

International Particle Physics Outreach Group

WG on Applications for Society

(Report from WG meeting 16 November 2021)






Barbora Bruant Gulejova & Yiota Fokka

Aristeidis Mamaras, Azra Gazibegovic - Busuladzic, Beatrice Bressan, Cecilia Colla Ruvolo, Despina Hatzifotiadou, Jonivar Skullerud, Katharina Mueller, Pedro Abreu, Priyanka Dasgupta, Sarah Maria Zoechling, Thomas Naumann



How to explain the need for a “Higgs factory” like the FCC to the public?

<https://indico.cern.ch/event/1093434>

11:00	→ 11:10	Welcome by conveners	🕒 10m	✎
Speakers: Barbora Bruant Gulejova (Universitaet Bern (CH)) , Yiota Foka (GSI - Helmholtzzentrum für Schwerionenforschung GmbH (DE))				
 Corrected_text_to_I...				
11:10	→ 11:25	Lessons from the most successfully communicated KT story in 2021	🕒 15m	✎
Speaker: Priyanka Dasgupta (CERN)				
 KT IPOGG talk 2021...  KT IPOGG talk 2021...				
11:25	→ 11:35	New sensor for SARS-CoV-2 and other viruses based on GSI nanotechnology	🕒 10m	✎
Speakers: Aristeidis Mamaras, Yiota Foka (GSI - Helmholtzzentrum für Schwerionenforschung GmbH (DE))				
 YF-IPPOG-WGapplic...  YF-IPPOG-WGapplic...				
11:35	→ 11:55	Discussion - how to reach out impactfully?	🕒 20m	✎
<ul style="list-style-type: none">▪ Studies show, that topics which work the best with students in order to raise their interest to study physics are: treating diseases with particle accelerators, understand big bang, detecting smuggles weapons, study volcanoes and pyramids or northern lights.... Can we think about list of subjects which would attract the best the interest of students / public and focus on writing on these?▪ How to make the information we try to prepare best disseminated, what would be the best means of communication apart from our IPPOG RDB, and how to get this information to media and teachers, how to help them to use it for students?				
Speakers: All WG members , Sarah Maria Zochling (University of Vienna (AT))				
11:55	→ 12:00	Opinion of HS physics teacher from Iran	🕒 5m	✎
Speaker: Soleiman Rasouli (Union of Iranian Physics Teachers Societies)				

Content for “Physics and Society” in new IPPOG RDB

Stories in progress:

- PET (Yiota, Beatrice, Despina, Barbora)
- GPS (Lorenzo, Thomas)

Collecting ready stories:

- CERN KT (Priyanka, Marzena)
- GSI (Aristeidis, Yiota)
- Symmetry (Cecilia, Catia)



Next year

Aim to cover subjects which have been proven to be most engaging for high school students!

(Sarah Zoechling's PhD at CERN):

- Diseases treatment with particle accelerators
- Understand big bang
- Detect smuggled weapons
- Study volcanoes and pyramids
- Northern lights
- Radioactivity
- WWW

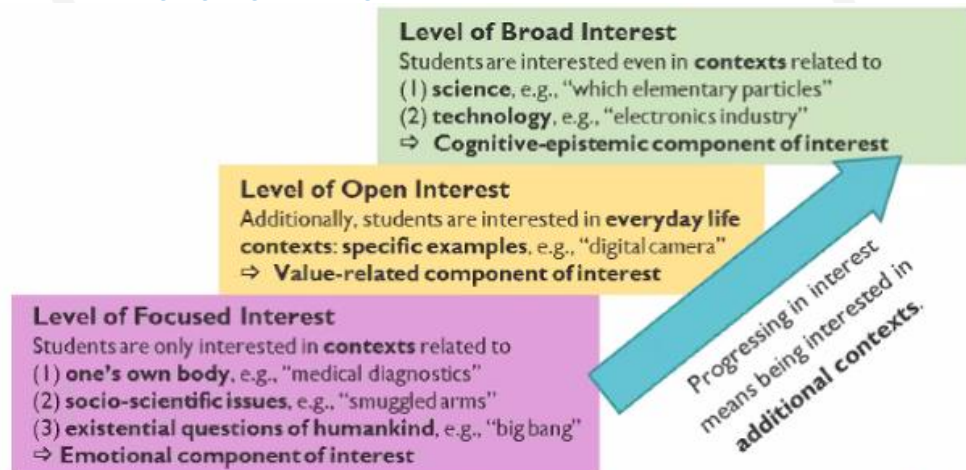


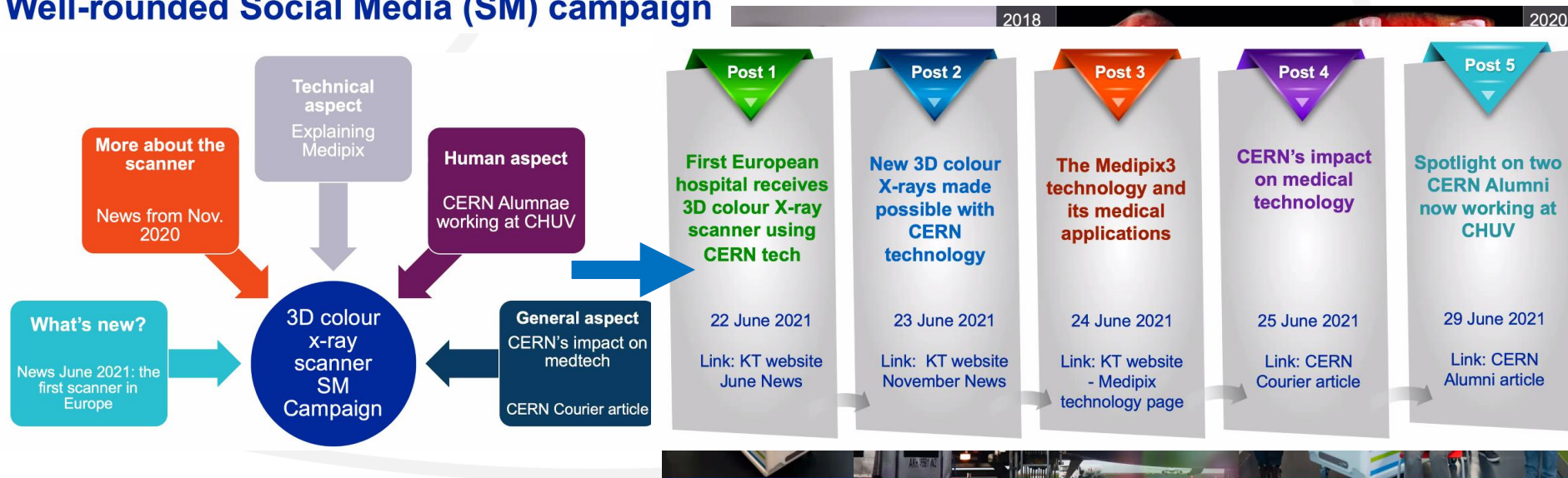
Figure 1: Characterisation of three levels of interest in particle physics that is valid for 75% students and based on the item hierarchy revealed by the Rasch analysis

Lessons from the most successfully communicated KT story in 2021

Priyanka Dasgupta

3D colour X-ray scanner - campaign channels

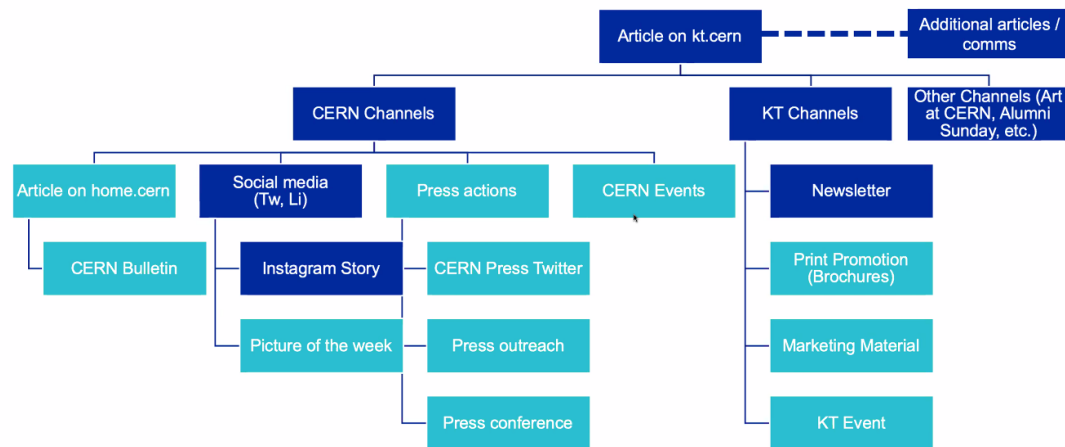
Well-rounded Social Media (SM) campaign



Lessons from the most successfully communicated KT story in 2021

Priyanka Dasgupta

3D colour X-ray scanner - campaign channels



Collaboration between various partners

CERN Social
Media Team

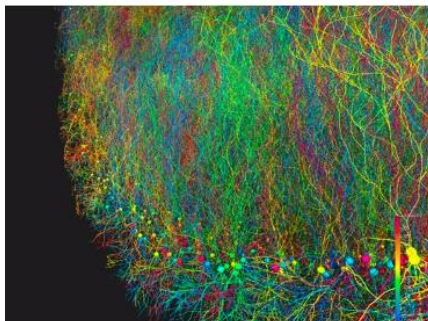


- High engagement (~3%) and impressions (~ 100k)
- Benchmarked to best CERN communications

- Targeted hashtags
- Targeted LinkedIn (e.g. Industry, Teachers)

Other prominent examples of CERN KT success stories 2020-2021

KT Success Stories: Stand against COVID-19



BioDynaMo

Data-analysis and simulation platforms for life sciences, most recently used for simulating the spread of COVID-19.



Personal Protective Equipment

CERN releases face shields and masks developed under the *CERN against COVID-19* programme under its Open Hardware Licence



High-Energy Ventilator

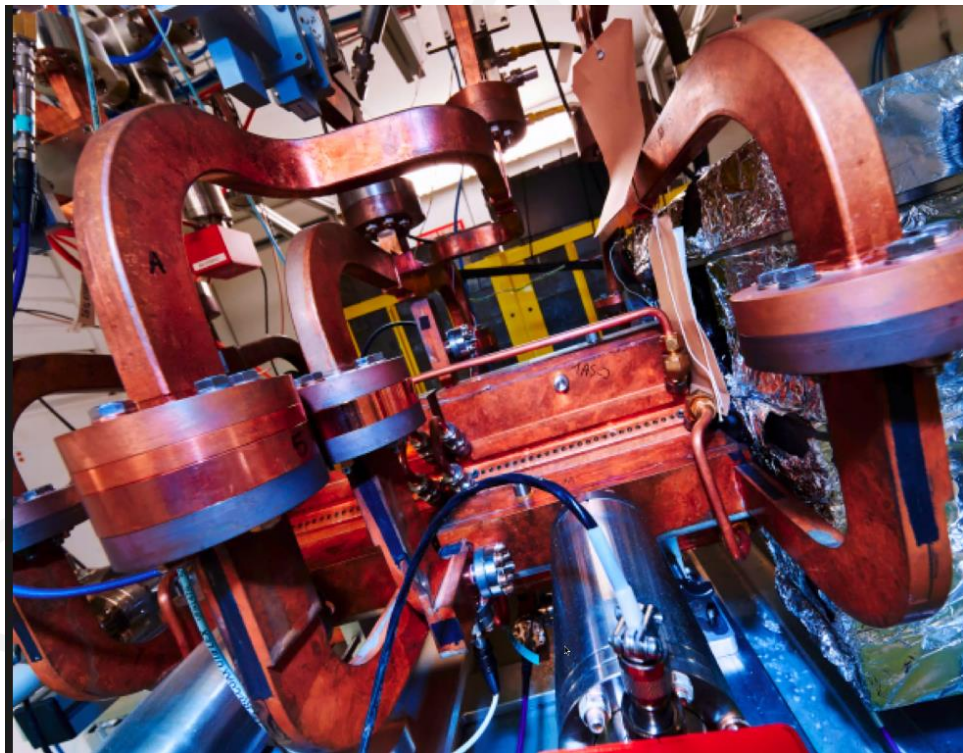
Developed by members of the LHCb collaboration to help combat COVID-19.



CARA

CERN-made software modelling the concentration of viruses in enclosed spaces

Other prominent examples of CERN KT success stories 2020-2021



CERN and the Lausanne University Hospital (CHUV) collaborate on a pioneering new cancer radiotherapy facility that will be based on the CLIC (Compact Linear Collider) accelerator technology.



We are particularly proud of our collaboration with CERN and strongly believe in the advancement of FLASH radiotherapy into a clinical setting.

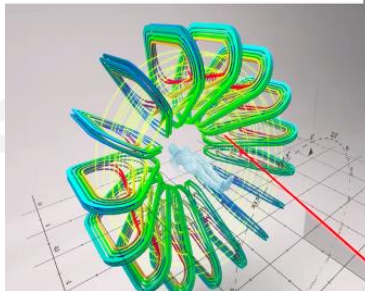
-Philippe Eckert, CHUV Director General

Other prominent examples of CERN KT success stories 2020-2021

KT Success Stories

GaToroid

Using CERN magnet technology in innovate cancer treatment



Sanofi Pasteur

Improving vaccine production with novel machine learning techniques



CERN-MEDICIS

New tools for precision medicine



Terapet SA

Enabling the monitoring of the delivered proton dose inside the patients during cancer treatment: in-vivo, non-invasively, in 3D and real-time

Other prominent examples of CERN KT success stories 2020-2021

MARS Bioimaging

- First 3D colour X-ray based on CERN technology, able to monitor bone healing following a fracture.
- MARS Bioimaging released new 3D colour X-ray images generated with the innovative MARS compact scanner, based on the Medipix3 technology developed at CERN.



BAQ

- CERN signed a license agreement on the RaDoM technology with the spin-off company BAQ: a start-up to tackle Radon gas
- RaDoM (Radon Dose Monitor) an innovative radon-monitoring prototype developed at CERN to drive analysis and mitigation.

OHL 2.0

- The latest version of the CERN Open Hardware Licence was updated in March 2020
- On 15 January 2021, OHL 2.0 got Open Source Initiative (OSI) Certified



Other prominent examples of CERN KT success stories 2020-2021



Image: ENERCON

ENERCON

How competences and technologies from HEP can support innovations in wind energy production

InsightART

Measuring the DNA of your art



Orvium

A CERN spinoff that aims to revolutionise academic paper review and publishing.

BioDynaMo with Statistics Netherlands

The CERN-codeveloped technology in collaboration with Statistics Netherlands will perform large-scale data modelling on socio-economic parameters



Other prominent examples of CERN KT success stories 2020-2021

Aerospace Applications



Lumina

An optical fibre-based dosimetry experiment on board the International Space Station



CELESTA

First full satellite tested at CHARM.

How can IPPOG and CERN KT collaborate?

Where can we find KT stories?

- KT updates (has information about all the stories and developments)
- KT news <https://kt.cern/news>
- KT Newsletter <https://kt.cern/newsletter>
- KT Reports <https://kt.cern/annual-report>
- Social media #CERNKT <https://www.instagram.com/cern/?hl=en>
- “For Society” folder on Instagram was created in October 2020
- KT can promote IPPOG stories
- KT seminars – IPPOG invited to take part

Short-term action plan

- IPPOG will identify the best KT stories which are ready to be published in RDB (Barbora, Katharina)
- CERN KT will give guidance and provide metadata for RDB (Priyanka)



New sensor for SARS-CoV-2 and other viruses based on GSI nanotechnology

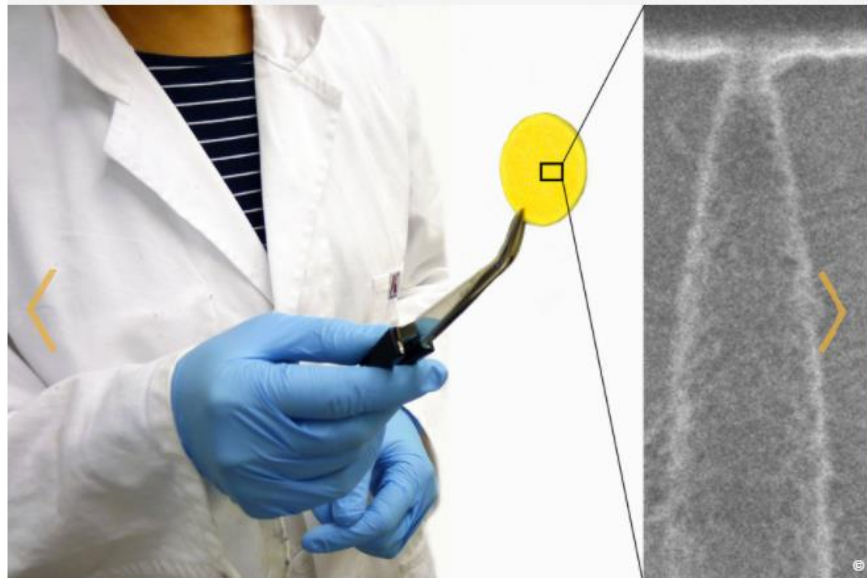
Aristeidis Mamaras for Yiota Foka

Press release: <https://www.gsi.de/en/start/news/details/2021/10/07/neuer-sensor-fuer-sars-cov-2-und-andere-viren-auf-basis-von-gsi-nanotechnologie>

GSI

New sensor for SARS-CoV-2 and other viruses based on GSI nanotechnology

Better and faster virus detection with single-nanopore membranes



- Better and faster virus detection with single nanopore membranes
- An international interdisciplinary team of researchers (at GSI over many years) developed a test method that detects SARS-CoV-2 in saliva
 - without sample pretreatment,
 - with the same sensitivity as qPCR test
 - in only 2 hours
- The sensor can distinguish infectious from non-infectious corona viruses: a crucial innovation!

New sensor for SARS-CoV-2 and other viruses based on GSI nanotechnology

Aristeidis Mamaras for Yiota Foka

- The highly sensitive nanopore sensor specifically detects SARS-CoV-2 viruses and human adenovirus in a variety of specimen including saliva, serum or environmental samples such as wastewater
- The sensor combines two key components: a sensitive nanochannel and highly specific DNA molecules attached to the channel surface.
- The selectivity of the sensor is provided by an in-vitro selection process for DNA fragments, so-called aptamers, which are incorporated into the nanopore.
 - Ongoing collaboration on new projects testing various virus inactivation protocols
 - Great potential beyond the Corona pandemic

Vision: to integrate the functionalized nanopore membrane into a portable device for rapid and efficient virus detection and diagnosis

Discussion - how to reach out impactfully?

- *How to make the information we try to prepare best disseminated?*
- *What would be the best means of communication apart from our IPPOG RDB?*
- *How to get this information to media and teachers, how to help them to use it for students?*

❑ Well-thought social media campaigns (like KT)

- Make sure to reach also to people who are not following our channels already
- Challenge is to go beyond “preaching to converted”

❑ Ideas from physics teacher (Soleiman Rasouli, Iran):

- Cartoons, Animations, Popular series, movies – in research/tech environment
- Popular music – collaborate with celebrities
- Computer games – create them in tech environment

5-15 year

Teenegers