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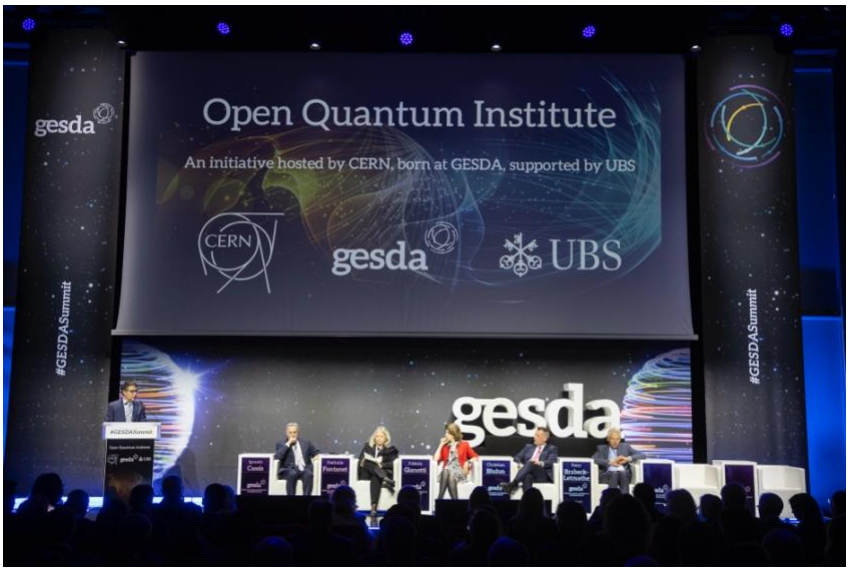
Bringing quantum computing to society

A new, three-year CERN-based programme called the Open Quantum Institute seeks to make quantum computing resources and technical expertise widely available



Announcement of the launch of the Open Quantum Institute on 13 October at the GESDA summit. (Image: GESDA/von Loebell)

A new, three-year CERN-based programme will make quantum computing resources and technical expertise available to projects designed to support the UN's Sustainable Development Goals (SDGs).

The new programme is called the Open Quantum Institute (OQI). Hosted by CERN, the OQI has been designed by the Geneva Science and Diplomacy Anticipator (GESDA) in collaboration with some 130 experts and will be funded by UBS as lead impact partner. The announcement of the three-year pilot phase was made on 13 October during the 2023 GESDA summit and the programme will be fully embedded into CERN's wider Quantum Technology Initiative (QTI) as of 1 March 2024. The OQI will be, de facto, the societal arm of the QTI, which was established at CERN in 2018 and is managed by the IT department. Today, the QTI involves several researchers from the CERN departments and experiments that are working on four main domains and applications: quantum computing and algorithms, quantum simulation and information processing, quantum sensing, metrology and materials, and quantum communication and networks.

Contents

The overarching goal of the OQI is to find ways to enable quantum computing to have the widest possible societal impact by promoting and facilitating access to quantum computing resources and technical expertise. Through the OQI, cutting-edge nascent technologies will also become available to people from underserved regions, thus contributing to reducing a possible new digital divide.

"The UN's SDGs represent the international community's collective view of what the greatest societal challenges are today," says Enrica Porcari, Head of CERN's IT department. "This is why we are proud to host the OQI at CERN and to provide a platform to transcend the boundaries of geography and disciplines in harnessing the power of quantum computing to address the SDGs. With its long tradition of collaboration across borders and knowledge sharing, CERN is the ideal place to host the pilot phase of the OQI and publicly reiterate that innovation has no boundaries. The OQI will strengthen CERN's profile as a scientific institution that serves society, in the Member and Associate Member States and beyond, on some of humanity's most pressing challenges. It will expand CERN's networks in support of knowledge transfer, education and training in quantum technologies".

GESDA and its partners have run an OQI incubation period, which started a year ago and has mobilised academia, the private sector, government representatives and young experts to identify together potential future projects. "This preparatory journey has allowed us to design a platform that focuses on specific items and really accelerates the potential of quantum computing for society," confirms Porcari. Quantum computing optimisation of the food supply chain for better food security (addressing SDG 2, zero hunger), more accurate medical imaging thanks to quantum machine-learning solutions (addressing SDG 3, good health and well-being) and quantum computing simulation to improve the catalysis process involved in the fixation of carbon on the surface of materials, thus reducing CO2 in the atmosphere (referring to SDG 13, climate action) are all examples of potential use cases to be explored as projects in the pilot phase of the OQI.

During the three years of its pilot phase, the OQI will support three or four projects targeting SDG-related use cases. It will also lay the foundations for the next phase of the programme and potentially become a reference for other initiatives aimed at deploying quantum technologies for the benefit of all.

Antonella Del Rosso

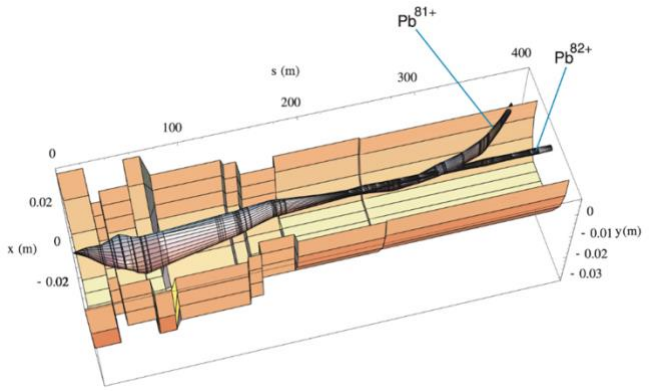
Accelerator Report: Ending the 2023 run with a quench

Another few days and the last 2023 LHC beams will be dumped. The official time for dumping the beams is set at 6 a.m. on Monday, 30 October but, this time, the beams will not be dumped by the LHC engineer in charge flipping the switch in the control room. Instead, we hope that the machine protection system will dump them … following a magnet quench. This may sound strange, as we normally don't predict magnet quenches days in advance and, well, the whole point is to avoid them during beam operation. Nevertheless, this time, the LHC machine experts want to experimentally validate the quench limit of the superconducting magnets, i.e. the amount of energy that a superconducting magnet can take before it quenches and loses its superconducting properties. To study this, the experts will provoke controlled beam losses in a superconducting magnet – in other words, they will deposit a given amount of energy in the magnet.

How can a beam be intentionally lost in a magnet?

During lead-ion collisions, the aim is to collide the ions head on. However, not all the ions collide: some just pass close to each other. In this case, the electromagnetic interaction between the ions is very strong and can lead to the production of electron–positron pairs, in which the electron

binds to the lead nuclei, changing the $Pb82^+$ lead ions into $Pb81^+$ lead ions.
These $Pb81^+$ ions have a different electrical charge to the $Pb82^+$ ions. Therefore, within the magnetic field of the same LHC magnets, they are deflected on a different trajectory, separate from the main $Pb82^+$ beam, forming a secondary beam. The trajectory of this secondary beam is so different that it is quickly lost, in a well-defined location in the machine, where it deposits its energy.



A schematic result of simulations made by machine experts. On the left-hand side is the interaction point, where the lead-ion collisions take place. Going to the right, the beam is de-squeezed (de-focused) while being transported downstream from the interaction point. At around 300 m downstream, the $Pb81^+$ secondary beam clearly separates from the $Pb82^+$ main beam. At 400 m, it is lost and deposits its energy. (Image: CERN)

To prevent this $Pb81^+$ beam from being lost in a magnet, extra corrector magnets are used to create a local orbit bump that displaces the beam locally by about 3 mm, thus changing the location where it is lost, so that its energy is deposited in a collimator, which is specifically designed to absorb these ions and their energy.
At midnight on Sunday, the LHC machine experts will fill the machine as normal. However, this time they will change the local orbit bump value so that the $Pb81^+$ beam is deposited in a superconducting magnet instead of a collimator. The number of ions and, therefore, the amount of deposited energy can be modified by adjusting the number of ion collisions at the upstream interaction point.
A well-defined procedure to increase the energy deposition until the magnet quenches has been established and validated, but the exact time of the beam dump is not yet known, as it will depend on the quench limit of the magnet.
Establishing this quench limit experimentally will complement the many simulations already made and will enhance our knowledge of the LHC machine, in view of the planned doubling of the stored beam energy at the HL-LHC.

Rende Steerenberg

CERN Science Gateway: public events programme

A season of events for all: find out what is in store now that CERN Science Gateway has opened its doors

CERN Science Gateway is our new flagship venue for visitors from all over the world wishing to learn more about the Laboratory and its work. The public events programme aims to create engaging content and experiences, ranging from talks to films and dance or music performances, all built around a seasonal programme to establish CERN Science Gateway as a scientific reference in the wider cultural scene, both locally and further afield.
Previously, CERN's Globe of Science and Innovation hosted events attended primarily by the local public. However, with the opening of CERN Science Gateway facilities on 8 October – and its auditorium seating up to 900 people – CERN now aims to broaden its reach, not only in terms of audience numbers, but also in terms of diversity: age, geographical distribution and interests. By collaborating and co-creating events with other museums, science centres, cultural centres and educational networks, we aim to reach a range of audiences: from families, whether local or visiting tourists, to more specialised groups such as the high-energy physics (HEP) community, as well as undergraduate and postgraduate students, alongside the general public and our neighbours in the local communities.
Overall, the public events programme at CERN Science Gateway aims to deliver one event per month (with the exception of December and the summer months), with a different theme each

season. "The chosen themes aim to address a topic that aligns with CERN's mission and is relevant to society", says Claudia Marcelloni, head of public events programming.

This is achieved through the gradual implementation of an ambitious seasonal programme, with most events falling under a thematic proposal, while leaving space for spontaneous and recurring events that CERN traditionally hosts or participates in, such as Dark Matter Day and CineGlobe.

In addition to the CERN Science Gateway programme, we will continue to organise off-site public events in the local area in both host countries, accessible to the public in their own venues and tailored to individual communities.

Exceptionally, the first season of public events will run from October 2023 until January 2024, when we will focus on the celebrations of CERN's 70th anniversary. Here is what we have in store for you in the coming months.

Public Events Season 2023/2024 at Science Gateway:

- **13 October at 6 p.m. in French**: *Partage ta science* – This "Share your science" evening will give you the chance to discover seven final year works covering a variety of scientific fields, presented by students from the Pays de Gex and Geneva.
- **30 October at 7.30 p.m**. in French: *L'aventure de la première grande découverte au CERN* - The story of the discovery of neutral currents, 50 years ago, told by one of the protagonists, a historian and a theoretical physicist.
- 3 November at 7.30 p.m. in English and French: Dark Matter Day – From light to darkness: exoplanets, black holes and dark matter, a conversation with Nobel laureate Michel Mayor, as well as CERN and ESO scientists.
- **9 November at 8 p.m.** in English and French: CineGlobe - *Mauvais Je(ux)* – An experimental theatre performance that recreates an audience member's identity based solely on their online data.
- **16 November at 7.30 p.m.** in English: Sparks! Future Quantum – Experts give our audience a first look at the growing importance and the potential impact of quantum technologies.
- **27 November at 7.30 p.m**. in English: The New Frontier of Interstellar Objects – Talk by Harvard University professor Avi Loeb, author of Interstellar: The Search for Extraterrestrial Life and Our Future in the Stars.
- **12 January at 7.30 p.m.** in English: The Infinite Monkey Cage – A special recording of the BBC's multi-award-winning science/comedy show hosted by Professor Brian Cox and comedian Robin Ince, joined by a panel of scientists and celebrity science enthusiasts. More information will be added to https://visit.cern/events in due course.

Save the dates for now. Registrations are mandatory and will be open three weeks before each event on https://visit.cern/events. We cannot respond to requests before registration has opened, thank you for your understanding.

The goal of CERN's public events programme is to further CERN's mission to establish the Organization as a key place to convey the importance and relevance of fundamental science in creating knowledge, bringing people and nations together through peaceful collaboration and driving innovation collectively.

Lila Mabiala

[This article was originally published on 22 August and has now been updated.]

CERN and Pro Helvetia announce selected artists for the Connect Chile residency

Arts at CERN, in collaboration with the Swiss Arts Council Pro Helvetia, has announced Swiss artist Dominique Koch and Chilean artist Marcela Moraga as the two selected artists for the Connect Chile dual residency

Chilean artist Marcela Moraga and Swiss artist Dominique Koch are the two selected artists for the Connect Chile dual residency. (Image: CERN)

Connect is a biannual juried award that supports outstanding practice by artists at any stage of their career who are interested in the dialogue between art and science. Connect Chile invited a selection of artists to propose ideas for a residency in both locations. The two honorees will complete a dual residency, spending three weeks at CERN, Geneva, and three weeks at the European Southern Observatory (ESO) and the Atacama Large Millimeter/submillimeter Array (ALMA) in the Atacama Desert in northern Chile. The residency in Chile is organised and coordinated by the Centro Interactivo de los Conocimientos – MIM.

Switzerland and Chile are home to some of the world's leading scientific research facilities, dedicated to investigating the mysteries of the universe. CERN, in Geneva, studies the fundamental constituents of matter with the most complex particle accelerators and detectors. In Chile, ESO's telescopes are used to observe a wide range of astronomical objects and the ALMA observatory studies the coldest and most distant objects in order to understand our cosmic origins. Connect Chile will juxtapose their complementary scientific and technological research, fostering meaningful dialogue between the arts and sciences through cultural exchange.

Dominique Koch lives and works in Basel, Switzerland. In her installations, which she describes as "thinking laboratories", the artist merges different fields of research to create hybrid entanglements and unlikely intellectual encounters.

Chilean artist Marcela Moraga explores the tensions of the nature–-culture binary. In her drawings, textiles and video performances, Moraga develops new narratives that establish a connection between humans and non-humans.

During their residencies, the artists will explore the extraordinary scientific sites, gaining a first-hand understanding of the scale and complexity of the research taking place there. Koch and Moraga will work with and receive support from scientists and engineers, as well the curatorial teams from Arts at CERN in Geneva and from Chile to research new forms of expression in their artistic practices and transform these new forms into works of art.

"I am thrilled to mark the fifth edition of Connect, this time as Connect Chile, which builds upon the successes of the long-term partnership with the Swiss Art Council Pro Helvetia. This exceptional dual residency will see artists Dominique Koch and Marcela Moraga embark on a remarkable journey, delving into the diverse realms of physics research, all against the backdrop of two of the world's most awe-inspiring scientific locations, CERN and ALMA-ESO," says Mónica Bello, head and curator of Arts at CERN.

"New creation processes and inspiration are generated in the context of interdisciplinary and intercultural exchange and experimentation. Together with our cooperation partners in Connect Chile, we want to provide a space for intensive research at the intersection of art, science and technology," explains Seraina Rohrer, head of Innovation & Society at Pro Helvetia.

The announcement of Connect Chile marks the fifth edition of Connect, which has included residencies at scientific organisations in South Africa and India. The Connect programme is a collaboration framework launched in 2021 by Arts at CERN and Pro Helvetia to serve as a platform for

exchange between artistic and scientific communities across the world.

The jury for Connect Chile was composed of Mónica Bello, Josefina González, Lucie Kolb, Enrique Rivera and Jennifer Teets.

The Beamline for Schools winners experimented at CERN and DESY

From 14 to 28 September, the three winning teams of the 2023 edition of the Beamline for Schools competition had the chance to use the test-beam facilities at CERN and DESY to perform their experiments.
The "Myriad Magnets" team from the United States and the "Particular Perspective" team from Pakistan came to CERN, while the "Wire Wizards" team from the Netherlands were invited to go to DESY.

The "Wire Wizards" team from the Netherlands during their stay at DESY. (Image: CERN)

In 2023, Beamline for Schools celebrated its 10th edition. To mark the occasion, CERN and DESY organised a hybrid event attended by representatives of CERN and DESY, the sponsors of the competition, winning students, team coaches and support scientists. Each offered a unique perspective on the various aspects of the competition.

Students from the "Particular Perspective" team from Pakistan present their experiment during the event organised to celebrate the 10th edition of the Beamline for Schools competition. (Image: United States Mission Geneva)

H.E. Mrs Bathsheba N. Crocker (in black), Ambassador, Permanent Representative of the United States to the European Office of the United Nations and other international organisations in Geneva, and the "Myriad Magnets" team from the United States check the detector alignment at CERN's test-beam facility. (Image: United States Mission Geneva)

Beamline for Schools is an education and outreach project funded through the CERN & Society Foundation by individual donors, foundations and companies.

“Partage ta science”: bringing French and Swiss students together

The event, which took place at CERN's Globe of Science and Innovation, invited local students to "share their science"

On Friday, 13 October 2023, for the 12th year in a row, CERN welcomed students from secondary schools in Switzerland and France to the cross-border “Partage ta science” event.

Following the style of a scientific symposium, seven secondary students presented their final-year work. The presentations covered a wide range of subjects, from mathematics and the laws of physics, to exoplanets, mechatronics and artificial intelligence.

Cartoonist Barrigue, creator of the magazine Vigousse and founder of the association *CrayonSolidaires, dessiner pour tous*, hosted the evening.

You can find videos of the presentations and photos of the evening on the event website (https://indico.cern.ch/event/1283570/).

Computer Security: In numbers

CERN is under attack. During working hours. On weekends. During vacations. Throughout annual closures. CERN is under attack. Permanently. Its Internet and web presence are constantly being probed for weaknesses and vulnerabilities. Its computing accounts are being targeted by phishing attacks or social engineering. Individual end-devices, laptops and PCs are vulnerable to hackers. While it is hard to quantify the number of daily attacks* CERN is subject to, we can have a look at CERN’s attack surface and the different measures the Computer Security team takes to protect that surface.

If you check out CERN IT in numbers, you’ll be able to fully appreciate its digital vastness and, hence, attack surface! The CERN network, its several public Class-B IPv4 & IPv6 networks, plus many non-routable ones, is comprised of 4000 switches, 300 routers and 5000 wireless access points. It serves more than 270 000 registered devices with 20 Gb/s flat bandwidth. Given CERN’s “Bring-Your-Own-Device” (or BYOD) policy, many of those devices are made of arbitrary hardware (laptops, tablets, PCs, embedded systems, IoT, etc.) and run arbitrary operating systems from Windows 95 via DSPs, Xilinxes and SoCs, to any flavour of Linux as well as any imaginable software program. These devices are linked to 37 000 computing accounts with attached CERN mailboxes.

CERN runs seven computer centres with up to 6000 servers/200 000 CPU cores each, over 30 000 different virtual machines, and a data storage capacity exceeding 1 exabyte provided by more than 110 000 hard disks/SSDs and 50 000 tapes. Those data centres provide all the computer and storage capacity as well as the IT services and infrastructure needed for the operations of CERN’s accelerator complex and attached experiments, for the processing and analysis of recorded physics data, and for the general needs of CERN’s researcher community (such as the provisioning of operating systems, office/engineering/HR/finance apps, databases, versioning/build systems, virtualisation and container services, collaboration tools, video/audio conferencing, printing, etc.). The web service alone serves centrally more than

10 000 websites/1.5 million webpages. More than 500 decentralised web servers provide additional sites and pages.

All these resources need to be monitored and protected. As coordinator, the CERN Computer Security team must fulfil its duty to prevent, protect, detect and respond in a way that does not obstruct the operations of CERN's accelerators and experiments or limit the academic freedom of our personnel and user community. Here's how we do it:

- Starting network-wise, CERN's outer perimeter firewall (the PaloAlto 7080 beast with 2x200 Gbps throughput) performs deep packet inspection and policy-based IP, domain and URL blocking. And on the Domain Name Server (DNS) level, we block an additional 800 known malicious domains and typo-squatting domains (like "CERN.CG"), with our upstream network provider, SWITCH, adding another 100 verified malicious domains per day. Given its protective power, the same DNS filtering has also been successfully applied at over 50 Swiss hospitals in collaboration with the Swiss government, as well as at a number of French hospitals, with none of them having yet fallen victim to a ransomware attack;
- The CERN Computer Security Operations Centre (SOC) automatically analyses about 3 billion network connections and 1.2 billion DNS requests daily, as well as several hundreds of thousands of logins and 4 billion commands executed on CERN's central computing clusters. These 3 TB per day amount to about 220 TB of archived computer security data (1 PB uncompressed) stored with a 13-month retention period;
- The SOC's capabilities are based on threat intelligence, or "Indicators-of-Compromise" (IoCs); so far, the SOC has detected as many as 22 million malicious IPs, domains, and file hashes, which we share with over 1000 peer organisations. About 100 000 IoCs are currently being actively monitored in CERN's SOC;
- Endpoints, i.e. laptops, smartphones, etc., are also monitored separately using local anti-malware software. Our pick, "ESET", is currently being used to protect more than 500 BYOD devices and more than 200 CERN centrally managed Windows PCs (more to come). This is complemented by the "Threatray" application, which is running on over 2700 CERN-owned Windows PCs (and number increasing);
- All those devices – computer-centre hosted, centrally-managed or BYOD – are scanned about once a month for vulnerabilities, insecure passwords and other weaknesses. Totalling about 24 000 scans per month, this generates more than 200 issues to be fixed by the corresponding device owners;
- On the training and awareness side, we give about one awareness session a month to newcomers and interested folks. So far, we have trained more than 100 CERN personnel as well as hundreds of external students in the CERN WhiteHat program to become penetration testers, and ran five very successful table-top exercises – some with the participation of real police forces from Geneva and Gex. And, of course, so far more than 325 articles have been submitted to the *CERN Bulletin*. You are reading one of them right now;
- Still, account protection is paramount. As you know, two-factor authentication has been set up on over 6000 CERN accounts. In parallel, we send about 4770 email notifications to people who recently logged into CERN from an – to us – unusual location. And we check whether CERN passwords as well as external passwords used with your CERN email address have been published on so-called dark web password dumps. In fact, since we are effectively sitting on a treasure trove of billions of such email/password combinations, we also monitor about 9000 affiliated universities, institutes and organisations and notify them of approximately 11 000 leaked passwords every day;
- In parallel, the SPAM and malware filter services (Microsoft's EOP & MDO as well as Xorlab "ActiveGuard") analyse around

115 000 email communications to and from @cern.ch email addresses per day, of which 10% are rejected as SPAM and 2% are quarantined as potentially malicious;

- CERN's Computer Security Incident Response Team (CSIRT) is on hand if something goes wrong; it automatically sends out about 300 alerts per month to users and device and account owners informing them about security problems with their assets. In return, they create about 200 tickets with the Team asking for assistance and help. Luckily, the majority of those incidents are local and harmless. The more major incidents at CERN remain infrequent (about 5–10 per year). However, this doesn't mean we are twiddling our thumbs: the Team assists many external universities, institutes and organizations in resolving their computer security problems before they spill over into CERN. This year, for example, several dozen universities were spared from ransomware attacks thanks to intelligence obtained by our team;
- Finally, on the prevention side, we conduct between 20 and 30 in-depth security reviews and audits of new and old CERN projects annually. Feel free to reach out to us at Computer.Security@cern.ch to get your project assessed.

Voilà… a few figures on CERN Computer Security with one more essential number: seven. Romain, Liviu, Luna, Christos, Roman, Pau, and Srividya – the names behind the numbers helping you, together with many more inside the IT department, to perform your work as securely as possible without hindering your creativity, flexibility, operations and academic freedom too much (we hope). Thank you, guys!

** "Attack" is vaguely defined… Is an attack one malicious login attempt or the entirety of all (brute-force) login attempts against an account? Or the whole campaign conducted by the same threat actor? What about scanning one IP address for vulnerable libraries or configurations? Or is one attack, again, the whole reconnaissance campaign against the entire web sphere? Is the social engineering attempt against one colleague an attack? Or, instead, the campaign using the same technique against everybody? Hence, "numbers of attacks" should be taken with a pinch of salt. They can vary between a "few" (campaigns) to billions (if you multiply 100 000 brute-force/rainbow table login attempts by the 40 000 accounts at CERN).*

Computer Security team

Announcements

Entrance B closed on Sunday 29 October from 8 a.m. to 6 p.m.

Due to roadworks on Route de Meyrin, CERN Entrance B will be closed to vehicles (including two-wheeled vehicles) on Sunday 29 October 2023 from 8 a.m. to 6 p.m.

Entrance to and exit from the Meyrin site will be via Entrance A.
Thank you for your understanding.

SCE department

A breath of fresh air: World Ventil8 Day | 8 November

8 November marks the annual World Ventil8 Day, the objective of which is to "raise awareness of the importance of ventilation as a crucial part of enabling the health and well-being of people." This year's theme is "Breathe Better, Live Better".
The crucial role of adequate ventilation of spaces was highlighted during the COVID-19 pandemic. However, the positive impacts of good air quality on our health and productivity have been well-documented for a long time. They include a lower risk of respiratory infections and improved sleep quality, as well as reduced exposure to pollutants. As the days become colder, keeping indoor spaces warm is on all of our minds, yet maintaining a steady circulation of fresh, clean air is essential to preserve good health and to limit the spread of common seasonal infections such as the flu or COVID-19.

To mark World Ventil8 Day, CERN's HSE unit will be running an information campaign on Wednesday 8 November, from 12 midday to 2 p.m. in Restaurant 1. At the stand, you can learn more about the impact of ventilation on improving indoor air quality for optimal health, and how to measure air quality with demonstrations of monitors, such as CO_2 and particulate matter sensors. You can also find out more about the CERN Airborne Model for Risk Assessment (CAiMIRA). Launched during the pandemic, CAiMIRA is a risk assessment tool developed to model the concentration of viruses in enclosed spaces, in order to inform space-management decisions.

HSE Unit

Arts at CERN invites the CERN community to meet artist in residence Joan Heemskerk

Joan Heemskerk at CERN Science Gateway. (Image: CERN)

Arts at CERN has welcomed Dutch artist Joan Heemskerk for a one-month residency at the Laboratory. Heemskerk is a member of the renowned art collective JODI, which was known for pioneering web-based art during the mid-1990s. Using the media of video, websites, video games, performances and installations, her work explores the norms and challenges of the languages of the internet and computer programs. Heemskerk's residency is dedicated to artistic research and focuses on her project, *Alice & Bob after Clay +=-> Hello, World!* Drawing inspiration from Tim Berners-Lee's proposal at CERN that all scientists should be able to exchange ideas, this project seeks to craft a new universal language through a re-examination of the cryptographic characters Alice and Bob, the material clay and the iconic computer program "Hello, World!"
Throughout her residency, Heemskerk aims to explore the various laboratory facilities and engage in conversations with physicists, engineers and other CERN personnel. Among her lines of research, she is examining how CERN's digital systems transmit and exchange information, and how this compares to the ancient practice of conveying information using materials such as clay tablets. This interest has taken her from the archived computer-coded printouts of

experimental physicist Louis Dick to the working processes and the intricacies of the CMS experiment's trigger and data acquisition systems. On 31 October at 11 a.m., CERN's Women in Technology group will host Heemskerk for a conversation about her artistic approach and current research, which will be followed by a Q&A session. More information about the event can be found here (https://indico.cern.ch/event/1339064/).

Arts at CERN invites scientists, engineers and everyone who might be interested in engaging exchanges with Heemskerk to come and meet the artist. These interactions will allow you to delve into discussions about your research, explore common areas of interest and get involved in Heemskerk's artistic projects. If you're interested in contacting the artist or in taking part in her research in any way, please contact us at info.arts@cern.ch.

As part of her Collide Copenhagen residency award, Heemskerk will travel to Copenhagen next month where she will continue to exchange with scientists and to develop an artwork that will be shown in an exhibition at Copenhagen Contemporary.

LIVE: from the CERN Control Centre with the four largest LHC experiments

Join scientists from the four largest LHC experiments and other experts, live at the CERN Control Centre on 2 November 2023, 3 p.m. CET, for a recap of the first heavy-ion run of the LHC Run 3

The lead-lead collisions on the screens of the CERN Control Centre. (Image: CERN)

For the last five weeks, the Large Hadron Collider (LHC) delivered lead-ion beams to the experiments, marking the first-ever heavy-ion run at the record energy of 5.36 TeV per nucleon pair and the first of the LHC Run 3.

By observing the particles created in lead-lead collisions in the LHC, physicists at CERN aim to study specific phenomena, such as quark-gluon plasma, a hot and dense state of matter thought to have existed for a few millionths of a second in the early Universe, shortly after the Big Bang.

The season of heavy-ion physics will come to an end on 30 October at 6 a.m. CET.

Join CERN on Thursday, 2 November, at 3 p.m. CET, live from the CERN Control Centre (CCC), where scientists from the LHC experiments and other experts will answer your questions about heavy-ion physics and the data they were able to collect this season.

The event will be broadcasted on CERN's Twitter/X, Facebook, LinkedIn, and YouTube.

Bianca Moisa

Celebrate Dark Matter Day at CERN Science Gateway

On 3 November, Nobel laureate Michel Mayor and other scientists will shed light on the dark side of the sky to celebrate Dark Matter Day 2023 at CERN

Look up at the sky – there is a vast part of the Universe that we don't know much about, full of mysteries yet to unravel. To celebrate Dark Matter Day 2023, CERN is pleased to invite the public to explore the latest discoveries in the dark cosmos, from exoplanets to black holes and dark matter, at the Organization's new flagship education and outreach facility, CERN Science Gateway, with Nobel prize laureate and Swiss astronomer Michel Mayor and scientists from CERN and ESO. The public event will be hosted by Paola Catapano and simultaneous interpreting into English and French will be provided.

Dark Matter Day celebrations globally are organised by the Interactions collaboration, whose catchline for the day is "Everyone loves a mystery". CERN's celebrations will help shed light on those mysteries by exploring the visible sky, the discovery of 5000 new solar systems, the dark side of the Universe, and many other such intriguing topics.

How do we know dark matter is out there? Two LHC experiments, ATLAS and CMS, will share what it takes to see and study the invisible. Through a live connection with the Paranal Observatory and the ALMA Observatory in Chile, we will hear from ESO scientists working at the largest and most advanced telescopes on the planet.

You can register to attend the event at CERN Science Gateway here (https://indico.cern.ch/event/1326668/) or tune in for the live webcast (https://webcast.web.cern.ch/event/i1326668) from across the world. This Halloween season, explore all things light to darkness with CERN and other organisations celebrating Dark Matter Day!

Watch a video of CERN scientists answering questions on dark matter submitted by CERN's Instagram followers during Dark Matter Day 2021.

Theatre: "Mauvais Je(ux)" | 9 November | CERN Science Gateway

The 12th edition of CineGlobe, an international film festival inspired by science and technology, presents "Mauvais Je(ux)" – An experimental theatre production that plays games with data.

A creation of Gruppe Laokoon, produced by CineGlobe in collaboration with CineGlobe and the GIFF (Geneva International Film Festival), which will take place on **9 November 2023** at the **CERN Science Gateway**.

Admission is free, but booking is essential. Tickets are available here: https://indico.cern.ch/event/1330009/.

Mauvais Je(ux) is an experimental theatrical evening by Gruppe Laokoon which explores the extent to which technology influences society. To do this, Laokoon will use the online data of a person unknown to them and recreate them based only on their data in the form of four different actors. Four unique interpretations, all based on the same data, and all of them claiming to be the original "I" . Can you spot the wrong "I" here? Place your bets! Mauvais Je(ux) invites the

audience to participate in a fascinating reflection on digital identity and the multiple facets our data can take on in today's digital world.

Don't just witness innovation, be a part of it! Join us on 30 October at CERN or online

Join the first CERN Venture Connect Partner Spotlight event

CERN Venture Connect (CVC) was launched in June this year with the aim of providing startups with fast-track access to five selected cutting-edge CERN technologies and a network of investors and incubators.
We would like to invite you to the first CERN Venture Connect Partner Spotlight event on 30 October, featuring speakers from Microsoft.
The event will be an opportunity for you to learn more about the CVC programme and meet the people behind it. Additionally, you will have the chance to discover how Microsoft enables digital transformation for the era of an intelligent cloud and an intelligent edge, as well as how the Microsoft for Startups Founders Hub helps startups radically accelerate innovation by providing access to industry-leading AI services, expert guidance and the essential technology needed to build a future-proofed startup.
Don't miss the opportunity to discover Microsoft's expertise in AI, open platforms and quantum technologies, and to explore how its expert guidance can help you in your future endeavours.
Gain invaluable insights from Andrea Apollonio, a CERN alumnus and the visionary founder behind Reshape Systems, as he shares the electrifying tale of our inaugural CVC spinout experience.

When: 30 October, 9.00 a.m.–6.00 p.m. CEST
Where: CERN and online (Zoom details available at the link below)
Register: https://indico.cern.ch/e/cvcms

CERN is set to launch its Open Source Program Office (OSPO) on 28 and 29 November and we invite you to join us to celebrate!

On the first day, we will host distinguished open-source experts and advocates from Nvidia, the Open Source Hardware Association and the World Health Organization to discuss the future and the impact of open source. This will be followed by an apéro to celebrate open source. Places are limited for the first day, **so please register in advance here: https://indico.cern.ch/event/1327562/**

The second day will be dedicated to the role of the OSPO within CERN, as a body driven by engaging with the CERN community and serving its needs. We will briefly present what the OSPO plans to do and listen to your ideas, questions and concerns. Please **join us for this event** (no registration is necessary for the second day).
https://indico.cern.ch/event/1327563/)

We invite you to submit any questions you may have before the event on our OSPO forum: **https://ospo.web.cern.ch/tag/opening-event**

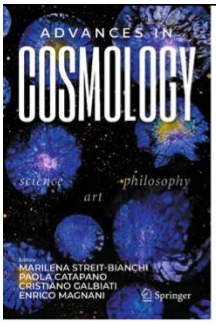
Central heating to be turned on at Meyrin and Prévessin sites starting 23 October

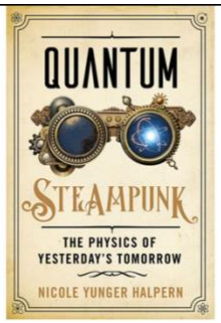
Central heating will be progressively turned on throughout CERN from Monday 23 October 2023. All buildings will be heated within the next few days.
Delaying turning on the heating on campus was one of the measures of the Energy Savings campaign launched in 2022 and included in the ISO50001 certification.
According to these measures, the heating switch on is not any more defined on the basis of a regular calendar but on the weather forecast, and more especially on the overnight temperature. For each day on which the heating start is delayed, our Organization achieves significant energy savings.
We therefore thank everyone for their understanding and supportive efforts to stand the few cooler days before the start date.

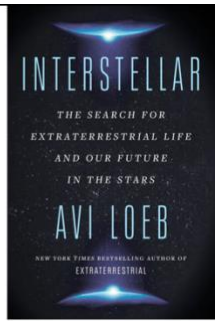
SCE department

CERN Library book presentations in November

Do not miss the next three book presentations at the CERN Library in November!







Friday, 3 November 2023 at 16:30-18:00: Advances in Cosmology by Marilena Streit-Bianchi, Paola Catapano, Cristiano Galbiati, Magnani, Enrico (eds.)
https://indico.cern.ch/event/1327252/

On the occasion of the 2023 Dark Matter Day, editors and authors will present their book "Advances in Cosmology" at the newly renovated CERN Library.
"This book outlines the latest research on modern cosmology and related topics from world-class experts. Through it, readers will learn how multi-disciplinary approaches and technologies are used to search the unknown and how we arrived at the knowledge used and assumptions made by cosmologists today. This multi-disciplinary book will appeal to anyone with an interest in the fields of Astronomy, Cosmology or Physics."
Michel Mayor, Nobel Prize Laureate for Physics in 2019, and Debora Pinna from CMS experiment will be present for the presentation. The event will be moderated by Paola Catapano and will be accompanied by an exhibition of the works of art of Enrico Magnani and followed by Q&A and signing sessions.
You will be able to purchase the book directly from the CERN Bookshop at the CERN Library. It is also available at the CERN Library as e-book or physical copy.

Tuesday, 14 November 2023 at 12:00-13:00: Quantum Steampunk: the physics of yesterday's tomorrow by Nicole Yunger Halpern.
https://indico.cern.ch/event/1327257/

Before her public talk in the Science Gateway, Nicole Yunger Halpern will present her book in the CERN Library.
"In this book, the Industrial Revolution meets the quantum-technology revolution! A steampunk adventure guide to how mind-blowing quantum physics is transforming our understanding of information and energy. It has won the PROSE Award for Best Book in Popular Science and Popular Mathematics by the Association of American Publishers."

The presentation will be followed by a Q&A and signing sessions. You will be able to purchase the book directly from the CERN Bookshop at the CERN Library. It is available at the CERN Library as a physical copy.

Monday, 27 November 2023 at 11:30-12:30: Interstellar: the search for extraterrestrial life and our future beyond earth by Avi Loeb.
https://indico.cern.ch/event/1327256/

Before his public talk in the Science Gateway, Avi Loeb will present his book "Interstellar" at the CERN Library":
"In the New York Times bestseller Extraterrestrial, Avi Loeb, the longest serving Chair of Harvard's Astronomy Department, presented a theory that shook the scientific community: our solar system, Loeb claimed, had likely been visited by a piece of advanced alien technology from a distant star. This provocative and persuasive argument opened millions of minds internationally to the vast possibilities of our universe and the existence of intelligent life beyond Earth. But a crucial question remained: now that we are aware of the existence of extraterrestrial life, what do we do next? How do we prepare ourselves for interaction with interstellar extraterrestrial civilization? How can our species become interstellar?"
The presentation will be followed by a Q&A and signing sessions. You will be able to purchase the book directly from the CERN Bookshop at the CERN Library. It is available at the CERN Library as a physical copy.

All Library Book presentation events are accessible via Indico https://indico.cern.ch/category/1280/ and require no registration. See you there!

CERN Library

REMINDER: Swiss ban on laser pointers

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 giving 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 with this legislation. Those who fail to do so risk criminal prosecution under Swiss law.
The term "laser pointer" refers to a small and light hand-held laser device that emits laser radiation for the purpose of pointing out objects and locations. These are most commonly used at CERN for giving presentations.
Swiss law is now more restrictive than French law, which authorises class 1, 1M, 2 and 2M laser pointers (décret n° 2012-1303 du 26 novembre 2012 – in French). The tightening of Swiss law follows various incidents in Switzerland involving the use of these lasers.
Ensuring appropriate disposal of laser pointers:
Laser pointers can be disposed of via the appropriate CERN waste pathways, as electronic waste, once the batteries powering them have been removed.
Should you be in possession of a laser pointer of class 1M or above, you can return it for appropriate handling and disposal by placing it in one of the dedicated blue containers for electronics provided by the SCE Storage, Recuperation and Sales service, or hand it in directly at Building 133.
Thank you for your cooperation.

SCE department

Ombud's corner

True or false: How much do you know about mediation? (Part II)

Mediation with the Ombud is available to all members of the CERN community and is an effective tool, yet it is largely underused, and colleagues who visit my office often describe conflicts that date back six months, a year or even more. Waiting this long to address a conflict with a colleague compromises the chances of resolving the situation and of restoring the dialogue, empathy, mutual respect and trust that enable the exchange of ideas between both parties.

In my first article on this topic, I invited you to test your knowledge of mediation by answering seven questions. This second article contains seven additional questions to help you complete your overview of mediation.

True or false? Mediation is not always the best way to resolve a conflict

True: Before the mediation begins, I always organise a short meeting with each of the parties involved. If the Ombud becomes aware that one of the parties is not fully committed to resolving the conflict, no further action will be taken. Similarly, in cases of severe and proven breaches of the Code of Conduct, or when the rules of the Organization have clearly not been respected, more direct arbitration by the management may be more appropriate. Finally, if the conflict has been dragging on for a long time (for example, one or two years), it may be very difficult to restore respect and understanding between the two parties through mediation. It is still important to consult the Ombud about the possibility of mediation, who will answer you in full transparency about what can be attempted.

True or false? Mediation by the Ombud will be recorded in my personal file

False: Once mediation has ended, all notes are destroyed, whether they have been taken by the parties involved or by the Ombud. Mediation with the Ombud is informal, and the exchanges between the parties, as well as the agreement reached, are strictly confidential; this obligation must be respected by the Ombud as well as by each of the parties.

True or false? I have filed, or am the subject of, a harassment complaint, in accordance with Operational Circular No. 9. This means that I can't seek mediation

False: OC9 states that either party may request mediation by the Ombud at any stage of the procedure. If both parties agree, the time frame and deadlines for the procedure will be suspended, and mediation will take place. If the parties are unable to reach an agreement following mediation, the procedure laid down in OC9 will resume.

True or false? As a manager, I can conduct mediation between two members of my team

False: As a manager, you are not necessarily trained in mediation techniques. Plus, it's very difficult for you to remain neutral and impartial in a conflict between two members of your team whom you may have known for a long time. Neutrality and impartiality are essential in gaining the complete trust of both parties in a conflict. However, you can listen carefully to each party's side of the story so that you are aware of their individual perception of the situation, the impact the conflict is having on them and what each party needs for a calm working environment, and you can try to meet these needs with the resources at your disposal. Any decision you make to resolve the conflict must be well-founded, fair and transparent.

True or false? Mediation only ever occurs between two parties that are in conflict

False: A conflict may involve more than two people. Mediation by the Ombud in such cases is still possible but may take longer, as the conflict is likely to be more complex. The number of meetings that will be required cannot be predicted.

True or false? Mediation can damage my reputation

False: Putting your trust in the Ombud and in a well-established and proven process can't hurt your reputation. Attempting mediation gives you a chance to clear up any misunderstandings, understand the other person's perspective and accommodate different outlooks. On the other hand, if you allow a conflict with a colleague to continue and let the situation deteriorate and gradually affect your whole team, your reputation is likely to suffer.

True or false? Mediation is always successful

False: Successful mediation results in an agreement between the two parties, but this is not always possible. The Ombud may decide to end mediation if it's clear that dialogue cannot be re-established. Alternatively, either party may wish to stop the mediation for any reason. In such cases, the Ombud will request a private discussion with the person concerned before confirming that the end of the mediation. However, even if it is not always successful, or if it is not completed, mediation never makes a conflict situation worse.

True or false? Informal conflict resolution is not the only benefit of mediation

True: Successful mediation allows both parties to reach an agreement on how they will continue to work together. Restoring a calm and respectful working environment is the primary benefit of successful mediation but it is by no means the only one. The process of mediation involving the Ombud helps us to step back when we tell the story of a conflict and to focus on what we've felt rather than who we believe was right or wrong. Mediation teaches us to express our needs and objectives clearly and calmly. These are all skills that are extremely useful in our working lives.

I hope that this second article on mediation has answered any questions you may have had. Don't hesitate to contact me if you require any further information. It would truly be of great benefit if mediation were to find its place in the culture of our Organization.

Laure Esteveny

I would like to hear your reactions and suggestions – join the CERN Ombud Mattermost team at https://mattermost.web.cern.ch/cern-ombud/.

Find out more about the role of the CERN Ombud and how to contact the Ombud at: https://ombuds.web.cern.ch/