International Particle Physics Outreach Group

WG on Applications for Society

(Report from 7th WG meeting 6 May 2022)

https://indico.cern.ch/event/1155223/

Barbora Bruant Gulejova & Yiota Fokka

Annabelle Grimm, Annika Grandison, Carmen Casteraz, Despina Hatzifotiadou, Fabiola Cacciatore, Katharina Mueller, Priyanka Dasgupta

IPPOG WG OUTREACH OF APPLICATIONS FOR SOCIETY

https://indico.cern.ch/event/1155223/

15:15 → 15:20	**Welcome by conveners**		🕐 5m
	Speakers: Barbora Bruant Gulejova (Universitaet Bern (CH)), Yiota Foka (GSI - Helmholtzzentrum fur Schwerionenforschung GmbH (DE))		
15:20 → 15:30	**CERN KT success stories 2021/2022**		🕐 10m
	Speaker: Priyanka Dasgupta (CERN)		
	📄 CERN KT HL stories...	📄 CERN KT HL stories...	
15:30 → 15:40	**Fusion for energy (F4E) knowledge transfer success stories**		🕐 10m
	Speaker: Carmen Casteras (F4E)		
	📄 F4E_KT_stories_6_...		
15:40 → 15:50	**EMBL knowledge transfer success stories**		🕐 10m
	Speaker: Annabelle Grimm (EMBL-EM)		
15:50 → 16:00	**IPPOG Collection of success stories**		🕐 10m
	New strategy for the first WG's deliverable to be published on the new IPPOG website.		
	Speaker: Barbora Bruant Gulejova (Universitaet Bern (CH))		
	📄 IPPOG_WG_Applica...	📄 IPPOG_WG_Applica...	
16:10 → 16:30	**Discussion: Collection & International Year of Basic Sciences for Sustainable Development**		🕐 20m
	• Call for volunteers to help with collection metadata		
	• International Year of Basic Sciences for Sustainable development - how WG can best showcase the connection between fundamental research and sustainable development goals (SDGs) and how to disseminate the message - Website? Article?		
	Speaker: All WG members		

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NEW WORKING PLAN

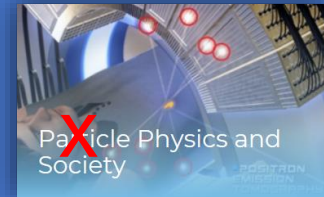1) COLLECT: all existing stories, which are scattered in many places

Short-term plan

EXAMPLE: Story on solar panels technology from ultrahigh vacuum in Symmetry magazine

2) WRITE new ones, which do not exist in short story form yet, perhaps create videos / interviews…

Long-term plan

3) EXPAND scope to beyond CERN / PP - heavy ions, astro-PP and cosmic rays, gravitational waves, thermonuclear fusion etc…

4) DISSEMINATE – through our IPPOG RDB

"XP and Society" in RDB

Particle Physics and Society

5) PUBLISH

PRIORITY 2022: COLLECTION OF SUCCESS STORIES

Collect the content from different places:

- the collection of materials on WG's google doc (see next slide)

- CERN KT, Accelerating news

- Other particle physics and related sciences labs, e.g. GSI

- Other Big Science Labs, e.g. EMBL, ITER / Fusion4Energy, ESA…

The collection of success stories "Benefits of fundamental research for society"

- ❖ First WG's deliverable to be published on the new IPPOG website

- ❖ IPPOG's contribution to UNESCO International Year of Basic
  Sciences to Sustainable Devel~~~~ Publish article on the subject till end 2022

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WG's COLLECTED MATERIALS / STORIES
on impact on society: working document

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 RMI 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 Charpak in 1968 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 Gulejova: 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	Benvenutti 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 UNITAR hosted at CERN, to be at te forefrtont 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 Link 5 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 traveling of future	Lorenzo	
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 Savanah 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-29july2020.pdf		Yiota	
ATTRACT highlights	https://attract-eu.com/news-and-events/		Barbora	

And more…

WG Applications for Society

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WORKING PLAN: COLLECTION OF SUCCESS STORIES

❖ Format / metadata type, Categories:

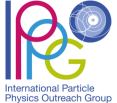Google sheet to collect the coherent metadata

Collection of success stories

Propose new category

Thanks, Katharina for help!

👍

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WORKING PLAN: COLLECTION OF SUCCESS STORIES

❖ Create the dedicated website as part of new IPPOG webpage: 👍

https://test-ippog-d8-clean.web.cern.ch

❖ Also part of IPPOG RDB

CALL FOR VOLUNTEERS

❖ Help to collect and fill the metadata to google sheet

AIM:

❑ Metadata directly filled to the new website

❑ 1-2 people per category

❑ 1-2 people per resource website / institute

THANK YOU

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SUCCESS STORIES FROM CERN
Knowledge transfer highlights from 2021

Priyanka Dasgupta
Knowledge Transfer group, IPT Department
06.05.2022

BETTER PLANET

AEROSPACE

SAFETY

CULTURAL HERITAGE

FROM CERN TECHNOLOGY TO SOCIETY

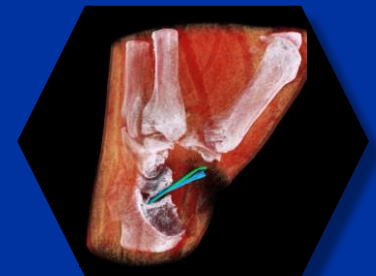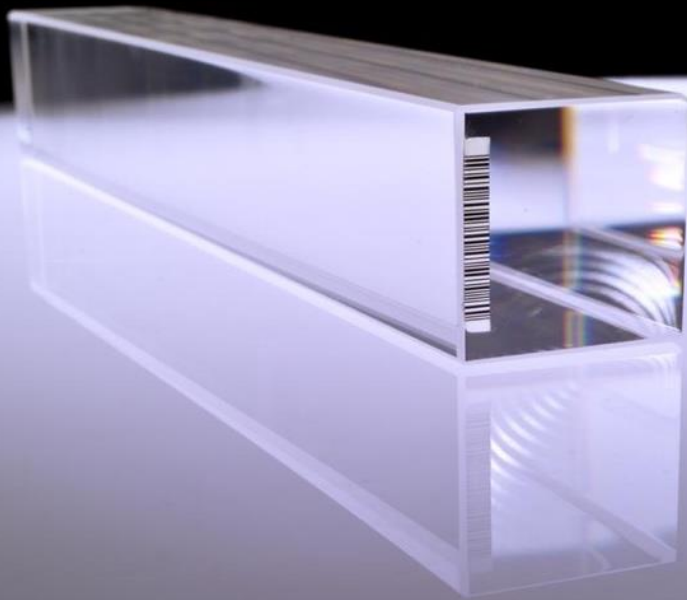INDUSTRY 4.0

MEDICAL & BIOMEDICAL

EMERGING TECHNOLOGIES

MARS Bioimaging

3D colour X-ray scanner using CERN Medipix technology arrived at the Lausanne University Hospital (CHUV) to start clinical trials.

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Development with the University Hospital of Bern for biological imaging and PET for organ-on-a-chip.

Project with TERAPET for non-invasive dose monitoring for proton therapy.

Development of fast heterostructure scintillators for PET.

CHUV has secured funding for the construction of a prototype FLASH VHEE radiotherapy facility based on CLIC technology.

GEMPix-based detectors for hadron therapy and microdosimetry being tested at CNAO.

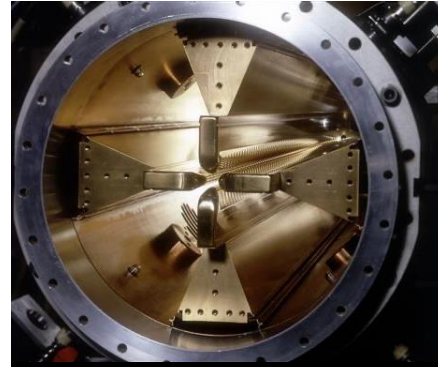CERN's COVID airborne risk assessment tool (CARA), made open source. Collaboration with WHO.

New prototype version of the High Energy Ventilator (HEV) for clinical use in low- and middle-income countries; developed by scientists in the UK and Brazil.
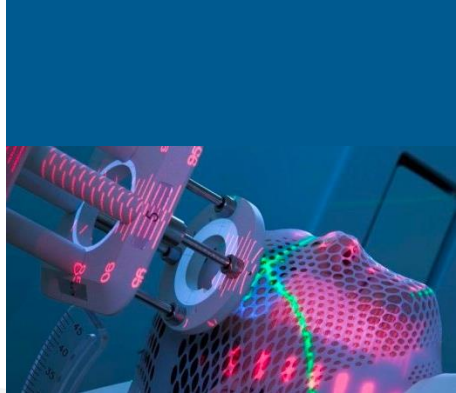
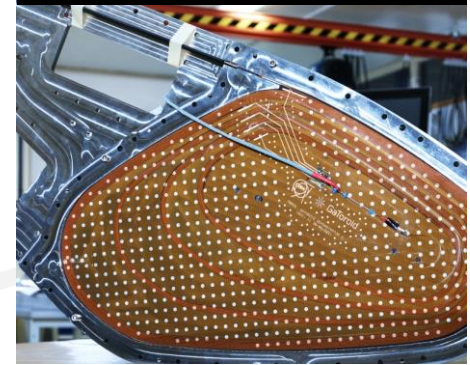CERN's MEDICIS facility produced the first samples for targeted alpha therapy.

CERN and SEEIIST have produced a design report of an innovative facility based on a room-temperature synchrotron.

CERN and CIEMAT completed the first out of four modules of a RFQ for a future carbon-ion therapy linear accelerator.

CERN assembled the first high-temperature superconductor prototype coil for GaToroid.

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Technologies for a Better Planet

CERN spinoff PlanetWatch grew its global network to 32k+ connected sensors worldwide for air quality monitoring.
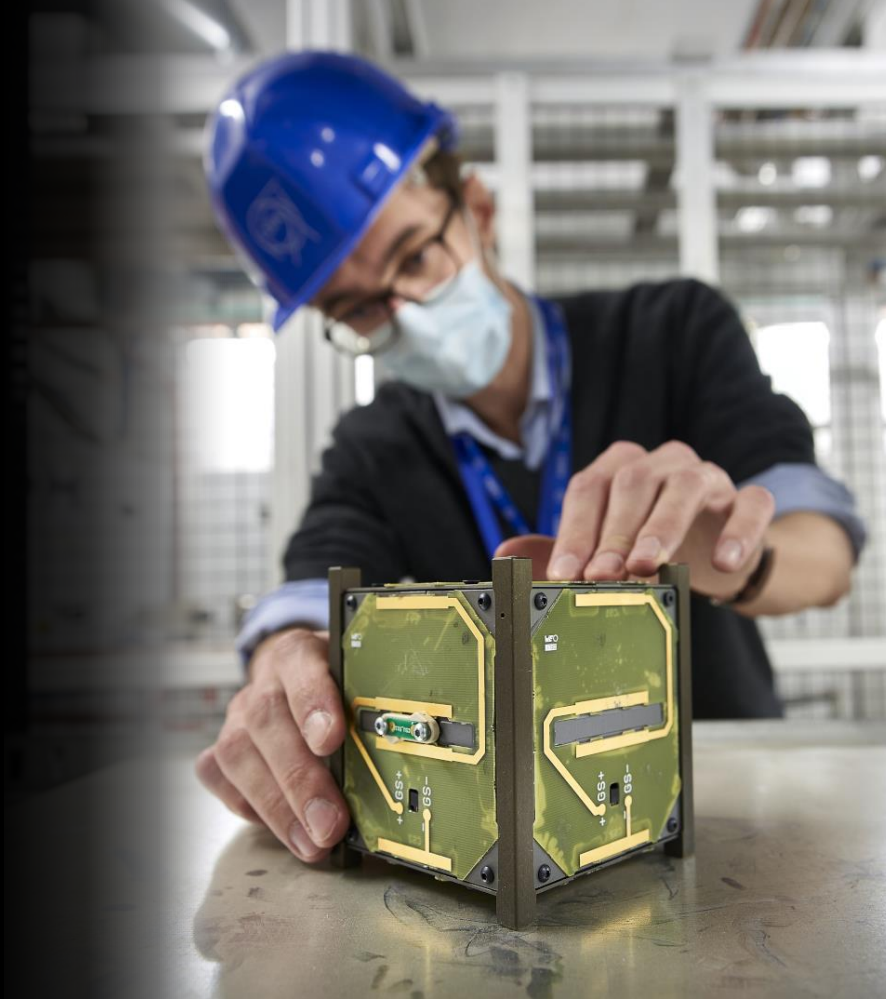

Partnership with Transmutex to help CERN build innovative and safer nuclear energy production systems.

The internal launch of the CERN Innovation Programme on Environmental Applications (CIPEA).

Partnership with ABB Motion to identify potential energy saving opportunities.

Aerospace Applications

Partnership with ESA in the field of quantum technology and artificial intelligence models for earth observation (QUAI4EO).

The ESA-supported CHIMERA project to adapt the CHARM irradiation facility for heavy ion testing.
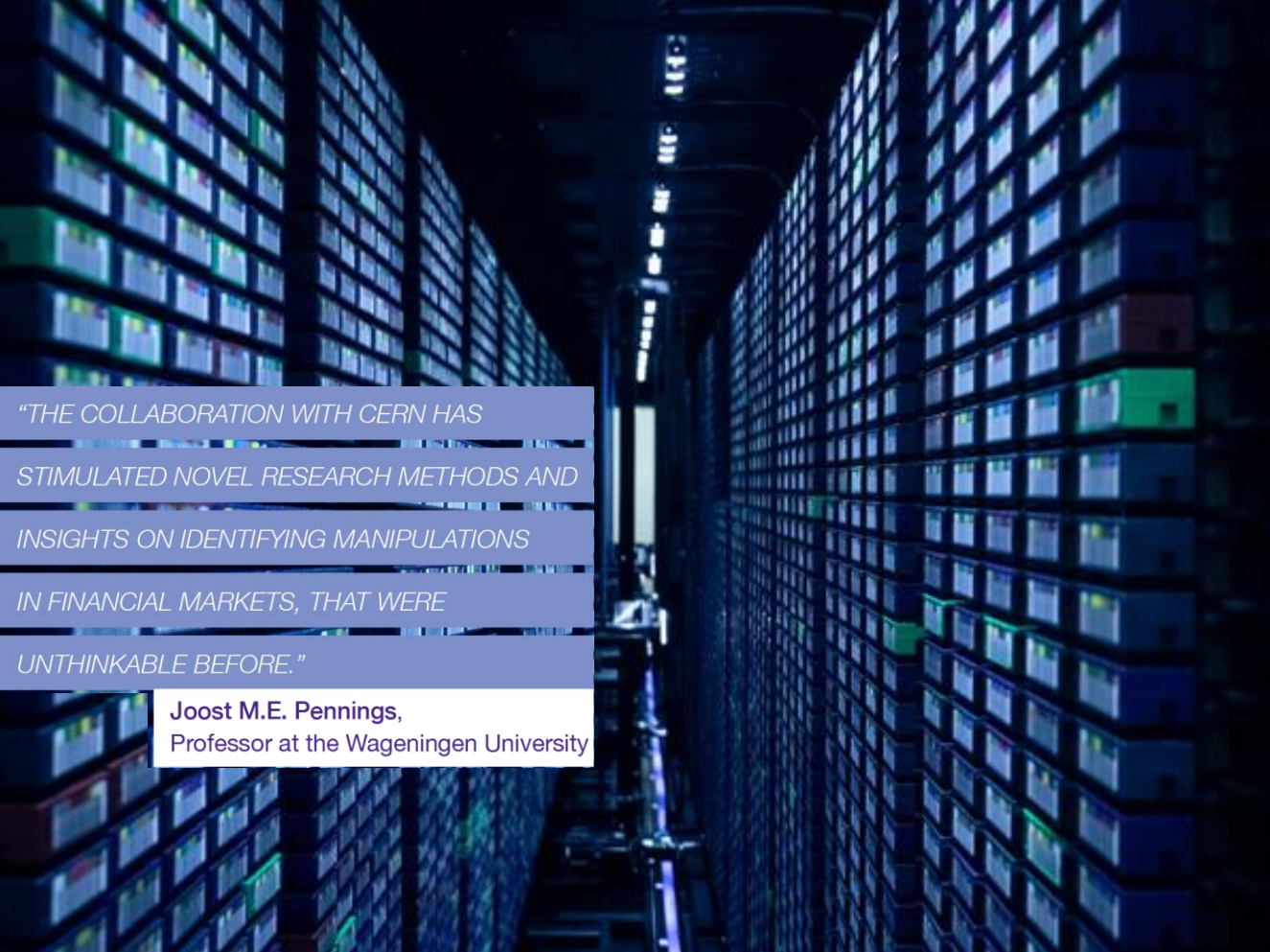
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"AS HUMANS VENTURE INTO SPACE, THE RADIATION LEVELS INCREASE, AND SO DOES THE NEED FOR RELIABLE DOSE MONITORING."

Florence Clément, project manager of the Lumina experiment, CNES/CADMOS

Lumina

Astronaut Thomas Pesquet activated Lumina, a CERN tested optical fibre-based dosimetry experiment, on board the International Space Station.

Financial Markets

"THE COLLABORATION WITH CERN HAS STIMULATED NOVEL RESEARCH METHODS AND INSIGHTS ON IDENTIFYING MANIPULATIONS IN FINANCIAL MARKETS, THAT WERE UNTHINKABLE BEFORE."

Joost M.E. Pennings,
Professor at the Wageningen University

CERN data analysis tool ROOT protects commodity and financial markets from fraud, in partnership with CORMEC and Wageningen University.
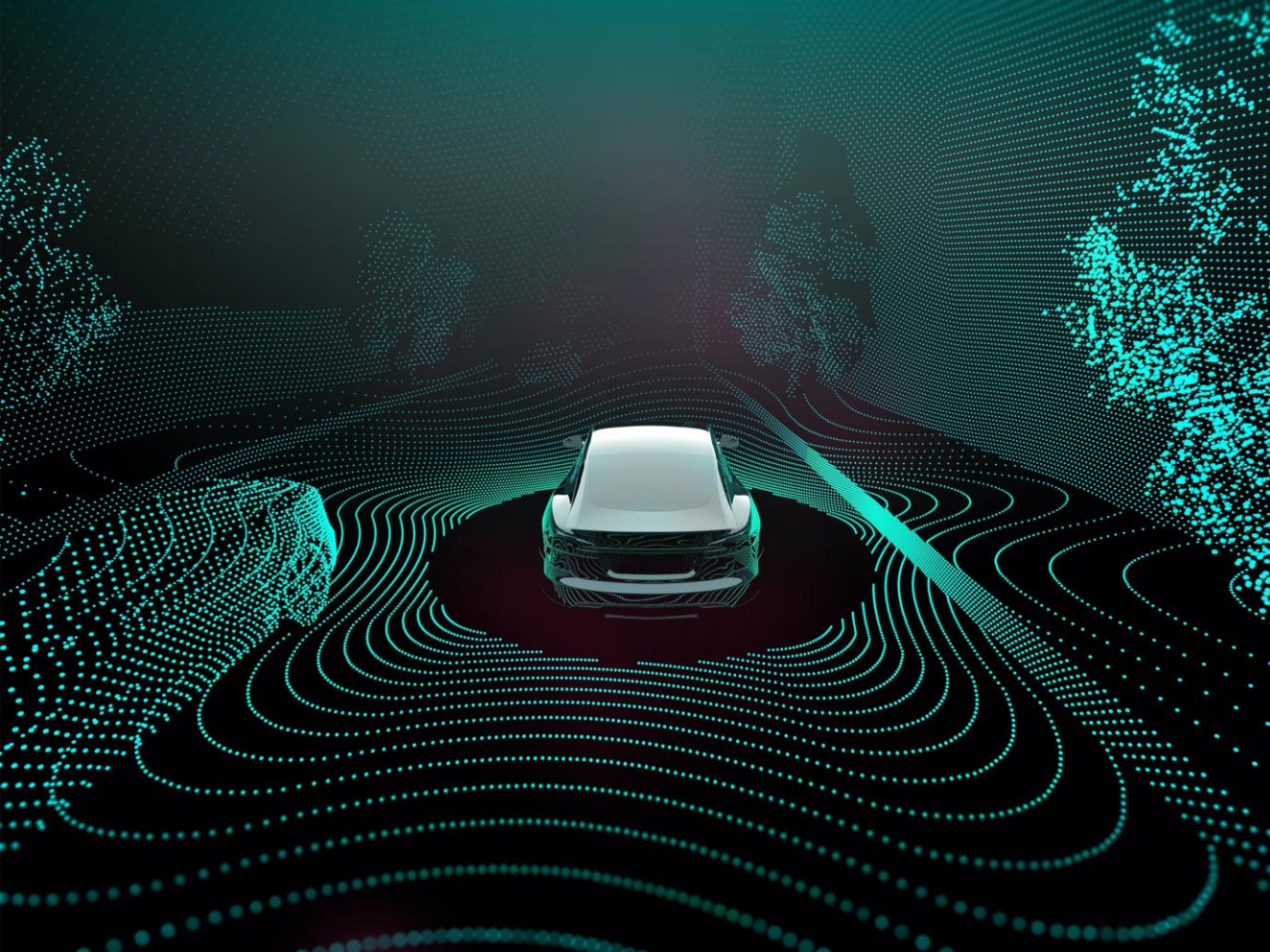
Partnership with Jumptrading to improve speed and scalability of CERN Virtual Machine File System for worldwide software distribution.
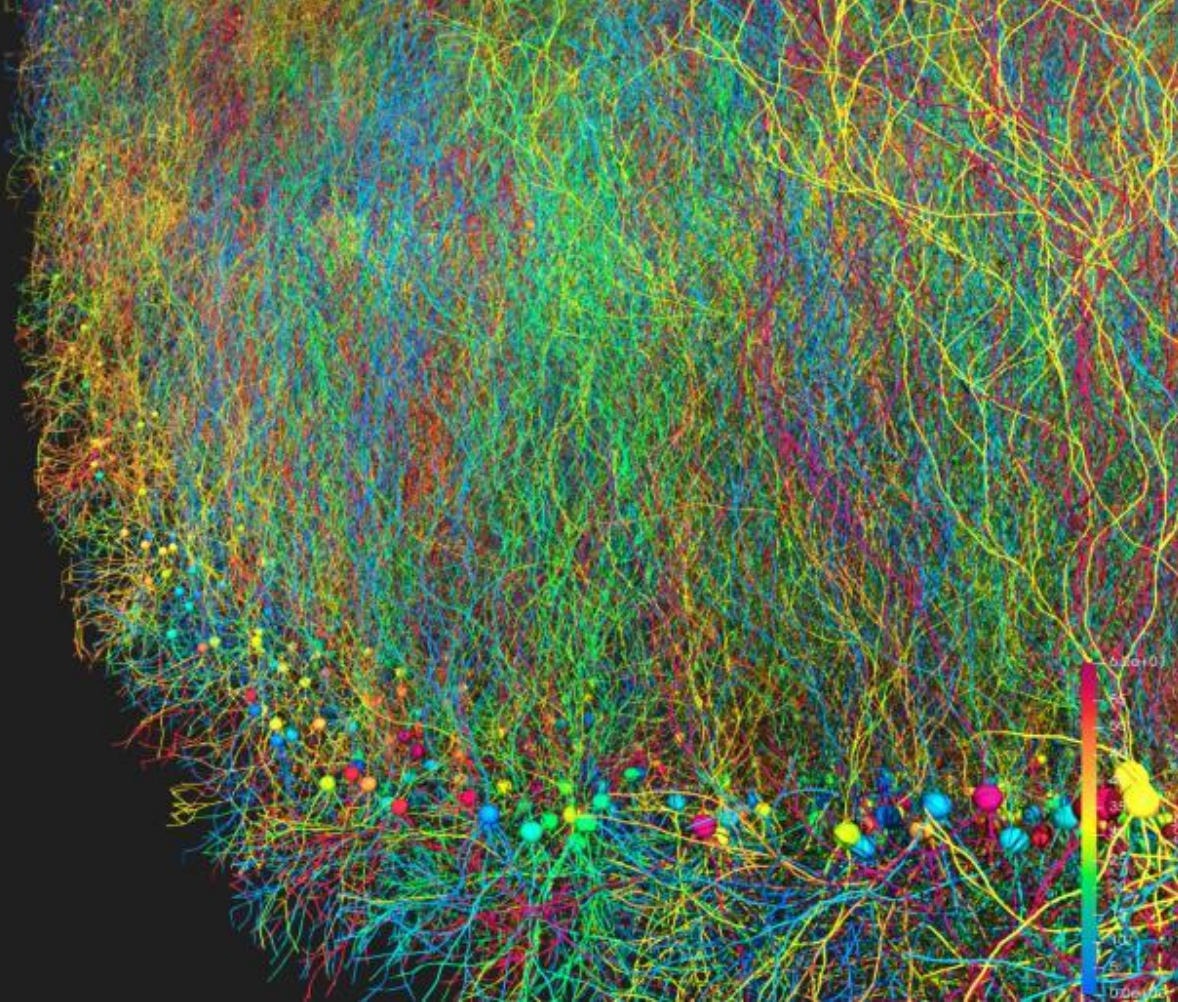
Zenseact collaboration

Zenseact has been exploring how machine learning algorithms used for the LHC can be applied to help avoid collisions in autonomous vehicles.
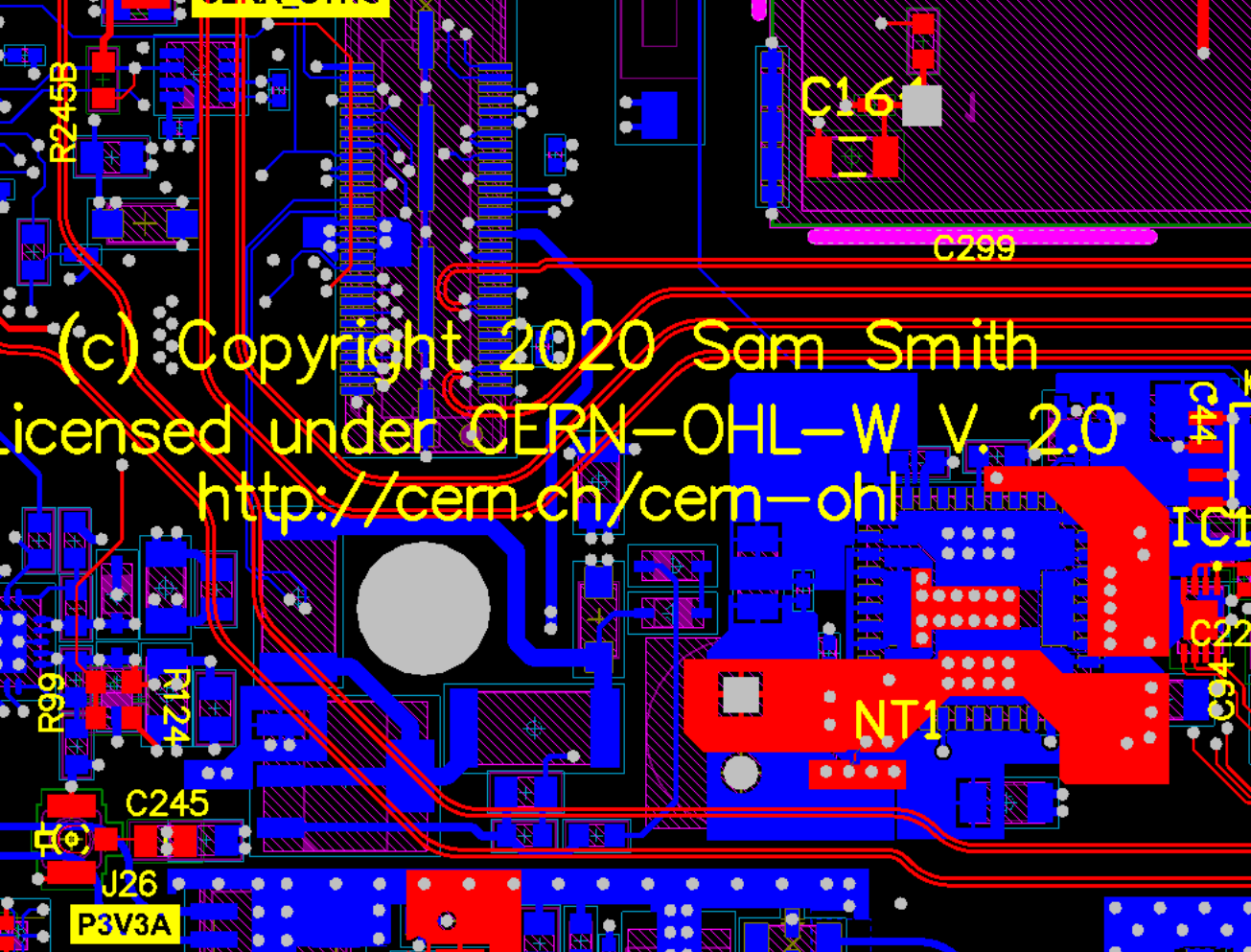
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BioDynaMo

BioDynaMo, an open-source agent-based simulation software, has been used to model the behaviour and spread of the SARS-CoV-2 virus.

CERN partnered with Statistics Netherlands to use BioDynaMo to perform large-scale data modelling on socio-economic parameters.

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CERN OHL 2.0

The CERN Open Hardware Licence 2.0 became Open Source Initiative (OSI) certified, making the selection and application of the licences easier.

SUCCESS STORIES FROM FUSION 4 ENERGY

https://techtransfer.f4e.europa.eu/

FUSION FOR ENERGY | TECHNOLOGY TRANSFER MARKETPLACE

https://techtransfer.f4e.europa.eu/index.php/success-stories/

Success stories

How fusion brings concrete benefits to the European industry

Discover our success stories of spin-offs, increased competitiveness, and innovation

ROSE: Remotely operated service robot from Fusion remote handling innovation technology
– helping to elderly and not autonomous people

Spin-off company CHROMODYNAMICS from diagnostics of fusion plasma impurities
– medical applications, e.g. high-speed Raman imaging spectroscopy, pharmaceutical and semiconductor applications…

From impurity diagnosis of fusion plasma to an in-line control system using multispectral vision

Wouter Vijvers, who worked at the

Dutch Institute for Fundamental Energy Research (DIFFER) and

Fusion remote handling innovation conducts tele-operation technology enhancement for robot companion services

Heemskerk Innovative Technology identified a major need in the

Welding ITER vacuum vessel components help Pro-beam signing contracts with Ariane Group and Solar Orbiter

In charge of the electron beam

welding of five of the nine sectors to the ITER vacuum vessel, pro-

SUCCESS STORIES FROM EMBL

https://embl-em.de

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Molecular Biology Laboratory

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SUCCESS STORIES FROM EMBL

CrystalDirect™: bridging the automation gap between crystallisation and X-ray data collection
November 11, 2016 — General

Structural biology at EMBL: driving technology development
April 19, 2021 — General

Portfolio Company: ALPX
The company ALPX was founded in 2019 in France, out of the EMBL Grenoble. It is located on the European Photon & Neutron Science Campus in close proximity to the …

ALPX – Smart Crystallography
July 8, 2020 — General

Remote access to EMBL structural biology pipelines to support research on SARS-CoV-2
May 6, 2020 — General

- Crystal surgery
- Screening of pharmaceutical molecules for accelerated drugs development
- Crystallography: accelerate structure-based drug discovery
- COVID and SARS research support

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