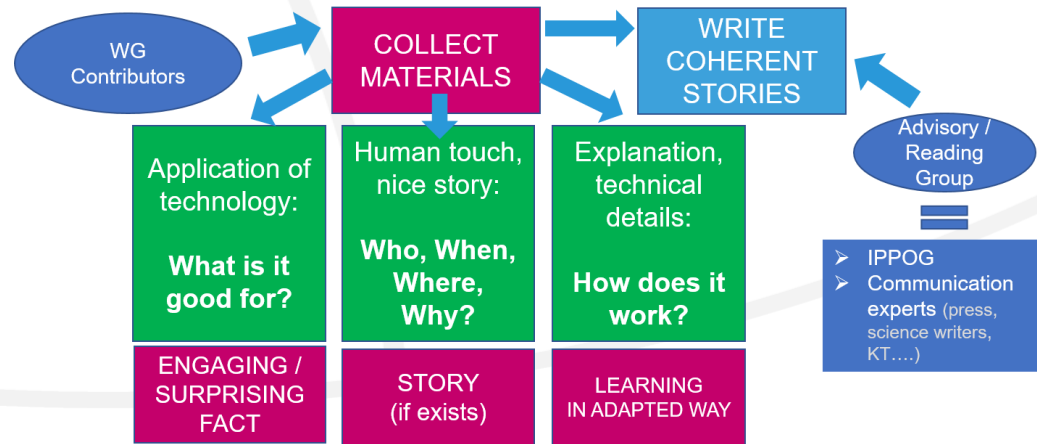
☐ Resources: quite big collection



- KT webpage
- links and materials provided by CERN experts (see general resources below)
- CERN brochures: on impact, KT reports etc...
- search for companies, who are part of the stories and work with them

☐ Format:

- stories (Abstract, Body, Pictures, Resources, Related links, ...)
- 1-2 pages



WORK IN PROGRESS

Open to IPPOG Forum!

IPPOG Application Stories

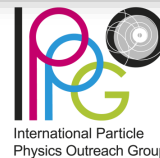
- Sign up for the topic where you want to contribute
- Propose new topics

TOPIC	RESOURCES	COMMENT	PERSON	STATUS
All applications	General resources			
Medical applications	General medical applications resources			
PET	Material from Martin Wensveen (CERN) here -Interview to be done later; -Maybe include CAEN PET scanner kit -Presentation by Despina 29 Nov 2019 here	PET using new type of dense scintillating crystals; CERN has pioneer contribution to forerunner of PET	Yiota Despina Andrej	Draft
RMI		PET and MRI imaging combined in single device thanks to new generation of CERN detectors		
Hadron therapy	Material from Hans Specht (GSI) here + interview to be done later More materials here	Treating tumours with beams of protons and light ions reducing the radiation exposure of healthy tissue (3 HT centres in Europe built in collaboration with CERN. CERN supports development of miniature linear accelerators for proton therapy). Kraft (presentation)	Katharina Bulatovic	HT story
Precise dose calculations based on particles simulations		Software for simulating particles interactions in detectors - used to calculate precise radiation dose for cancer treatment - space applications		
MEDIPIX	Info here	medical diagnostics, industrial processes, X-ray based material analysis, X-rays by detectors invented by Charles in 1958 need fraction of dose required by photographic methods, International Space Station	Yiota	

MEDICIS (Radioisotopes treatment and diagnosis)			Barbora	
Other applications	General resources			
WWW	Text for article for slovak newspaper in Slovak language, Barbora Bruant Gulejeva here	Invention at CERN (1993) driven by need of better communication of scientist worldwide, had a huge impact: # of internet users from 14 millions to 3.2 billions from 1993 till 2015- contribution to 2.9% of world global GDP - 1672 billion US\$ (in 2011)	Barbora Teddy	
Touchscreen	Article here	CERN was pioneer in breakthrough technologies, such as touchscreen for SPS in 1973	Thomas	
Solar cells technology	Article in symmetry here	Benvenuti working at CERN, inspiration for solar cells technology based on ultra high vacuum - GVA airport, KT case, cautious as it went bankrupt	Barbora	
TERABEE		sensor technology used in drones to explore places with difficult access	Teddy	
INVENIO		digital library and document repository used by providing cloud based digital library system for UN		
CLOUD	Link 1 Link 2 Link 3 Link 4 Link 5 Link 6	exploring the influence of cosmic rays on cloud formation in the Earth's atmosphere giving important input to global climate models	Katharina	
Radiation protection		Dosimeters and other applications		
UNOSAT	Notes from BBG here	In cooperation with UN, CERN provides the IT infrastructure to UNOSAT programme of UN/TAR hosted at CERN, to be at forefront of satellite analysis technology -15 years of humanitarian mapping: disaster risk reduction, regional capacity development, - damage assessment, climate services, water and food security	Barbora	
Superconductivity	Link 1 Link 2 Link 3 Link 4 Renewable and sustainable - Volume 55 , March 2016, Pages 59-72	Potential use for energy transport	Katharina	
Rolex antimagnetic watch	See link		Barbora Teddy	
Cultural heritage	Muon tomography,....		Despina Katia	
Accelerators for society	Medication, Sterilisation, Water purification... "Accelerators on ships" from "ARIES Accelerating News" See here		Yiota	
Detectors in industry				
WIFI	See here	Search for Hawking radiation	Jonivar	
GPS and Einstein Theories			Lorenzo	GPS story
GPS	GNSS Masterclass GNSS links	Example of simple GPS based masterclass for EEE high school students	Marina Trimarchi for EEE collaboration	

Hyperloop	link	Possible track of future	
CAEN	Interview with Gianni (CAEN), more materials will be sent	Examples of their technologies used in industrial applications	Barbora
CERN against COVID	Presentation from James Gillies at IPPOG here CERN against COVID19 seminar here Website CERN against COVID TF here		
LIP and COVID	Ricardo's presentation at IPPOG here		
Science response to COVID	Presentation from Savannah at IPPOG here Initiative "science responds" here		
Physics in the service of archeology	https://indico.cern.ch/event/942612/contributions/3962145/attachments/2082233/3497568/Alfaro.pdf		Jose Ruben Alfaro Molina
Tesla	https://indico.cern.ch/event/942612/contributions/3960794/attachments/2082036/3497226/YF-TESLA-IPPOG-WG-29jul2020.pdf		Yiota
ATTRACT highlights	https://attract-eu.com/news-and-events/		Barbora

And more...



STRATEGY

❑ RESULTS – ORIENTED Working Group

❑ Create USEFUL DELIVERABLES

❑ For whole spectrum of AUDIENCES

- Teachers and students
- General public
- Scientific ECO Community

STRATEGY – WHAT?

- ❑ COLLECT all existing stories, which are scattered in many places

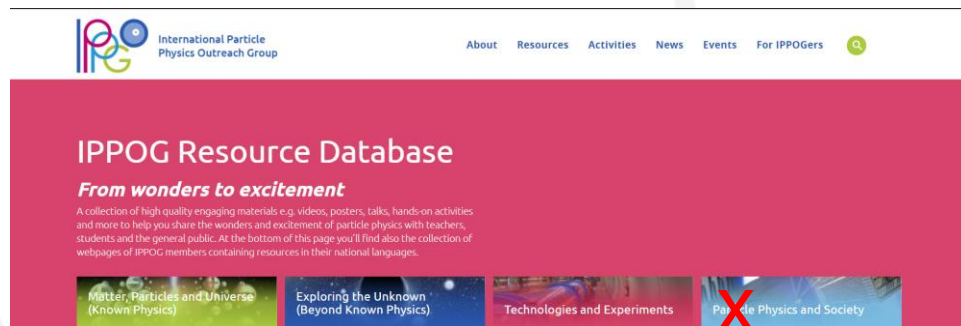
E.g. Story on solar panels technology from ultrahigh vacuum in [Symmetry magazine](#)

- ❑ WRITE new ones, which do not exist in short story adapted for lay-audience form yet, perhaps create videos / interviews...

- ❑ EXPAND scope to beyond CERN / PP => all related sciences, like heavy ions, astro-PP and cosmic rays, gravitational waves, thermonuclear fusion etc...

STRATEGY – WHERE FOR?

- **DISSEMINATE** - through IPPOG RDB
 - social media...
 - e.g. new #CERNImpact



- **PUBLISH** - in different journals for general public / lay audience
 - examples from CH: Le Temps, Tribune de Geneve, Global Geneva, Chambre of Commerce Geneva Info...

↑
Distributed to schools, read by Geneva International stakeholders

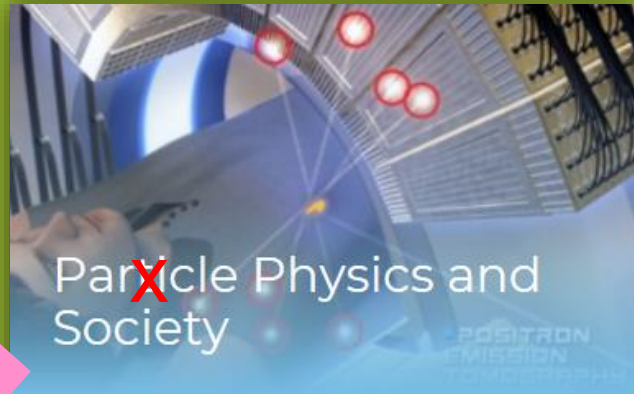
STRATEGY – EXAMPLE to FOLLOW

PE

Put all together as one resource on RDB:

- D ✓ Short story
- Y + Learn more
- E ✓ Full story
✓ Technical info

Cover all audiences



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SPECIAL GUEST

Sarah Zöchling

- Doctoral student at CERN
- Research: “Spreading interest in particle physics – what matters?”
- PhD thesis: “The role of interesting contents and contexts in physics education”
- Engaging also with applications of particle physics

*“Overall, physics education researchers agree that when trying to catch students’ interest, **context matters the most.**”*

