

IPPOG Working Group: “Outreach of Applications for Society”

Formed October 2018 at 16th IPPOG meeting:

See panel report:

https://indico.cern.ch/event/742487/contributions/3147691/attachments/1729453/2794540/Panel_Outreach_PP_applications_report.pdf

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REMIT and STRATEGY:

- 1) Collect information about applications from PP and fundamental research in general used for the benefit of the society: stories, pictures, videos, animations, presentations, articles, posters....
- 2) Write easy understandable stories of fundamental research applications for society, which are currently missing and will be part of the IPPOG resource database (category “PP and society”)

TOPICS:

From 44 to 16

1) MATTER, PARTICLES AND UNIVERS (KNOWN PHYSICS)

PARTICLES AND THEIR INTERACTIONS
COSMOLOGY
HIGGS
ANTIMATTER
QUARK-GLUON PLASMA
NEUTRINOS

2) EXPLORING THE UNKNOWN (BEYOND KNOWN PHYSICS)

SUPERSYMMETRY
DARK MATTER
DARK ENERGY
EXTRA DIMENSIONS

3) TECHNOLOGIES and EXPERIMENTS

ACCELERATORS
DETECTORS

4) PARTICLE PHYSICS AND SOCIETY

WHY FUNDAMENTAL RESEARCH
INTERNATIONAL COLLABORATION
APPLICATIONS & SPIN-OFFS
PEOPLE BEHIND THE SCIENCE

- 3) There can be different levels of “sophistication”:

- story telling language, not using too many technical details, so that it is understandable for the lay audience
- more technical details for physics teachers or more technically skilled audience
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4) Resources to be used:

- 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 (CAEN, etc.)

- find all here:

https://docs.google.com/document/d/1vJnm2a7wmzHVHpM_0xUVeNw_JMPqmwQlbdZ-HwUozGc/edit?usp=sharing

- Inspiration would come also from the panel discussion on “**Outreach on the benefits to society from fundamental research**” on Friday morning at IPPOG meeting:

<https://indico.cern.ch/event/767060/timetable/?view=standard>

5) Format of the stories:

Abstract
Structure of the body
Pictures
Resources
Related links

6) Recommended length: ~ 2 pages

WORKING PLAN:

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

DEADLINE: next IPPOG meeting, Fall 2019

TOPIC	RESOURCES	COMMENT	PERSON(S)	STATUS
All applications	General resources			
Medical applications	General medical applications resources			
PET	<p>Material from Martin Wensveen (CERN) https://drive.google.com/open?id=1YbwygQPnc_6Qd0Z4ninEGqNfcQTN_vRI</p> <ul style="list-style-type: none"> + Interview to be done later; + Maybe include CAEN PET scanner kit 	PET using new type of dense scintillating crystals; CERN has pioneer contribution to forerunner of PET;	Yiota Despina Andrej	
RMI		PET and MRI imaging combined in single device thanks to new generation of CERN detectors		
Hadron therapy	<p>Material from Hans Specht (GSI) https://drive.google.com/open?id=1eSggw2CtmKKbUL7N0KJ0DqXHcBH</p>	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;	Katharina Bulatovic	https://docs.google.com/document/d/1NRGDrLeS-Spr

	<p>RZQZ3 + interview to be done later</p> <p>More materials here: https://docs.google.com/document/d/1vjpuJBZ6w-Ub0cXaSHju5UNHhT9gOc0jB5vCmik33ys/edit?usp=sharing</p>	<p>CERN supports development of miniature linear accelerators for proton therapy)</p> <p>Kraft (presentation)</p>		<p>9BfRg1Glymvm_rFgrizCFFT9eOMefo/edit?ts=5ce80507</p>
Precise dose calculations based on particles simulations		<p>Software for simulating particles interactions in detectors -used to <u>calculate precise radiation dose for cancer treatment</u> - space applications</p>		
MEDIPIX	<p>https://docs.google.com/document/d/1BpPA5pciCXhgyTw8YIkD8MIkoJFXreChhEMkySRxLwE/edit?usp=sharing</p>	<p>medical diagnostics, industrial processes, X-ray based material analysis, X-rays by detectors invented by Charpak in 1968 need fraction of dose required by photographic methods, International Space Station</p>	Yiota	
MEDICIS (Radioisotopes treatment and diagnosis)			Barbora	
Other applications	General resources			
WWW	Text for article for slovak newspaper in Slovak language, Barbora	Invention at CERN (1993) driven by need of better communication of scientist worldwide, had a huge	Barbora Teddy	

	Bruant Gulejova: https://drive.google.com/open?id=1qpa3ZVVzg7dnsApXEmhcZZ1EziFyVczL	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)		
Touchscreen		CERN was pioneer in breakthrough technologies, such as touchscreen, SPS ~ 40 years ago		
Solar cells technology		Benvenuti working at CERN, Inspiration for <u>solar cells technology</u> 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		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: https://drive.google.com/open?id=1e	In cooperation with UN, CERN provides the IT	Barbora	

	aPc3EO2QIVtOi8rpF767hQ4eRSkW4Sq	infrastructure to UNOSAT programme of UNITAR hosted at CERN, to be at the forefront of satellite analysis technology - 15 years of humanitarian mapping: disaster risk reduction, regional capacity development, -damage assessment, climate services, water and food security,...		
Superconductivity		Potential use for energy transport	Katharina	
Rolex antimagnetic watch	https://www.rolex.com/watches/milgauss.html		Barbora Teddy	
Cultural heritage	Muon tomography,....		Despina Katia	
Accelerators for society	Medication, Sterilisation, Water purification...		Yiota	
Detectors in industry				
WIFI	https://www.abc.net.au/science/articles/2012/09/18/3590519.htm	Search for Hawking radiation	Jonivar	
GPS and Einstein			Lorenzo	https://docs.google.com/

Theories				e.com/document/d/1LjDjQFMkSj4hYjHrNaTF4OaEhxilX20w_6pbRwF_3ik/edit?ts=5ce8da5b
GPS		Example of simple GPS based masterclass for EEE high school students	Marina Trimarchi for EEE collaboration	GNNS Masterclass.pdf
Hyperloop	https://kt.cern/success-stories/hyperloop	Possible traveling of future	Lorenzo	
CAEN	Interview with Gianni (CAEN), more materials will be sent	Examples of their technologies used in industrial applications	Barbora	