CERN Bulletin

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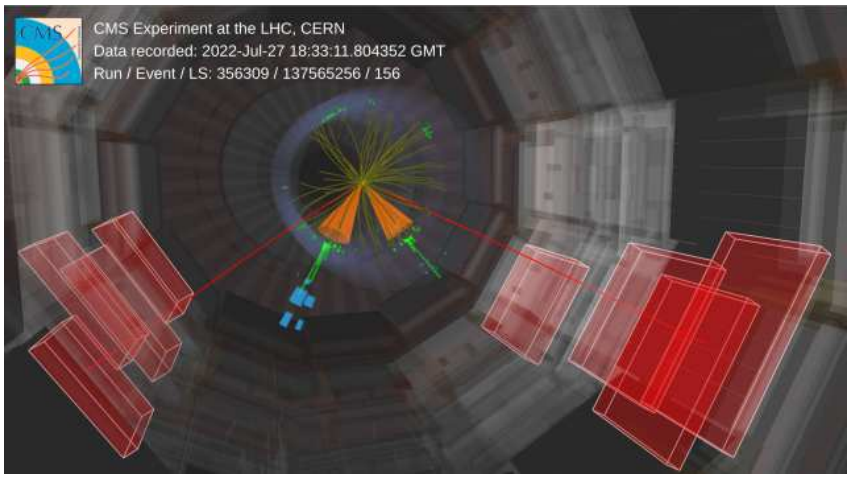
http://home.cern/cern-people

First Run 3 physics result by CMS

CMS measured the top-quark pair production cross section



Run 3 event display by CMS showing the top-quark pair decay (Image: CERN)

On 5 July, the LHC roared to life for its third run after three years of continual improvements to the machine as well as to the experiments' detectors and analysis tools, and immediately reached a record energy of 13.6 TeV. Just three weeks later, the CMS collaboration was ready for its physics data-taking period.

The CMS collaboration recently presented its first Run 3 physics results of the production rate of pairs of the heaviest elementary particle, the top quark. In just one week, from 28 July to 3 August, the CMS collaboration collected data equivalent to almost 12% of the data set that had been required for the Higgs boson discovery in 2012.

Before Run 3 began, it was hoped – and has now been confirmed — that it would be possible to gather such a vast amount of data in a very short time. It took physicists two years to collect the data used to announce the Higgs boson discovery in 2012. But now, thanks to developments in data acquisition and selection systems and to the unprecedented speed of the analyses, the Run 3 data can now be analysed in almost real time.

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Due to the high number of top-quark pairs created at the LHC, physics analysis can start with even a small amount of data. The production rate of this heavy system of particles has been enhanced by about 10% thanks to the collision energy increase from 13 TeV in Run 2 to 13.6 TeV in Run 3. The CMS results, which agree with the Standard Model prediction, are important because precise measurements of top-quark properties provide, among other things, crucial input for various searches for new phenomena in Run 3. Because of its high mass, the top quark decays immediately to a b quark and a W boson, which is also an unstable particle. The decay products leave traces as they pass through the detector, making it possible to observe them and to test the detector performance.

Precision measurements of the Standard Model are an essential part of the Run 3 programme, as any significant deviation could hint at new physics. The measurement of top-quark pair production rate is only the first step into the unexplored territory of the new energy regime, where answers to fundamental physics questions may be found.

Kristiane Bernhard-Novotny

CERN prepares energy reduction scenarios for the coming winter

Look out for information that will be displayed on screens and posters like this one around the laboratory to keep up-to-date with what CERN is doing to save energy, and how you can contribute to the effort.

With energy shortages anticipated this coming winter in Europe, CERN is implementing measures to contribute to the collective effort and minimise disruption.

In order to play its part, CERN has advanced the start of the year-end technical stop (YETS) of the accelerator complex by two weeks, to 28 November, and reduced the running period of the accelerators by 20% in 2023. In addition, on 2 November, CERN signed an agreement with electricity supplier EDF to manage further energy reductions, if needed, before the start of the YETS. The agreement stipulates that EDF may ask CERN to reduce its electricity consumption for periods of 3–6 hours, once per day, subject to two days' notice. CERN will endeavour to accept such requests up to three times per week. These reductions will be entirely managed from the CERN Control Centre and will have no impact beyond the accelerator complex. No action is required on the part of CERN personnel in this context.

If circumstances in France so require, CERN's EDF electricity supply could be cut off at short notice. This is not unprecedented and, under normal circumstances, the site network automatically switches – possibly with a short interruption – to a Swiss supply, which has limited capacity. Were this to happen, accelerator operation would be interrupted until the EDF supply was re-established.

Given the unusual energy situation this winter, CERN is preparing for the unlikely eventuality that both French and Swiss electricity supplies might be lost at the same time. If this happens, essential services, including safety systems, the CERN Control Centre and one area of the Data Centre, will receive emergency power from CERN's diesel generators, which can maintain a supply for up to two days with on-site diesel stocks, and possibly longer, subject to diesel deliveries.

In the event of a blackout, members of the personnel will receive instructions via email and SMS.

The Data Centre status will be regularly updated on the IT status board.

Efforts have also been made to reduce CERN's consumption of gas, which is used to heat the Meyrin and Prévessin sites. The start of heating was postponed by one month this year, and a slight reduction in temperature is being implemented. Further reductions, or gas supply interruption, should the Host

States so require, would have an impact on operations. Mitigation measures are being prepared.
Energy savings are the day-to-day responsibility of all of us and we can all contribute to the collective effort. If you live in France, you can keep up to date with the current status of supply, along with measures you can take, on the website https://www.monecowatt.fr. At work, look out for messages on home.cern and on the information screens around the Laboratory, informing you of measures taken by CERN and what you can do to play your part.

CERN fundraising effort contributes to aiding Ukrainian civilians

The sum raised by the CERN personnel, the Directorate and the Staff Associations contributed to the Swiss Red Cross's essential humanitarian response to the war in Ukraine

CERN raised 820 000 CHF for the people of Ukraine.

More than eight months after it began, the war continues to sow destruction in Ukraine, a CERN Associate Member State, making humanitarian support to the country ever more vital. The Russian invasion was condemned in the strongest terms by CERN, whose Council implemented measures concerning the involvement of the Russian Federation and Belarus in the Organization's scientific programme. Click here (https://home.cern/news/news/cern/cern-council-takes-further-measures-response-invasion-ukraine) for an overview of the first round of measures, and here (https://home.cern/news/news/cern/cern-council-cooperation-agreements-russia-belarus) to read about the second round.
In parallel, the CERN community demonstrated its solidarity and generosity by raising funds through a campaign organised by the Staff Association, which also contributed financially to the campaign. The CERN Directorate matched, from the CERN Budget, donations made by the personnel. As a result, CERN was able to provide 820 000 CHF to the Swiss Red Cross (SRC). This sum fed into the 42 million CHF of total donations made to the SRC for its humanitarian response to the war in Ukraine. Around half of these funds have so far been spent on life-saving actions, and a new report released by the SRC details how they have been used to alleviate the suffering of the Ukrainian people.
With the funds made available by donors like CERN, the SRC has contributed to the international effort to support more than 14 million refugees and internally displaced people by providing emergency relief – including cash assistance, medical supplies and household appliances – in the country's western provinces. In neighbouring Moldova and Poland, the SRC has deployed emergency relief specialists and is building a stockpile of equipment to facilitate blood transfers for the refugee population. The SRC has also made direct financial contributions to National Red Cross Societies on the frontline of the humanitarian crisis in support of a multilateral response to the refugee emergency. In parallel, the SRC activities on Swiss territory have so far consisted of providing psychological support through collaboration with therapists, teachers and people supporting refugees, as well as publishing reliable information to foster social integration. Financial support has also been granted by the SRC to refugees who are struggling with high food and electricity prices.
Although identifying the specific actions into which CERN donations have been channelled is impossible, those funds have undoubtedly contributed to the wide-ranging relief effort described above. And as the war shows no sign of abating, the SRC stresses that additional actions will be undertaken in the coming months to bring much-needed relief to the Ukrainian people, drawing on the remaining 19.6 million CHF made available by donors like the CERN community and on any future donations.
Find out more about the SRC's humanitarian response here (https://staff-association.web.cern.ch/sites/default/files/Rapport%20croix%20rouge%20_%20Ukraine_Oct%202022_EN.pdf

Arts at CERN and Pro Helvetia launch an open call for Connect India

Arts at CERN announces a new open call for artists from Switzerland and India

Connect India poster designed by Rafa Yuste (Image: CERN)

Arts at CERN and the Swiss Arts Council Pro Helvetia today announced a new open call for the Connect programme – "Connect India". This second edition offers one joint residency for two artists, one from Switzerland and one from India. The residency is fully funded, and it is aimed at artists with a distinct interest in a cross-disciplinary approach and a strong engagement with fundamental science.

Connect is a collaboration framework that was launched in 2021 by Arts at CERN and Pro Helvetia to serve as a platform for interactions and dialogue between artistic and scientific communities across the world.

Based on the same model as last year's edition, Connect South Africa, the international format of Connect India will bring an artist from Switzerland and an artist from India together to participate in a residency at CERN in Geneva and at the International Centre for Theoretical Sciences (ICTS) in Bengaluru. This residency exposes the artists to two unique scientific facilities as well as the fundamental research that is conducted there. While CERN offers a unique range of experiments in particle physics, the ICTS engages in research areas that include statistical and condensed matter physics, physical biology and mathematics.

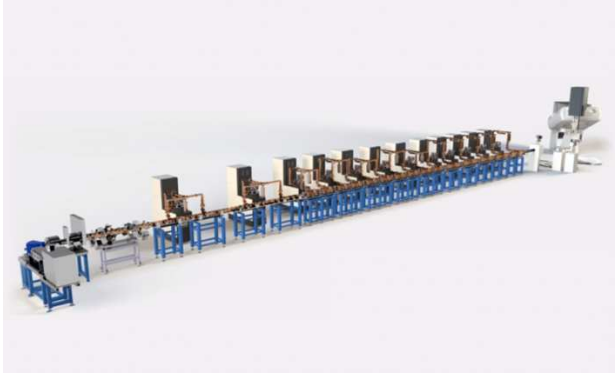
Artists interested in applying to Connect India are invited to submit a proposal detailing a process of artistic research to be carried out in dialogue with the CERN and ICTS scientific communities.

"Connect is a unique opportunity for artists and scientists to engage in dialogue, enrich each others' creativity and forge new links between their communities. For the winning artists, it will be a once-in-a-lifetime chance to explore ground-breaking research environments at CERN and in India," says Mónica Bello, Curator and Head of Arts at CERN.

Online applications for Connect India are open from 3 November until 12 December 2022. On 23 November, Connect Info Day will give applicants the opportunity to find out more about the residencies and put their questions to the Connect India team. A jury of cultural experts and scientists will select the winning artists, who will start their residencies in 2023. The winners will be announced in February 2023.

Fighting cancer with LIGHT

A novel proton accelerator for cancer treatment, based on CERN technology, is getting ready to receive its first patients in the United Kingdom



Advanced Oncotherapy's LIGHT accelerator (image: AVO)

Cancer irradiation with hadron beams, a method to which CERN contributed by propelling carbon ion therapy of radioresistant tumours into the medical world some thirty years ago, has treated more than 300 000 patients to date. As collaborations and projects have mushroomed over the decades, new methods aimed at improving and democratising this type of cancer treatment have sprung to life. Among these methods, therapy with proton beams from circular accelerators stands out as a particularly

effective treatment: protons can obliterate tumours, sparing the surrounding healthy tissues at higher rates than conventional electron or photon therapy. Unfortunately, present proton and ion therapy centres are large and very demanding on the design of accelerators and guiding systems.

Advanced Oncotherapy (AVO), a London company that has further developed and is marketing CERN's expertise in medical particle accelerators, aims to change the picture. The highly adaptable Linac Image-Guided Hadron Technology (LIGHT) accelerator developed by ADAM, AVO's Geneva-based subsidiary, provides a proton beam allowing the delivery of ultra-high dose rates to deep-seated tumours. It is based on RFQ CERN technology, and a prime example of knowledge transfer from CERN to societal applications, supported by CERN's KT Group. LIGHT reached the maximum treatment energy of 230 MeV at the STFC Daresbury site (United Kingdom) on 26 September and is getting ready to treat its first patients in collaboration with University Hospital Birmingham (UHB).

LIGHT, the first linear accelerator used for proton cancer treatment worldwide, operates with components and designs developed by CERN, ENEA and the TERA Foundation for the three successive sections of an accelerator that would be both affordable and dense, an important requirement for the medical sector. Components of note include LIGHT's radio-frequency quadrupole (designed by CERN), which contributes to its compact design, as well as ten radio-frequency modules composed of side-coupled accelerating cavities based on a TERA Foundation design. Each module is controlled to vary the beam energy 200 times per second, depending on the depth of the tumour layer. The linac design reduces beam losses, stray radiation and, consequently, the volume of shielding material required. This innovative design allows the linear accelerator to generate an extremely focused beam of 70 to 230 MeV and to target tumours in three dimensions, by varying the depth at which the radiation dose is delivered much faster than existing circular accelerators can.

Four years after the first 16-metre-long prototype was built and tested at LHC Point 2, this novel oncological linac will treat its first patients at Daresbury during the second half of 2023. Of course, this is only the beginning of what is bound to be a long journey, as AVO hopes their new 25-metre-long design will change the landscape of cancer treatment over the long term by enabling the development of new dose delivery methods based on faster energy variation and a more focused beam.

Kristiane Bernhard-Novotny

Big Science Business Forum 2022: a meeting point between CERN and industry

The second edition of the Big Science Business Forum (BSBF) highlighted the added value for companies of doing business with CERN, from gaining new knowledge to fostering innovation

Raphaël Bello, CERN Director for Finance and Human Resources, speaks at the BSBF forum 2022 (Image: CERN)

Industrial suppliers are crucial to advancing CERN's scientific mission – half of the Organization's annual budget returns to industry through procurement. For the 2022–2026 period, marked by the high-luminosity upgrade of the LHC (HL-LHC), CERN plans to spend 2.5 billion Swiss francs on procurement. In doing so, CERN is creating unique opportunities for industry to invest in cutting-edge technology.

The Big Science Business Forum (BSBF) catalyses collaboration with industry. It is a one-stop shop for companies (large and small) interested in providing services and solutions for large scientific organisations like CERN. This year's edition, held in Granada from 4 to 7 October, brought together 1150 participants from more than 500 organisations and 33 countries. CERN, along with ten of its European counterparts –EMBL, ESA, ESO, ESRF, ESS, European XFEL, F4E, FAIR, ILL and

SKAO – presented upcoming procurement opportunities for European companies in fields ranging from superconductivity to cryogenics.
"The expectation for CERN was to meet with potential new suppliers that might have worked with other organisations, but not yet with us. This objective was met: the Forum's open atmosphere helped establish new connections and enabled discussions on solutions never explored before," explains Anders Unnervik, Head of the Procurement and Industrial Services group at CERN and a member of the BSBF International Organising Committee. "The added value of working with CERN came up repeatedly during the exchanges with companies. Contracts with CERN are very often related to advanced engineering and state-of-the-art technology. The R&D effort such contracts require challenges companies and expands their know-how. We are looking for those companies that are ready to take up such challenges," he adds.

The process of value creation through supplying for CERN was illustrated by Sandra Imbach, CEO of IMBACH & CIE AG, a company that has been collaborating with CERN for many years. "We developed forging and ring rolling of aluminium alloys many years ago in cooperation with CERN. Today, it has become one of our core competencies, and business with CERN is still thriving: we recently supplied forged cylinders in a high-strength aluminium alloy for the HL-LHC's low-beta quadrupole (MQXFB)."
To find out more about CERN's procurement policy and current opportunities, visit CERN's procurement website.
CERN technologies and know-how can also help companies take forward ambitious innovation programmes, as described on CERN's Knowledge Transfer website..

How far can technology improve our health?

Listen, watch and connect with us as Sparks! tackles the visions and challenges for future technology for health

Can living organisms become resistant to all viruses? How do we detect even the smallest, earliest stage cancer? What health-related data should we be sharing with one another? This year, CERN Sparks! dives headfirst into what future technology for health looks like, how we get there and what ethical questions we will need to answer along the way.
CERN has been involved in the health applications of particle physics research since the 1970s. Sparks! uses this as a starting point to open up the conversation to a wide range of health professionals from different fields. Bringing together fantastic minds is our speciality, and this year's podcast, talk line-up and forum are no exception.

What is Sparks!?

Sparks! is a series of podcasts, talks and forum events organised around a particular theme of interest to CERN and society. The aim is to spark connections and diversity of thought by sharing perspectives from multidisciplinary experts, and to inspire our audiences.

Listen to the podcast

The CERN Sparks! podcast brings together leading figures in their fields to examine the potential of technology to change lives. We also ask important questions about medical ethics, equity and the benefits of open science, in discussion with Jennifer Doudna, recipient of the 2020 Nobel Prize in chemistry; Jeremy Farrar, director of the Wellcome Trust; George Church, the "founding father of genomics"; Pushmeet Kohli, head of research for DeepMind's AlphaFold project, and many others. The six episodes span topics from the biological revolution to the power of collaboration.
Listen to the podcast on our website or on your favourite audio platform.

Watch the talks

How can we prevent deficiencies, injuries and diseases before they even have a chance to strike? What should we be working on together globally? How can we make sure treatments are shared around the world? How do we prevent the next pandemic?

The CERN Sparks! talks are organised in two sessions: Treating People, with an expert line-up who will explore the technologies that will make it possible to treat more people with more precision in the future and, shifting the mindset from treatment to prevention, Keeping People Healthy, where the speakers will focus on how research moves us towards never being ill.
Soumya Swaminathan, WHO chief scientist; Jane Metcalfe, founder of Neo Life and Wired magazines; and Rolf Apweiler, director of EMBL's European Bioinformatics Institute (EMBL-EBI), are among this year's prestigious guests.
The CERN Sparks! talks will take place on 17 November between 4.00 p.m. and 7.30 p.m. Stream the talks at home on CERN's YouTube channel or partner with us to get a high-quality streaming service for larger groups – we want the talks to be enjoyed across the world! Reach out to us to organise a viewing for your organisation.

Connect through the Serendipity Forum

How do you foster serendipity? This was the challenge we set ourselves: to create a space that allows serendipitous connections and ideas to emerge – to not only allow conversations around future technology for health, but bring diversity of thought into the mix.
In order to do so, after the inspiring podcast and talks, an innovative forum will take 50 participants on a journey through seven key topic areas. They will have the space and freedom to discuss the topics from multiple points of view to allow an expansion of thought and understanding – an exercise in blue-sky thinking.
There is also an academic side to this: last year's forum discussions led to the drafting of a CERN Yellow Paper, which will be published shortly; a similar paper will be compiled this year. Additionally, Sparks! will be teaming up with Frontiers for Young Minds, an open access scientific journal for children, to write a summary of the event, which will be peer-reviewed by 12-year-olds!
If you're streaming the talks, we encourage you to organise your own space for a forum ¬– as formally or informally as you like! This could mirror our forum at CERN and take our discussion topics as starting points, or could even be informal coffee chats. Contact us here (https://sparks.cern/webcast) (to find out more. We want to spark ideas, after all!
Sparks! is part of the CERN & Society programme. CERN & Society activities are only possible thanks to the support of our partners, in particular Rolex, which has a long-standing association with CERN. The 2022 Sparks! event is also supported by the Didier and Martine Primat Foundation.

The many facets of safety in research infrastructures: CERN hosts the 2022 International Technical Safety Forum

From 25 to 28 October, more than 100 people from CERN and other research institutes from around the world gathered in the Globe of Science and Innovation at CERN for a key conference on health and safety matters


Attendees of the ITSF 2022 at CERN (Image: CERN)

Safety is a priority for CERN. The dedicated Safety Policy spans all areas of occupational health and safety, including environmental protection and the safe operation of CERN's facilities. Continuous exchanges with similar research infrastructures on best practices and techniques ensure that we maintain the highest standards. From 25 to 28 October, more than 100 people from CERN and other research institutes from around the world gathered in the Globe of Science and Innovation at CERN for a key conference on health and safety matters: the International Technical Safety Forum (ITSF).
The ITSF is a forum for exchanging state-of-the art ideas, processes, procedures and technologies in personnel, environmental and equipment safety from

a variety of high-energy physics (HEP), synchrotron and other research laboratories.

Ralf Trant, of CERN's TE department, attended the ITSF for the first time in 2003, the fourth meeting of the Forum, which first met at CERN in spring 1998. "In its 25-year existence, the ITSF has evolved with the times, all the while increasing its attractiveness as a forum for experts to share their knowledge, experience and challenges. Its scope has broadened from HEP to a wider range of disciplines and participating institutes, in Europe and beyond, with Asian labs joining in addition to the American institutes that have been involved since the beginning."

Benoît Delille, the Head of CERN's HSE unit, opened the event, noting: "For colleagues from different institutes who are visiting CERN for the first time, it is an occasion for us to share the values on which this Organization is built, that we are proud of, and also how we make them come to life through the prism of safety." A first session on environmental protection and sustainability matters saw CERN share its approach to minimising its environmental footprint in key domains, alongside a presentation from ESS on its approach to environmental management in its post-construction phase. The week then unfolded to cover a wide range of topics, with sessions spanning continuous improvements in health and safety, fire safety, equipment certification, incidents and lessons learned, risk assessment and technical risks, and finally new projects and challenges, safety culture and behaviour, and safety training.

Peter Jakobsson, the Head of Environment, Safety, Health & Quality (ESH&Q) at ESS and a member of the ITSF organising committee, chaired the event's "Incidents and lessons learned" session: "Listening to your colleagues from other research institutes informing about events that have occurred, lessons learned and recent developments in safety assessment is the pure essence of ITSF. We openly share information in different subject safety areas like fire hazards, handling of chemicals, inspection of pressurised equipment, etc. In doing so, we all learn from each other to create a safe work environment for our staff and scientific users: a true sign of the safety culture that we all strive for."

In addition to a rich programme of presentations, the event also featured an interactive fire workshop, at which participants shared ongoing projects and challenges related to fire safety in particle accelerator facilities. CERN took the floor to share experiences of the FIRIA (Fire-Induced Radiological Integrated Assessment) project, whose objective is to develop a general methodology for assessing the fire-related risks present in CERN's facilities and provide a collaborative networking forum in which experts working in the fire field can stay connected and updated.

Participants also enjoyed visits of CERN's installations, complemented by a tour of the Safety Training Centre in Prévessin on the last day. As the event drew to a close, the organiser of this year's event, Yves Loertscher, the Leader of CERN's Occupational Health & Safety group reflected: "As occupational health and safety specialists, we're all working to provide support for people to protect people. This event gave us the possibility to share our knowledge through presentations but also through networking breaks, visits and social events. After a break of almost three years owing to the pandemic, it's a pleasure to interact directly with peers again and share new ways of thinking and acting in the field of occupational health and safety and environmental protection."

Computer Security: When your restaurant turns sour

Every Sunday, for years, I've been going to my favourite restaurant in downtown Geneva. Always the same table. The same view. Always ordering the same starter, main and dessert. The same wine. Delicious. Un régal. Never been disappointed. Until last weekend. When the owner changed, as did the chef, and the food. A disaster. Fortunately, after the first bites, I noticed. But you won't.

You won't today, if you're a programmer, software developer, VM importer or container administrator. You won't today, if you run NPM or PyPI. You won't today, if you import VMs and containers from untrusted sources on the internet. You won't today, if you copy/paste snippets of code from random origins on the web. You won't, just as you won't notice that the owner has changed, that the chef is not the chef anymore.

In fact, it's the beauty of software engineering to reuse programs/libraries/packages/VMs/containers developed by others. But this comes with a caveat. You need to trust those others. Can you? GitHub, Stack Overflow and others provide zillions of lines of code ready for reuse. And NPM and PyPI make your life easier when it comes to importing, reimporting and updating that code if a new version is available. But that requires trust. Trust that the original owner, the

original chef, is honest. Trustworthy, reliable, honourable. With good intentions. Not turning rogue or malicious. Nor turning into a third-party evil attacker.

Packages on NPM, PyPI, GitHub and any other remote-software-provisioning platform have been compromised in the past by accepting backdoored source code into the newest release, by unverified packages and libraries, by compromising the account of the source-code owner or by handing over the maintenance of that source code to a new (evil) maintainer. In 2021, a security researcher executed a successful supply-chain attack against Microsoft, Apple, PayPal, Shopify, Netflix, Tesla, Yelp and Uber simply by publishing public packages using the same name as the company's internal ones. He took advantage of the fact that PyPI and NPM look out for the newest version and give them priority even over a download from internal sources. So software using NPM or PyPI with internal dependencies on third-party libraries fetches newly released dependencies from the internet, first. All the researcher had to do was to figure out the names of those libraries, publish a more "recent" version and wait for PyPI and NPM to do their job.

So, instead of falling into the same trap, be vigilant. Our development methods do not differ. The risk remains the same for PyPI, NPM or automatic internet downloads. In the interests of integrity and security – but also for better version and revision control, dependency management and licence compliance – we can and must do better. While mitigations exist, like using central software dependency curators, they need to be deployed, centrally managed and curated. The CERN IT department already provides Harbor and Nexus as container and software component repository services, respectively. However, while these are currently non-curated, you should still consider using them in order to avoid direct downloads. Team up with other groups of developers in a joint effort to improve the software you develop, including the packages and libraries you import. And address your needs to your IT representative so that they can make such a centrally managed service possible!

And by the way, what's your favourite restaurant in Geneva? I need a new one…

Official news

Ban on laser pointers in Switzerland

On 1 June 2019, Switzerland introduced a ban on the import, possession and use of laser pointers on Swiss soil, with the exception of Class 1 laser pointers, which are authorised for use in making presentations.

Articles 22 and 23 of the Ordinance to the Swiss Federal Act on Protection against the Risks associated with Non-Ionising Radiation and with Sound (O-NIRSA) place a ban on all laser pointers belonging to Classes 1M, 2, 2M, 3R, 3B and 4, as well as on laser pointers that are not classed or are incorrectly labelled.

All CERN contributors who use laser pointers are requested to comply immediately with this legislation. Those who fail to do so risk criminal prosecution under Swiss law.

Announcements

28 November: “The sphere packing and beyond”, a conference by Maryna Viazovska

The public conference will take place on 28 November 2022
From 8 p.m. to 9.30 p.m.
At the Globe of Science and Innovation, CERN

Maryna Viazovska was awarded a Fields Medal, a prestigious honour often described as the Nobel Prize of Mathematics, for solving the sphere-packing problem in 8 and 24 dimensions. In doing so, she resolved a question that had stumped mathematicians for more than four centuries: how to pack spheres – such as oranges stacked in a pyramid – as close together as possible.

In this lecture we will talk about the history of the sphere-packing problem in different dimensions, the concept of high dimensions and its role in mathematics, and also about new unexpected connections between sphere-packing in high dimensions and the theory of quantum gravity.

In 2022, Viazovska became the second female Fields Medallist – after Maryam Mirzakhani in 2014 – and joins a list of over 60 mathematicians to have received the prestigious honour to date.

Presentation in English | Event recorded
Mandatory registration
More information on the Indico page of the event

Join the ranks of the ambassadors for Women and Girls in Science and Technology

From 30 January to 3 February 2023, female scientists and engineers will be invited to speak at local schools to get young people excited about science. Volunteer now!

For the seventh year running, CERN, the University of Geneva’s Scienscope, EPFL and the Annecy Particle Physics Laboratory (LAPP) will be joining forces to celebrate the International Day of Women and Girls in Science. From 30 January to 3 February 2023, female science ambassadors will visit local schools to talk to the pupils about their profession.
They will discuss their careers, reveal some of the mysteries of science and, in some cases, perform small experiments. The aim is to change how schoolchildren view scientific, technical and technological professions and to show that they are just as accessible to girls as to boys. And, who knows, the presentations might even help some to discover their vocation.
The Women and Girls in Science and Technology week is a huge sucess every year, with 121 presentations made in 2022. This is why we are always looking for more volunteer female scientists willing to give up a bit of their time to visit schools. So come and join the adventure by signing up: the deadline is 11 December 2022 (11.59 p.m.).

Who is eligible to become an ambassador?

Registration is open to all women working in a profession connected with science, technology, engineering or maths (STEM), as well as computer science, communication or education.
Priority will be given to presenters from CERN, the University of Geneva, EPFL and LAPP. If you are not from one of these institutions but would like to take part, contact us.
You will be required to deliver one-hour presentations for a maximum of 30 pupils aged 7 to 15.
The majority of presentations will be given in French (95%), but some may also be given in English.
You will be required to attend a briefing session.
To sign up and find out more: https://cern.ch/wis-internal. Deadline: 11 December 2022 (11.59 p.m.)

A new system to measure the number of people entering Restaurant 2

The SCE department has designed several solutions to achieve an optimal level of operation of its catering services, among which a counting system allowing everyone on site to check the number of available seats in Restaurant 2 (a similar system has been running in Restaurant 3 since 15 December 2021).
This system has been fully effective since 7 November and will help cope with a potential increase of crowds in R2 during the refurbishment of Restaurant 1, which will resume next month.
The multifunctional camera detects the flow of visitors in real time and provides high counting and tracking accuracy. Data is collected for a real-time analysis delivered on a page that you can access here (https://cern.technis.com, only from the CERN site). The system processes data anonymously, in compliance with the CERN data privacy rules.

The November/December issue of the CERN Courier is out

The vast neutrino telescope KM3NeT is taking shape deep beneath the Mediterranean Sea. Combined with recent evidence of high-energy neutrino emission from a nearby galaxy reported by the IceCube collaboration and the growth of the Baikal-GVD detector, neutrino astronomy is entering its golden era.
As LHC Run 3 gets into its stride, the November/December issue also reports on the completion of civil engineering for the High-Luminosity LHC and takes an in-depth look at the crystal collimation essential for high-luminosity operations. Going beyond the LHC: how to deal with the millions of cubic metres of excavation materials from the proposed Future Circular Collider (FCC) at CERN, and a new project to explore the use of high-temperature superconductors for FCC-ee. Post-LHC colliders also feature large in the recently completed Snowmass community planning exercise.
Elsewhere in the issue: newly founded firm TAU Systems aims to commercialise plasma-wakefield accelerators; a new international society for quantum gravity; IPPOG turns 25; Swiss Physical Society evaluates the impact of physics; plus the latest conference reports, LHC-experiment results, reviews, opinion and more!

Ombud's corner

I hope I won't need to come and see you

When I took up the position of CERN Ombud in April 2021, I was faced with a variety of reactions when I told my colleagues the news:
"Won't you get bored? Won't it be lonely?"
"Are you sure? I don't know anyone who'd want to be Ombud!"
"I hope I won't need to come and see you!"
Of all the reactions, the one that struck me the most was the last one: "I hope I won't need to come and see you!". It implies that the only reason to visit the Ombud is that you have a serious problem to discuss and are in

an extremely difficult situation. Today, I would like to show you that that's not the case.

True, the Ombud's mandate revolves around helping resolve interpersonal conflicts and, indeed, in 65% of cases, the people who come to see me are seeking to resolve a conflict. Sometimes they come in the early days of a conflict, when communication is simply proving difficult. Much more often, they come when a conflict has been rumbling on for a while and has reached boiling point. Some people also contact me before a conflict arises, as a "preventive" measure, to prepare for a difficult conversation or get an outside perspective on a potentially conflictual situation that's troubling them.

But I also receive colleagues who aren't dealing with a conflict and come with other intentions:

They simply want to share their personal experiences of organisational processes, recognition of qualifications, advancement, budget allocation, internal mobility, etc.

They want to talk about things they perceive as a systemic issue for our Laboratory, such as persistent sexism or a lack of transparency in recruitment processes.

They want to point out things they see as a risk to the Organization, such as a loss of knowledge and expertise in the use of certain equipment or a loss of resources in a given area of activity, and where they feel that they aren't being listened to when they flag the issue.

They are simply looking for information about the rules, policies, procedures, etc., in force, such as the Organization's policy on sabbatical leave, external activities, personal data privacy, etc.

They want to discuss a project, a choice they have to make or a decision to be taken and are looking for a sounding board – someone external and impartial with whom to explore their ideas.

The Ombud offers a safe space that is governed by the principles of absolute confidentiality, informality, impartiality and independence, where anyone can express concerns or ask questions that don't necessarily have to be connected with a conflict.

If these conversations bring to light problems that appear to be systemic, the Ombud, acting as a watchdog, can escalate them to colleagues who are in a position to address them, particularly the Management. This is what I do, for example, when I present the Ombud's annual report to the departments and the collaborations.

When I escalate these problems, I never reveal the identity of those who confided in me, nor provide any information that would lead back to those individuals.

No one should feel guilty or worried because they need to consult the Ombud. Doing so is not an admission of weakness either. When you come to see the Ombud, you're simply using a resource that's placed at your disposal to explore a problem, concern, question or choice. Rest assured that no mechanism will be triggered against your will, and that you will be met with active listening and empathy and an external, impartial perspective.

Laure Esteveny

PS: And no, I don't get bored! And yes, the role can be a little isolated, but that's the price to be paid for its fundamental independence.