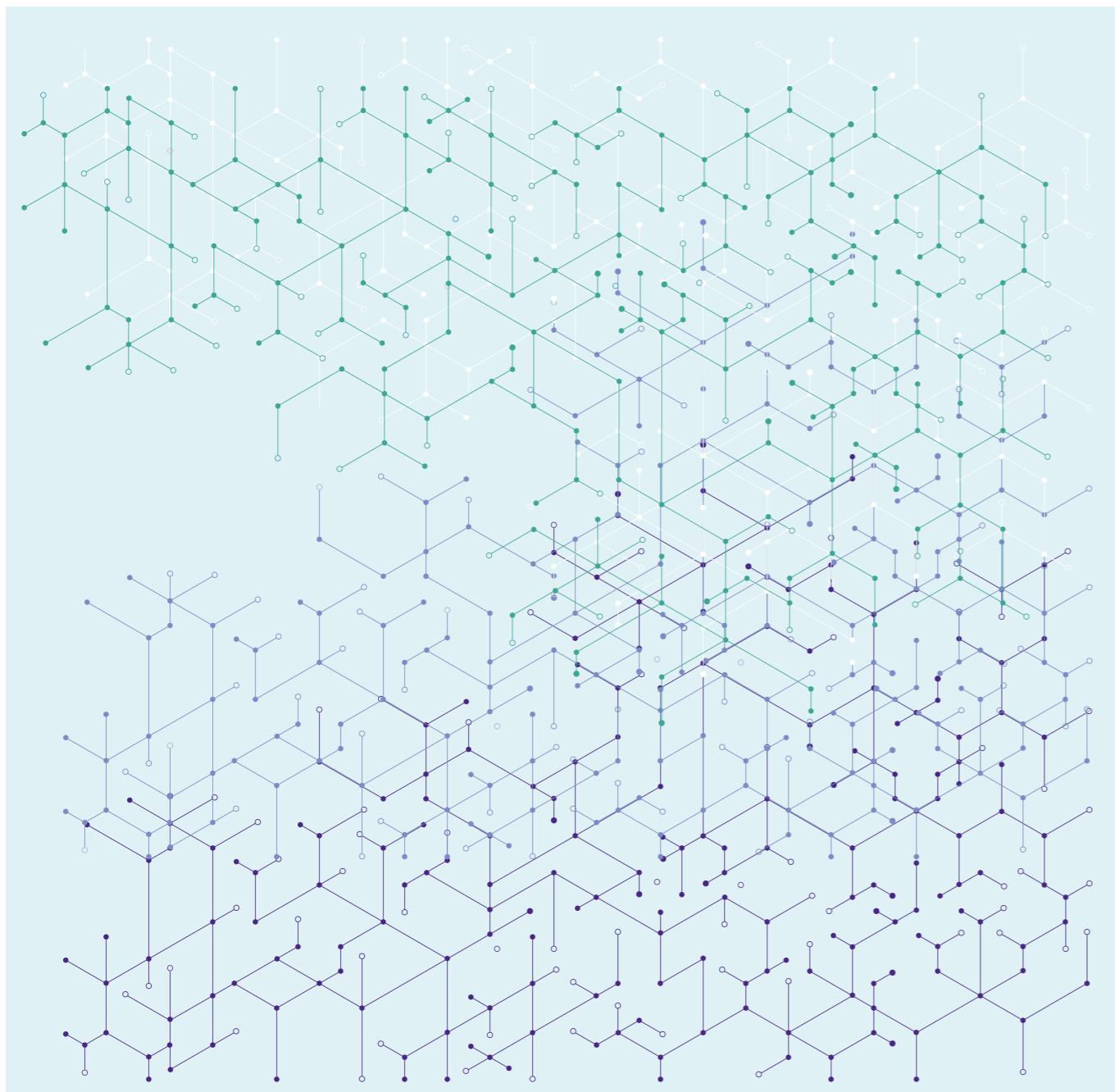


Knowledge Transfer **2022 Highlights**





A word from Raphaël Bello, CERN Director for Finance and Human Resources



At CERN, we are committed to sharing the knowledge, expertise and technology that we have gained through our cutting-edge research. The cooperation with our industrial, innovation and research partners is pivotal in generating a positive societal impact in our Member States, Associate Member States and beyond.

2022 marked the launch of several projects focused on sustainability. CIPEA, CERN's Innovation Programme for Environmental Applications, gave rise to a wealth of ideas inside the Organization, reflecting the CERN community's commitment to tackling environmental challenges. From the proposals presented, eight are now under development. Additionally, we joined forces with Airbus to develop innovative clean energy technologies for the next generation of aircraft.

Within Healthcare, CERN, CHUV and THERYQ signed an agreement for the development of a revolutionary FLASH radiotherapy device using Very High-Energy Electrons, based on CERN's CLIC (Compact Linear Collider) technology, to treat cancers resistant to conventional treatment.

CERN's expertise in advanced instruments has also made it to space, with the CELESTA microsatellite for radiation monitoring being launched on an ESA rocket in July, as well as the Timepix chips being launched on the Artemis 1 NASA mission.

Based on the fundamental principle of open science, CERN's knowledge transfer to industry and society is an integral part of its core mission to advance the frontiers of science and technology for the benefit of humanity. We aim to maximise the dissemination of CERN technologies and expertise to industrial and institutional stakeholders through various channels: open source, proprietary licensing, R&D collaboration and consultancy agreements. The objective is to make our intellectual property widely available and to monitor its distribution through careful patenting, IP policies and management. CERN's knowledge transfer activities are not designed to make significant profits; any resulting revenues are used to cover the costs of technology developments and to provide seed funding for further innovation.

We look forward to continuing this important work in the future, in collaboration with our external partners.

Raphaël Bello

EVENTS

25+



Events organised or attended by the CERN Knowledge Transfer group to innovate with industry



1k

People attended 7 Knowledge Transfer Seminars in person or via webcast

#CERNIMPACT

2022 HIGHLIGHTS AT A GLANCE

OUR DOMAINS

HEALTHCARE

AEROSPACE

QUANTUM

DIGITAL

ENVIRONMENT

INTELLECTUAL PROPERTY AND LICENSING

11

New technologies disclosed internally

42

Knowledge Transfer contracts signed

Contracts by Type



Contracts by Partner



CERN TECHNOLOGY IMPACT FUND

5

UN Sustainable Development Goals (SDGs) contributed to by BioDynaMo, a technology added to the fund in 2022



FUNDING OPPORTUNITIES FOR CERN PERSONNEL

12

Projects funded by the Knowledge Transfer fund and Medical Applications budget



Of which 7 projects have a strong environmental focus thanks to the CERN Innovation Programme on Environmental Applications (CIPEA)

1.47 MCHF

Total funding allocated to projects taking CERN tech into society

50kCHF - 224kCHF

Range of funding received per project

ENTREPRENEURSHIP

80+

Participants at the NTNU Screening Week and the INSEAD deep-tech Key Management Challenge

EUROPEAN UNION CO-FUNDED PROJECTS WITH A STRONG KT COMPONENT

AIDAINNOVA released report on particle detector market trends

ATTRACT2 unveiled selected projects for innovation

I.FAST achieved first 3D printing of RFQ and hosted innovation project addressing accelerators for the environment

#CERNKKT

EXECUTIVE SUMMARY

In 2022, CERN's Knowledge Transfer activities were focused on five key areas with the potential for greatest impact - Environment, Healthcare, Aerospace, Quantum and Digital technologies.

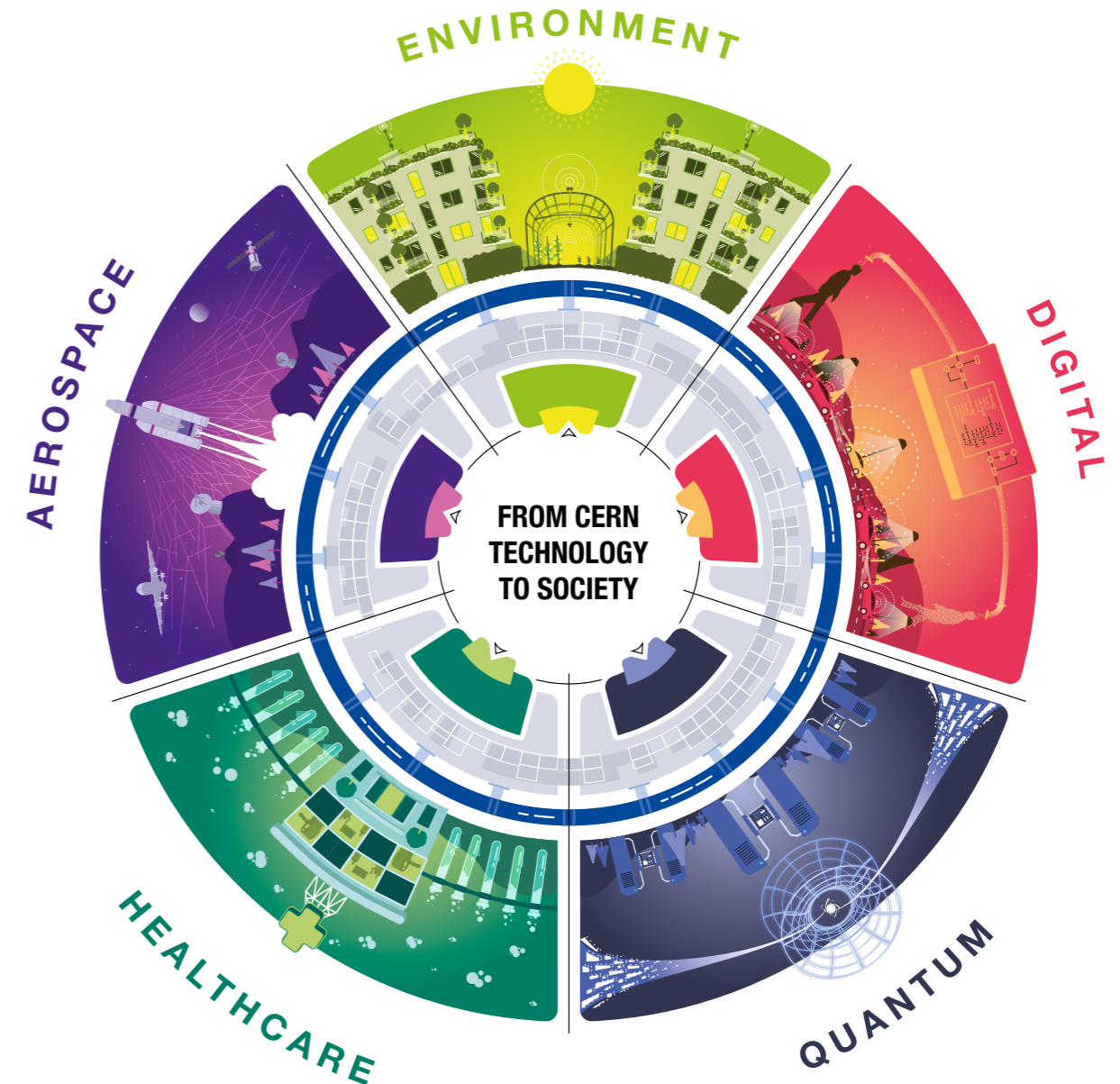
Within the Environment domain, the Organization placed an emphasis on sustainability through the launch of the CERN Innovation Program for Environmental Applications (CIPEA) (p. 10), as well as partnerships to develop future clean transportation and energy efficient cooling and ventilation systems (p. 8-9).

In the Healthcare sector, CERN has leveraged its accelerator technology to achieve pioneering advancements in cancer treatments through an innovative FLASH radiotherapy facility (p. 11) and technologies for novel proton therapy devices (p. 13). Additionally, the Laboratory has played a vital role in fostering innovation in healthcare through the SpecXray workshop, bringing together experts from around the world to advance "colour" X-ray imaging (p. 12).

CERN's expertise was also used in Aerospace, by working in collaboration with organisations including ESA, NASA and the Italian Space Agency for the application of technologies such as radiation monitoring and superconducting magnets (p. 16-17). CERN has started exploring opportunities to collaborate with industry in order to transfer its knowledge to the domain of Quantum technologies, which has the potential to revolutionise our world through various areas including superconducting materials, ultra-high vacuums, precise timing, and more (p. 18-19). In parallel, developments in partnerships concerning data management, storage and analysis have led to innovations in areas within the Digital domain such as autonomous driving (p. 20) and quantitative research (p. 21), where big data is becoming increasingly important.

Underlying all these efforts lies the Organization's dedication to collaborate with partners through R&D partnerships, the licensing of its technologies and by providing technical expertise through consulting services and the organisation of training courses and workshops (p. 22-24).

This report highlights a few examples of how CERN's technology and know-how, paired with the expertise of our partners, can drive innovation and progress for the benefit of society as a whole.



The applications of CERN technology extend beyond high-energy physics to a vast range of areas, with a focus in 2022 on the five priority domains of the Environment, Healthcare, Aerospace, Quantum technologies, and Digital.

ENVIRONMENT

CERN AND AIRBUS TOGETHER FOR FUTURE CLEAN AVIATION

In 2022, CERN and Airbus UpNext (France), a subsidiary of Airbus, kick started a joint project to evaluate how superconductivity can contribute to the decarbonation of future aeroplanes.

CERN has over 40 years of expertise in building superconducting cables, which are at the core of existing and next-generation particle accelerators. Airbus is leading the development of low-emission hydrogen-powered planes. Using superconductivity in the on-board power distribution systems could potentially reduce their weight and increase their efficiency.

Aimed at promoting the adaptation and adoption of CERN's superconducting technologies in airborne electrical distribution systems, a superconducting demonstrator named SCALE

High Temperature Superconducting (HTS) Rare-Earth Barium Copper Oxide (REBCO) power transmission cable used at CERN



(Super-Conductors for Aviation with Low Emissions) will be built at CERN. The project will combine CERN's expertise in superconducting technologies with the innovative aircraft design and manufacturing capabilities of Airbus.

"PARTNERING WITH CERN WILL HELP PUSH THE BOUNDARIES OF RESEARCH, AS WE WORK TO MAKE SUSTAINABLE AVIATION A REALITY."

Ludovic Ybanez, Head of superconducting technologies demonstrator at Airbus UpNext.

ABB AND CERN PARTNER FOR SUSTAINABILITY AND ENERGY EFFICIENCY

CERN and ABB Motion, a global company specialised in digitally enabled motor and drive solutions to support a low-carbon future for industry, infrastructure and transportation, started collaborating to reduce the energy consumption of CERN's cooling and ventilation systems.

The condition monitoring platform, installed in 2022, will collect data insights from CERN infrastructures. These data insights, paired with expert analysis, will allow for the simulation and testing of energy reduction scenarios. Results and best practices from this collaboration will be disseminated publicly and will hopefully inspire similarly large facilities to follow this path.



CERN's cooling and ventilation system equipped with ABB smart sensors

Segment of the cryogenic system that cools the LHC's superconducting magnet



TESTING CRYOGENIC TECHNOLOGIES FOR FUTURE DECARBONISED TRANSPORTATION

Hydrogen is essential to decarbonise transport, but its safe storage remains a challenge, as it must be kept at cryogenic temperatures (20K, below -253 °C). To help address this issue, CERN is supporting the Spanish company Applus+ in developing new testing capabilities for the mechanical characterisation of composite materials used for hydrogen tanks. A cryostat based on a CERN model, and adapted to the company's needs thanks to CERN's experience in cryogenics, will be built by the company at their premises. It will then be used to provide testing services to organisations developing compact liquid hydrogen storage solutions.

CIPEA - CERN INNOVATION PROGRAMME ON ENVIRONMENTAL APPLICATIONS

Renewable energy, clean transportation, pollution control, climate monitoring, nature protection, green science... many technologies developed at CERN can help build a more sustainable planet.

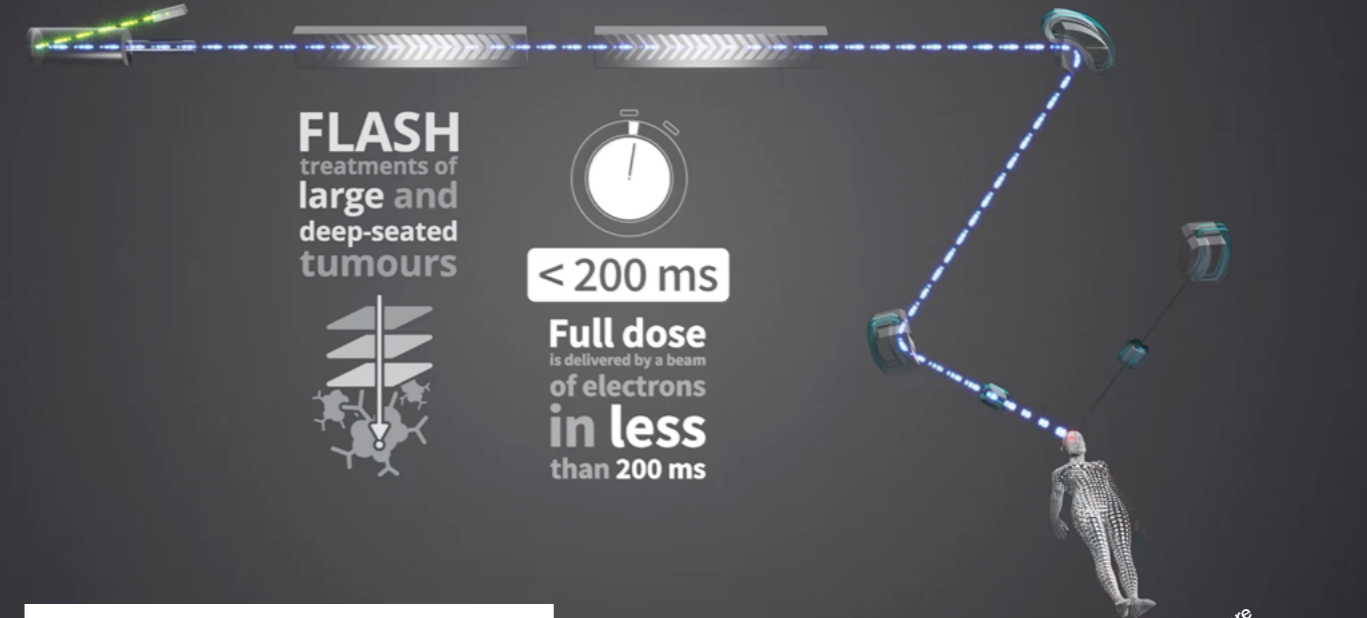
Acknowledging global environmental challenges, CIPEA was launched to invite the CERN community to come up with innovative ideas for environmental applications based on CERN's technologies, know-how and facilities.

The programme started with a formal kick-off event in March, followed by intense brainstorming and the CIPEA Innovation Day in June. The response from the CERN community was enthusiastic and effective. Of all the proposals presented, eight are currently under development - seven of which are supported by the KT fund.



CIPEA Innovation Day brought together experts from all CERN technical departments

HARNESSING CERN'S INNOVATION POTENTIAL FOR THE ENVIRONMENT



HEALTHCARE

CERN, CHUV AND THERYQ JOIN FORCES FOR A WORLD FIRST IN CANCER RADIOTHERAPY

CERN, the Lausanne University Hospital (CHUV) in Switzerland, and THERYQ (ALCEN Group, France) signed an agreement for the world-first development of a revolutionary FLASH radiotherapy device that will use very high energy electron (VHEE) radiation to treat cancers resistant to conventional treatments.

The device will include a compact linear accelerator based on CERN technology, and will use very high-energy electron beams of 100 to 200 MeV, allowing cancers up to a depth of 20 cm to be treated using the FLASH technique. It has the potential to decrease the overall cost of treatment, and its compactness will allow it to be used in a hospital setting. It will be based at CHUV and is expected to be operational within two years, with the first clinical trials planned for 2025.

"...EAGER TO OFFER THE MOST EFFECTIVE TECHNIQUES TO PATIENTS, WE HAVE JOINED FORCES WITH CERN AND A CUTTING-EDGE INDUSTRIAL PARTNER TO SOLVE A MEDICAL, PHYSICAL AND TECHNICAL PROBLEM AND FIND INNOVATIVE SOLUTIONS TO FIGHT CANCER."

Pr. Philippe Eckert,
Former Director General of CHUV.



SIXTH WORKSHOP ON MEDICAL APPLICATIONS OF SPECTROSCOPIC X-RAY DETECTORS (SPECXRAY) HELD AT CERN

CERN plays a vital role in fostering innovation, not only thanks to the work of its researchers but also by creating opportunities for collaboration and exchange through bringing together experts from around the world.

The SpecXray workshop at CERN is one such example. The workshop is dedicated to advancing spectral X-ray imaging in medicine; the technique that allows for “colour” imaging during CT scans, better enabling the identification of different components of body parts.

In September 2022, MARS Bioimaging’s extremity spectral scanner, based on the Medipix3 technology developed at CERN, was approved for clinical use in New Zealand.



MARS Bioimaging’s colour X-ray scanner produces higher contrast bone details compared to traditional X-ray scanners

“I AM CONVINCED THAT INSTITUTIONS LIKE CERN PLAY AN IMPORTANT ROLE FOR INNOVATIONS IN MEDICAL IMAGING. COMMUNITIES LIKE THE MEDIPIX COLLABORATION AND THE SPECXRAY WORKSHOP ARE ESSENTIAL INSTRUMENTS OF OUR SOCIETY, CONNECTING AND AFFIRMING RESEARCHERS IN ACADEMIA AND INDUSTRY...”

Steffen Kappler, founding member of the SpecXray Workshop Scientific Advisory Committee and long-time lead scientist for photon-counting CT at Siemens Healthineers.

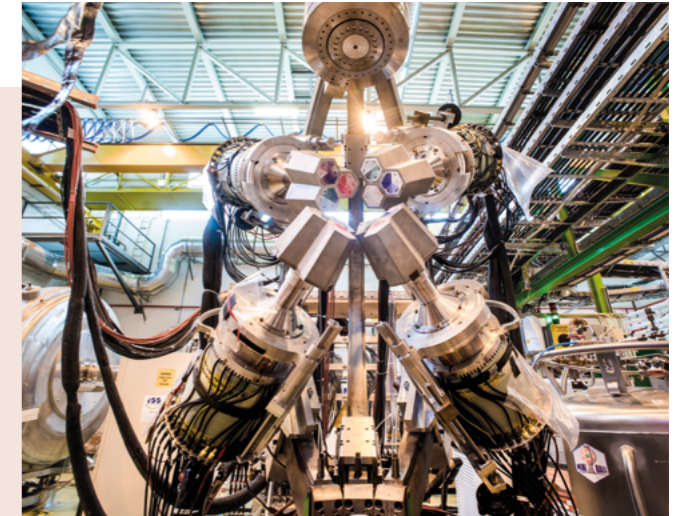
DEVELOPING VENTILATORS FOR CLINICAL USE IN LOW AND MIDDLE INCOME COUNTRIES

In light of the growing COVID-19 pandemic in 2020, a team of CERN physicists first prototyped the High Energy Ventilator (HEV). Following in its footsteps, another new prototype called the High Performance Low Cost Ventilator (HPLV) was developed for manufacture and clinical use in low- and middle-income countries, thanks to funding by UK Research and Innovation (UKRI). In December 2022 CERN signed an HEV/HPLV licence with the Indian company Life Line Biz Pvt. Ltd.

The ISOLDE facility at CERN allows for the production and study of unstable nuclei

FROM UNSTABLE NUCLEI TO MEDICAL DIAGNOSIS

Researchers at CERN are exploring new ways to utilise unstable isotopes, already known in medical diagnostics and therapeutics, through the advancement of innovative nuclear magnetic resonance (NMR) techniques. This year, a partnership was started between CERN and the Mainz University in Germany to develop an extremely high sensitivity and portability NMR technique that allows for higher signals in a smaller device than traditional NMR techniques.



CERN TECHNOLOGIES AT THE GENEVA HEALTH FORUM

At the 2022 Geneva Health Forum, CERN showcased how technologies and innovation behind high-energy physics can contribute to innovations within healthcare. Technologies presented included CAiMIRA, CERN’s Airborne Model for Indoor Risk Assessment; MARCHESE, a portable device to recognise and monitor human beings; OnBoard, a platform to deal with complex data collection, storage and analysis; and CAFEIN, a federated learning platform for collaborative AI training (nominated for the Jet D’Or innovation award). CERN spin-offs were also present; PlanetWatch, a company for community-driven global air quality monitoring, and BAQlab, a company working to create better air quality.

CELEBRATING ACHIEVEMENTS IN HADRON THERAPY

CERN, with its expertise in particle accelerators, has over the past decades helped to advance cancer therapy techniques that rely on particle accelerators. In 2022, a symposium at CERN celebrated the 30-year anniversary of the Italian TERA Foundation, founded by former CERN physicist Ugo Amaldi. The symposium reviewed TERA’s contributions to hadron therapy and also showcased the many fruitful collaborations between TERA and CERN, including the pivotal PIMMS study which provided a basis for the design of the treatment centres CNAO and MedAustron.

Furthermore, the UK based company Advanced Oncotherapy built the first proton therapy linac at the STFC Daresbury site using the highly adaptable Linac Image-Guided Hadron Technology (LIGHT) accelerator developed by its Swiss R&D daughter and CERN spin-off, ADAM. The accelerator is based on CERN RFQ technology, and reached the maximum treatment energy of 230 MeV.

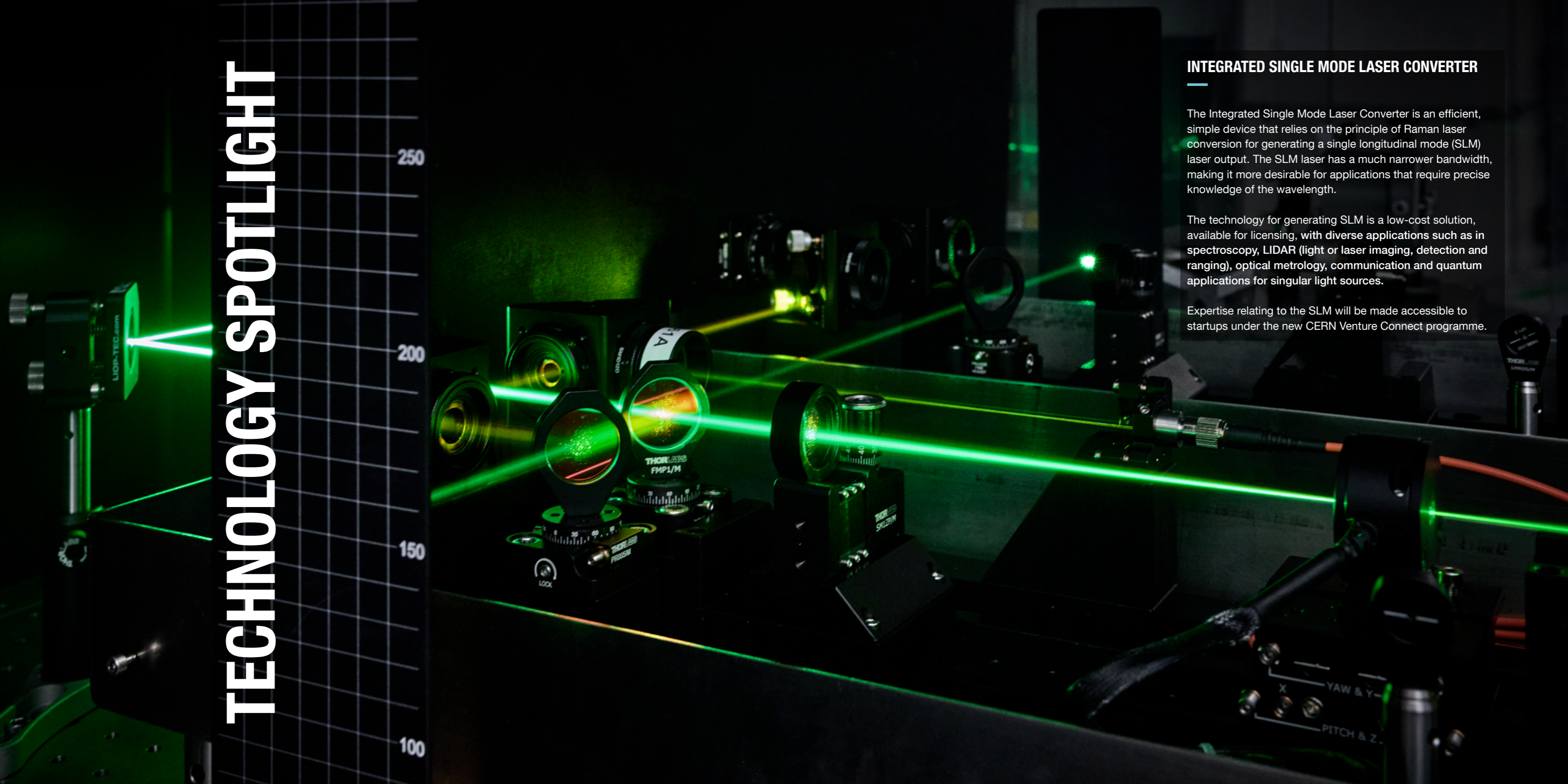
TECHNOLOGY SPOTLIGHT

INTEGRATED SINGLE MODE LASER CONVERTER

The Integrated Single Mode Laser Converter is an efficient, simple device that relies on the principle of Raman laser conversion for generating a single longitudinal mode (SLM) laser output. The SLM laser has a much narrower bandwidth, making it more desirable for applications that require precise knowledge of the wavelength.

The technology for generating SLM is a low-cost solution, available for licensing, with diverse applications such as in spectroscopy, LIDAR (light or laser imaging, detection and ranging), optical metrology, communication and quantum applications for singular light sources.

Expertise relating to the SLM will be made accessible to startups under the new CERN Venture Connect programme.





AEROSPACE

The launch of the Vega C rocket from the Guiana Space Center in French Guiana on 13 July 2022

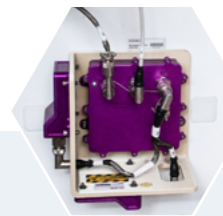
CELESTA – FIRST CERN MICROSATELLITE IN SPACE

In July, CELESTA was launched into space - a result of the collaboration between CERN, the University of Montpellier (France) and the European Space Agency (ESA). Weighing just one kilogram and measuring 10 centimetres on each of its sides, this nanosatellite studies the effects of cosmic radiation on electronics thanks to its payload - the Space RadMon, a miniaturised and low-power version of the LHC's well-proven radiation monitoring device. The satellite was qualified for space by irradiating a twin model in CHARM, a unique CERN facility capable of reproducing, to a large extent, the radiation environment of low Earth orbit. The launch, performed on the VEGA-C rocket's maiden flight, put CELESTA on a circular orbit at about 6000 km. The mission has successfully completed the collection of data that will be analysed soon.

"THE SUCCESS OF THIS SATELLITE IS THE RESULT OF A FRUITFUL PARTNERSHIP BETWEEN CERN AND THE UNIVERSITY OF MONTPELLIER, WHICH INVOLVED MANY STUDENTS FROM BOTH INSTITUTIONS AND RADIATION EFFECT SPECIALISTS FROM CERN."

Prof. Laurent Dusseau, director of the University Space Center of Montpellier and the Van Allen Foundation.

The new Hybrid Electronic Radiation Assessor (HERA), which is composed of three Timepix devices, is now a standard component for NASA space exploration programmes



CERN DETECTORS VENTURE AROUND THE MOON

In order to better protect astronauts, NASA has made the CERN-born Timepix detector chip a standard component for dosimetry and used it for a decade on the International Space Station.

Launched this November as part of NASA's new lunar exploration programme, the Artemis 1 mission also carried three Timepix chips in the Orion spacecraft to determine the impact of space radiation on astronauts for future missions.

Another chip was carried by the BioSentinel satellite, the first biology experiment that will study living cells' response to long term exposure to deep-space radiation.



NASA astronaut Megan McArthur in the International Space Station

TOWARDS SUPERCONDUCTING MAGNET TECHNOLOGIES FOR SPACE APPLICATIONS

High-field superconducting magnets, based on high temperature superconductors (HTS), have several promising applications in space: from very high resolution astroparticle spectrometry, to active radiation shielding for astronauts. This year, the HTS Demonstrator Magnet for Space (HDMS) project came to a successful end, having produced and tested a prototype that fulfils the performance requirements set by the project. Built by CERN, the Italian Space Agency, the University of Trento, TIFPA in Trieste, and INFN Milano, this prototype provides a base design for the development of a future flight model.

NEW SYNERGIES EXPLORED WITH ESA ON RADIATION TESTING AND DATA ANALYSIS

CERN and ESA started two projects this year with the aim of adapting CERN's CHARM irradiation testing facility to enable high penetration tests with heavy ions. Another project was also started to investigate new ways to test commercial-off-the-shelf (COTS) components against radiation. In addition, the ongoing collaboration on quantum and artificial intelligence for Earth observation (QUAI4EO) was extended to include a new topic: time series analysis.

DIGITAL

"DEEP LEARNING HAS STRONGLY RESHAPED
COMPUTER VISION IN THE LAST DECADE... BUT THE
RESULTS OF OUR RESEARCH WITH CERN SHOW THAT
THERE'S STILL ROOM FOR IMPROVEMENT WHEN IT
COMES TO AUTONOMOUS VEHICLES."

Christoffer Petersson, research lead at Zenseact.

APPLYING MACHINE LEARNING FOR FAST DECISION-MAKING IN SELF-DRIVING CARS

The field of autonomous driving has held much intrigue and expectation from researchers and car enthusiasts alike. Even the smallest development in the area can go miles towards making efficient and safe cars that could drastically reduce accidents on the road.

CERN and Zenseact, a company based in Sweden and owned primarily by Volvo Cars, have generated new insights on hardware-optimised machine learning models to develop autonomous-driving technologies that can greatly improve the decision making process of the car, thus helping to build systems for safer cars.

In 2022, the collaboration published their findings in *Machine Learning: Science and Technology*, showcasing how CERN's expertise in machine-learning, combined with specialised hardware, software tools and Zenseact's domain knowledge, can influence the future of autonomous driving.

Learn more



IMPROVING SCALABILITY OF SOFTWARE SYSTEMS

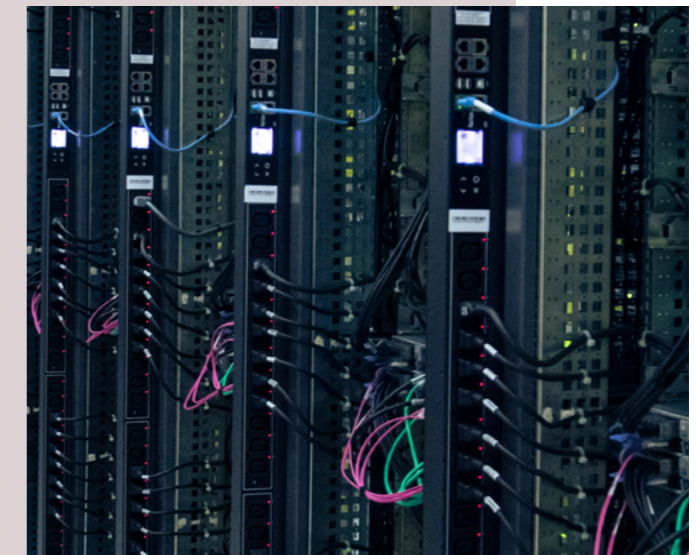
CERN's computing environment for data analysis relies on a scalable and low-maintenance software distribution service known as CERN Virtual Machine File System (CERNVM-FS).

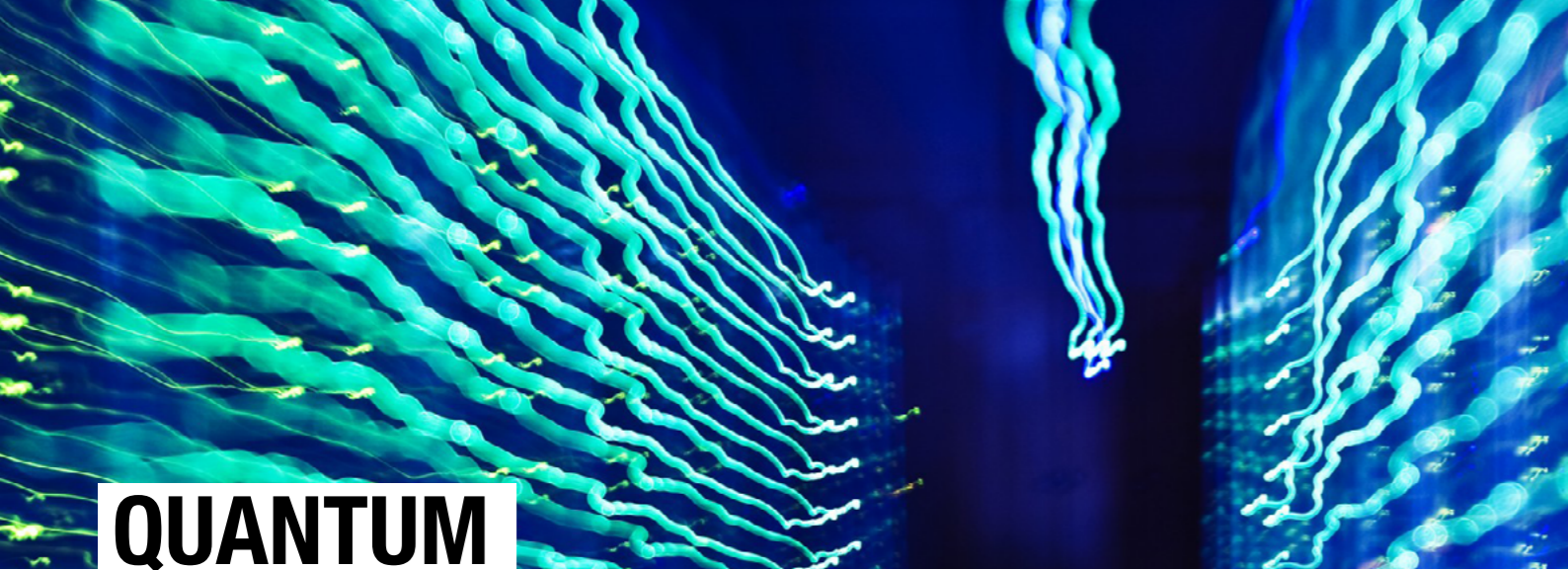
Jump Trading, a leading international quantitative research company, uses this open source software for small file distribution and accessing market data archives. In 2022, CERN and Jump Trading together began investigating how the speed and scalability of the CERNVM-FS software can be improved, benefitting the wider open source community using the software.

UPGRADING ACCELERATOR FACILITIES BEYOND CERN WITH CUSTOMISED SOLUTIONS

CERN-specific power-converter designs and digital controls used for its facilities are well suited to satisfy the demanding needs of other particle accelerators such as synchrotrons or light sources.

CERN signed an agreement with NEUREUS, a Spanish company, for the licensing of the SIRIUS power converter family technology and FGC digital controls. This will allow the company to expand its portfolio and strengthen its market position, for example in the field of synchrotron light facilities.





QUANTUM

ACCELERATING THE SECOND QUANTUM REVOLUTION WITH CERN TECHNOLOGY

Quantum technologies are set to revolutionise our world by harnessing the seemingly mysterious laws of physics at the smallest scale to advance real-world domains such as computing, communications, sensing and imaging.

Many of the extreme requirements faced by quantum technologies are shared with high energy physics, such as ultra-high vacuums, precise timing, the need for superconducting materials, and more.

For this reason, Quantum has been introduced as a new focus area for CERN's Knowledge Transfer group, focussing on how CERN's wealth of expertise and technologies can directly address challenges in the quantum industry.

The initiative lies under the umbrella of the CERN Quantum Technology Initiative (CERN QTI), CERN's R&D, academic and knowledge-sharing initiative for quantum.

In 2022, two major events took place: the CERN UK Quantum Technology Roadshow, arranged to foster collaborations with industry in the UK, as well as the Quantum Technologies for High-Energy Physics (QT4HEP) conference hosted at CERN, where there were sessions dedicated entirely to industry-academia collaborations within quantum.

"... IN ADDITION TO FANTASTIC POSSIBILITIES FOR QUANTUM TECHNOLOGIES TO PROVIDE NEW ROUTES IN THE INVESTIGATION OF FUNDAMENTAL PHYSICS, CERN TECH COULD PROVIDE IMMEDIATE AND GAME-CHANGING CAPABILITIES TO THE DEVELOPMENT OF QUANTUM DEVICES."

Professor Kai Bongs, Principle Investigator at the UK Quantum Technology Hub in Sensors and Timing.

ENTREPRENEURSHIP

LAUNCHING A PLATFORM TO SUPPORT STARTUPS



By providing expert support and a network of investors, incubators and mentors, CERN wants to help visionary startup founders address an unmet need in the market or solve an innovation challenge.

The new CERN Venture Connect (CVC) programme was set up in 2022 to support startups interested in using CERN technologies.

CVC will provide a platform to connect CERN with deep-tech founders, investors, incubators and other key players in CERN's Member States and Associate Member States.

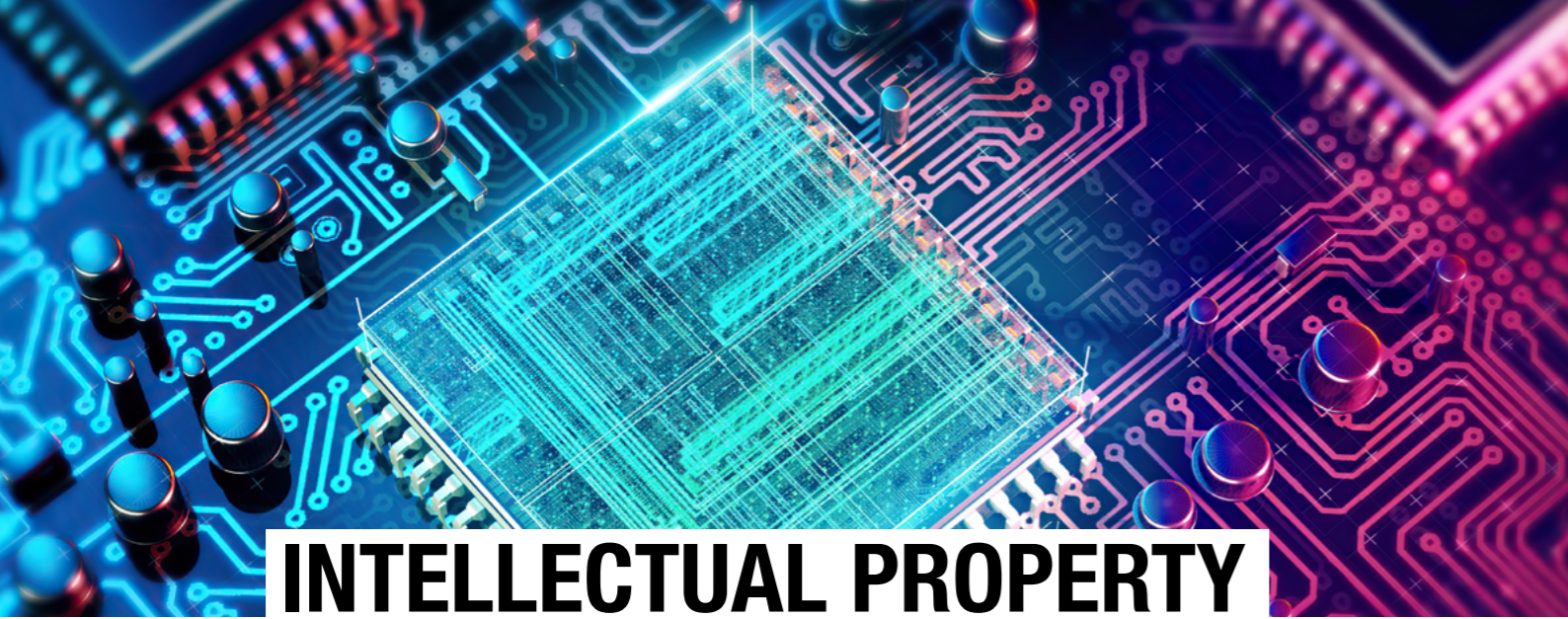
A range of CERN technologies have been selected and will be made accessible to startups participating in the program, ranging from lasers and cooling technologies, to data management and precision timing software.

TRAINING COURSES FOR DEEP-TECH ENTREPRENEURS

In 2022, CERN hosted Executive MBA candidates from INSEAD, one of the world's leading business schools, for the second edition of the deep-tech Key Management Challenge (KMC). 2022 also marked the fifteenth edition of the CERN-NTNU Screening Week, where students from the Norwegian University of Science and Technology (NTNU)'s School of Entrepreneurship spent one week at CERN exploring the potential commercial application of CERN technologies.



The CERN-NTNU Screening Week was held at IdeaSquare - the Innovation Space at CERN



INTELLECTUAL PROPERTY

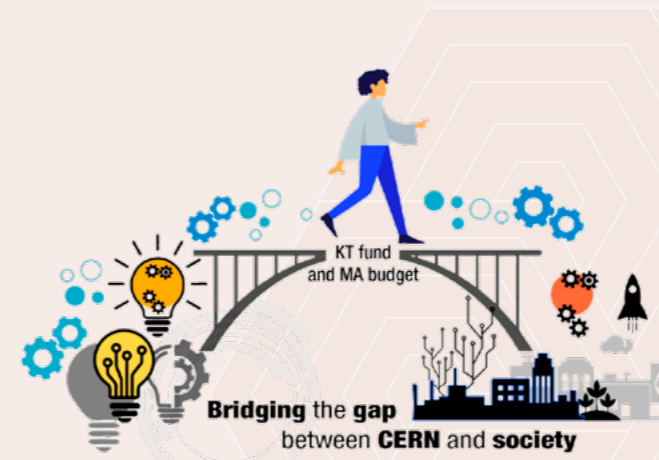
Intellectual property lies at the core of successfully transferring CERN's unique know-how and technologies to society. CERN's technical expertise and most innovative technologies are available for scientific and commercial purposes through a variety of opportunities, ranging from licensing, R&D collaborations, service & consultancy, and the use of CERN technology in startups. CERN's policy is to disseminate its technologies as widely as possible to industrial and institutional partners, in particular those in Member and Associate Member States, for the benefit of society.

CERN FOR OPEN SCIENCE

In September 2022, CERN adopted a new policy supporting the use of open science practices at the Organization. The policy enshrines principles aimed at the advancement of science and wide dissemination of knowledge by making CERN research more open, global, collaborative and responsive to societal changes.

One of the key parts of this policy is the implementation of open source licensing for software and hardware, including through the CERN Open Hardware Licence 2.0: the family of licences that governs the use, copying, modification and distribution of hardware designs.

BRIDGING THE GAP






KT FUND AND MA BUDGET

Funding mechanisms like the CERN Knowledge Transfer (KT) fund help support CERN experts take their research from the lab to wider applications in society. On top of this, the CERN Medical Applications (MA) budget focuses on nurturing technologies with the potential for applications in medical or biomedical fields. In 2022, the KT fund and MA budget allocated 1.47 MCHF to support 12 projects, seven of which had a strong environmental focus thanks to the CERN Innovation Programme on Environmental Applications (CIPEA).

HELPING SOCIETY VIA THE CERN TECHNOLOGY IMPACT FUND

The CERN Technology Impact Fund is an initiative created with help from the CERN & Society Foundation. Its aim is to support projects that help bridge the gap between technologies for research at CERN and their potential applications to address societal challenges, with a particular focus on the 17 UN Sustainable Development Goals (SDGs). Currently, the Fund is inviting donations for BioDynaMo, a multidisciplinary simulation framework accepted to the fund in 2022. Donations will go towards creating an impact in three areas:

-  Improving cancer treatment therapies with GSI Helmholtz Center in Germany;
-  Simulating dynamics of mosquito populations and the vector-borne disease dengue to support mitigation and control strategies with the Institute of Global Health, University of Geneva;
-  Large-scale modelling on socio-economic parameters to help policy makers alleviate socio-economic inequalities with Statistics Netherlands.

INVITING CONTRIBUTIONS



EU-FUNDED PROJECTS

WITH A STRONG KNOWLEDGE TRANSFER COMPONENT

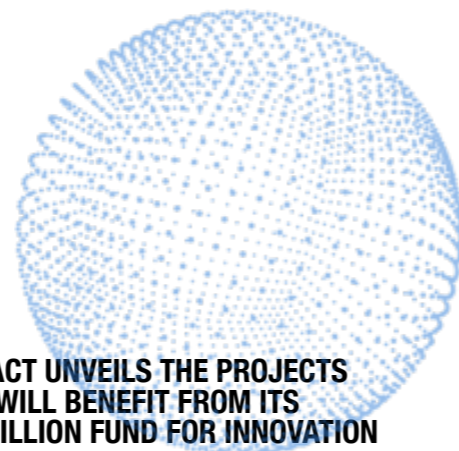
CERN actively participates in and/or coordinates projects co-financed by the European Union (EU) under its research and innovation programmes, notably Horizon 2020 and Horizon Europe. Among the 60+ EU projects running at CERN in 2022, 13 have a strong knowledge-transfer component. CERN coordinates six of the main initiatives; AIDAInnova, ATTRACT2, ATTRACT1B, I.FAST, PRISMAP, RADNEXT. The total EU funding for all six projects amounts to circa 70 MEUR and is distributed among the participating institutes and companies. These projects develop and promote the use of accelerator and detector technologies and test facilities in Europe for various industrial and societal applications.

INNOVATION TRENDS CALL FOR EUROPEAN TECHNOLOGICAL EXCELLENCE IN PARTICLE DETECTORS

With the aim of maintaining European leadership in the field of particle detectors, AIDAInnova published a report assessing the innovation-market trends of particle detectors. A combination of market research, patent landscaping and market survey, the document draws attention to the global state of R&D and market growth, highlighting the growth stalemate of Europe and the United States in comparison to China, and the need to build closer links between academia and industry to ensure European strategic positioning in semi-conductors.

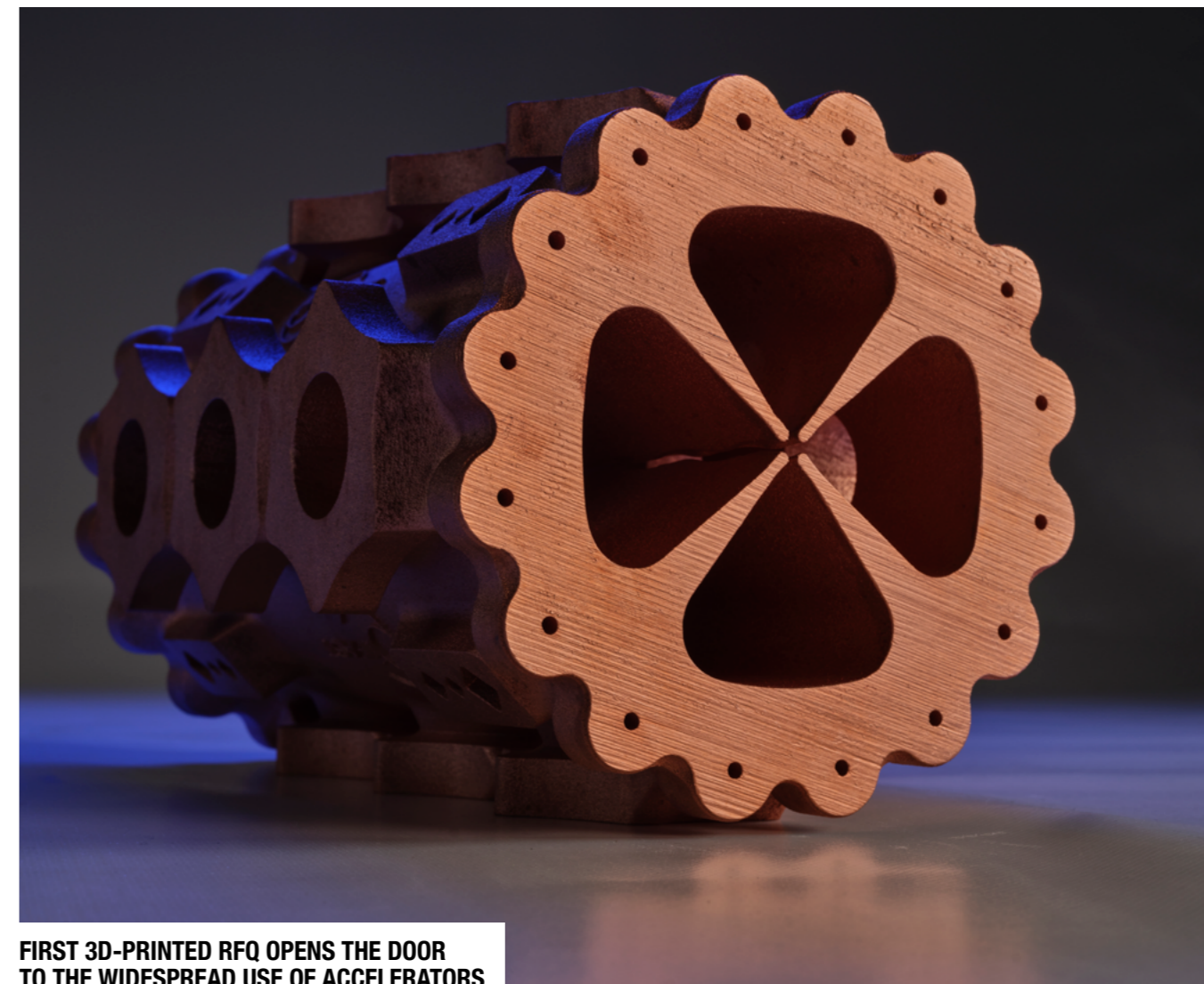
BRINGING STUDENTS AND EXPERTS TOGETHER TO IDEATE ENVIRONMENTAL APPLICATIONS FOR ACCELERATORS

How can accelerators address environmental issues? The I.FAST Challenge-Based Innovation project gathered students from all over Europe to find innovative answers to this question. The students, from varying backgrounds, worked in multidisciplinary teams to tackle the challenge, presenting their ideas to experts in fields related to the challenge on the last day.



ATTRACT UNVEILS THE PROJECTS THAT WILL BENEFIT FROM ITS €28 MILLION FUND FOR INNOVATION

The ATTRACT project presented the 18 Research & Development & Innovation projects that will receive funding to move to a pre-market product. Amongst them is AHEAD, which will build on developments at CERN proposing a new way to manufacture smart pipes for the next generation of cooling systems.



FIRST 3D-PRINTED RFQ OPENS THE DOOR TO THE WIDESPREAD USE OF ACCELERATORS

Particle accelerators play a crucial role in healthcare and industry, and hold the potential for ambitious environment and energy applications. However, their size and manufacturing cost are often obstacles to their widespread societal use. This picture shows the first 3D printing of a radio-frequency quadrupole, a critical accelerator component, which was made

possible by the I.FAST project and Trumpf (Germany). Used at a wider scale, this technique can pave the way towards more affordable and versatile particle accelerators. This Horizon-2020 project aims to develop and enhance leadership in particle accelerators in Europe.

CREDITS

CERN
Knowledge Transfer group
Find out more at kt.cern

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- Everyone who has contributed to the content and production of this report.

Scan the QR code to access the digital version of the report, which includes links to further information.

