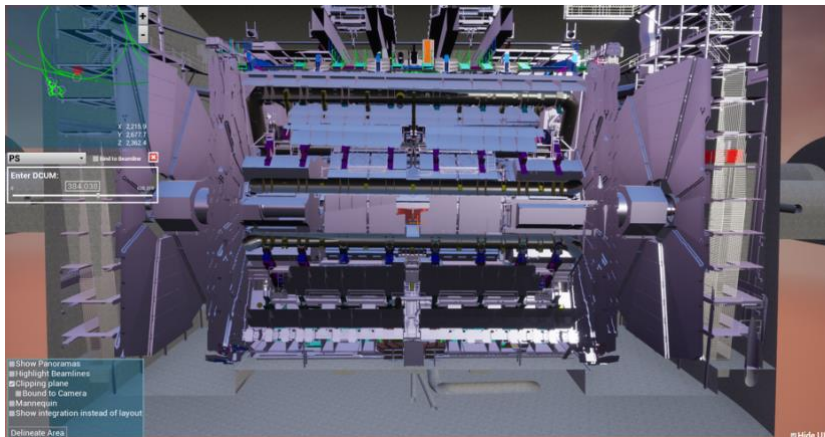


## Digital twins at CERN and beyond

Discover how these virtual copies of reality are being used at CERN and what their impact is on society



A digital twin, or virtual copy, of the ATLAS experiment at CERN. (Image: CERN)

“Digital twins” blur the line between the physical and the virtual. More than simulations, these virtual copies of reality incorporate real data to reshape the way we design and build, allowing us to predict real-world outcomes with astonishing accuracy. A recent workshop at CERN explored the complexities of this technology and showcased its applications.

At CERN, digital twins play a key role in high-energy physics experiments: from detector development, to designing strategies for data analytics and comparing results with theoretical models. For example, digital twins of particle collision events are used to make samples of physics processes within detectors in order to compare and evaluate the presence of new signals.

They are also used to enhance the operability of robots in a safer testing environment before integrating them into the accelerator complex. Digital twins of the cranes and the cooling and ventilation systems make it possible not only to analyse and improve CERN’s infrastructure, but also to find unidentified anomalies before they arise in real life.

Beyond CERN, digital twins are crucial in optimising production and ensuring equipment safety in manufacturing and industry. In healthcare, they assist in patient data analysis, surgical planning and training. They play a pivotal role in design, testing, and simulation in aerospace, automotive and aviation industries. They also contribute significantly to smart city initiatives, aiding in urban planning and infrastructure management.

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The recent workshop examined shared challenges, showcased reusable development frameworks, and sparked discussion on strategic approaches within the digital twin domain at CERN. The enthusiastic response has led to a follow-up digital twin workshop, foreseen for summer 2024, with planned inclusion of industry and academic participants from outside CERN. For more information, contact [digital-twins@cern.ch](mailto:digital-twins@cern.ch).

As these digital doppelgangers continue to bridge the realms of reality and the virtual, their impact on society is clear. With the power to revolutionise industries, advance scientific discovery, optimise infrastructure and enhance healthcare, digital twins are not just a technological marvel, but a catalyst for building a smarter, safer and more sustainable future for us all.

*Marina Banjac*

## Accelerator Report: Exploring performance potential for future benefit

The 2023 LHC run ended with a quench in the early morning of 30 October, two hours ahead of the official start of the year-end technical stop (YETS). Later that same morning, bells started to ring on the LHC access console in the CERN Control Centre: the technical teams were ready to enter the LHC tunnel, kicking off the 2023–2024 YETS. In the coming months, many preventive and corrective maintenance activities will take place in different locations in the LHC machine, as well as in the injector chain. The schedule is tight – the machines have to be ready for the injection of the first 2024 LHC beam on Monday, 11 March.

In the injector chain, the beams to the majority of the experimental facilities were also stopped – but not to all of them. Linac4, the PS Booster and the PS will still produce beams for the antimatter factory until 13 November, to partially compensate for the 50 days of lost beam time earlier this year.

Pauses in beam production before the start of the maintenance activities are a good opportunity for dedicated machine development studies and tests: on 30 and 31 October, Linac4 and the PS Booster were able to study beam production with a high beam current out of the Linac4  $H^-$  source. In the framework of the LHC Injectors Upgrade project, Linac2 was replaced by Linac4, which, in combination with the PS Booster, is able to produce particle beams of higher brightness – more protons in the same beam size. The Linac4 source provides a beam current of 35 mA, which is

sufficient to produce the operational beams currently required, but further developments to its source will enable an extracted beam with a higher current to be produced. In order to deploy such a beam in future operations, tests must be performed, in particular to explore the capacities of the PS Booster with a high beam current.

On 30 October, the source experts adjusted the Linac4 source parameters and managed, in less than one hour, to extract a beam current of 48 mA – almost 40% higher than usual. The next step was to accelerate and transport this high-current beam through Linac4 to the PS Booster. The operational cycles used to deliver beams to the LHC, AD, n\_TOF, ISOLDE and the SPS North Area were successfully adjusted to match these new beam parameters, proving that with the high-current beam from Linac4 the PS booster can produce the operational beams that are required today.



The Linac4 fixed display, indicating the beam current (the negative values) at different locations along the machine, from the source (far left, usually at -35 mA, but at -48.3 mA during the test) up to the PS Booster (far right). (Image: CERN)

In a second stage, the intensity reach was explored, with the cycle used to send beams to ISOLDE. The nominal beam intensity to ISOLDE is usually  $3.2 \times 10^{13}$  protons per cycle, which come from the four PS Booster rings (each ring accelerates  $8 \times 10^{12}$  protons per cycle). During the test, the experts managed to double the beam intensity in three of the four rings, without significantly increasing the beam losses. This performance was achieved during a relatively short period, and its stability remains to be proven

over longer periods of time. Nonetheless, in the future, such a beam intensity could allow more than  $6 \times 10^{13}$  protons to be provided per cycle, which is an unprecedented amount. This potential is a great asset for future upgrades and consolidation of downstream experimental facilities and will benefit future fixed-target physics.

*Rende Steerenberg*

## Heard about quantum technology? Now it's time to understand it!

Quantum technology is among the biggest talking points on the web. And yet, the general feeling is that only experts can understand it. The Sparks! Forum at CERN aims to prove this wrong



Like several other types of information technology developed in the recent past, quantum technology looks like a “strange new thing” with the potential to change our present and future. At CERN, this feeling is not new to us, as it is here that the World Wide Web was invented over 30 years ago.

Today, quantum is a global initiative involving research centres, established companies and startups. At CERN, the Quantum Technology Initiative, which provides a platform for quantum computing, has recently been complemented by the Open Quantum Institute (OQI), which has been designed to become the societal arm of CERN’s Quantum Technology Initiative and aims to support projects that use quantum computing for the benefit of all.

There could arguably be no better place to showcase this theme than the Sparks! Forum, designed to inspire curious minds to discover

cutting-edge topics in science and technology that affect society. Its third edition will be on the theme of Future Quantum. In preparation for it, on 16 November in the recently inaugurated auditorium of CERN Science Gateway, speakers will take the audience on a journey into the future of quantum technology, as well as looking at how it is already shaping our present.

At the event, you will hear a range of presentations, from a basic overview of quantum technology to quantum’s applications in agriculture and medicine, passing through the potential impact of quantum in the field of high-energy physics.

Confirmed speakers are:

- Nicole Yunger Halpern, author of Steampunk Quantum
- Mira L. Wolf-Bauwens, Responsible Quantum Computing Lead at IBM Research
- Rachel Maze, Head of Quantum Technologies Policy, UK Department for Science, Innovation and Technology.

The event will also explore the theme of quantum technology through the artistic point of view of dancers Wenchi Su and I-Fang Lin.

The event will be moderated by Bruno Giussani and is supported by the CERN & Society Foundation and Rolex.

## **CERN's new Open Source Program Office**

**CERN launches its Open Source Program Office to help you with the release of your software and hardware designs**

Have you ever considered making your software or hardware designs publicly available? Sharing your work with collaborators in research and industry has many advantages, but it may also present some questions and challenges. To help you with all issues relating to the release of your software and hardware designs, we are launching CERN's Open Source Program Office (OSPO).

In our community, it is common practice to publish open source software and hardware designs. By releasing your work under licences that allow others to use it, study its source code, redistribute it and share improvements, you can promote transparent and inclusive research practices. Given that all our research is a collaborative effort, open source is a common way of making our software and hardware accessible to everyone, allowing us to grow through contributions and new partners.

But how easy is it to publish open source designs? While there are many advantages to releasing open source software and hardware, it also presents challenges, such as addressing intellectual property rights by choosing the right licence. The effects of licence choices on future collaborations are not always obvious and must be carefully considered. Additionally, you may be confronted with technical challenges in ensuring that released material can be effectively used and modified by others.

### **Why an Open Source Program Office?**

The OSPO will support you, whether you are a member of the personnel or a user, to find the best solution by giving you access to a set of best practices, tools and recommendations. With representatives from all sectors at CERN, it brings

together a broad range of expertise on open source practices. If you would like to get in touch with the OSPO, you can contact us via [Open.Source@cern.ch](mailto:Open.Source@cern.ch). As well as supporting the CERN internal community, the OSPO will engage with external partners to strengthen CERN's role as a promoter of open source.

Open source is a key pillar of open science. By promoting open source practices, the OSPO thus seeks to address one of CERN's core ambitions: sharing our knowledge with the world. Ultimately, the aim is to increase the reach of open source projects from CERN to maximise their benefits for the scientific community, industry and society at large.

### **We launch on 28 November – join us!**

We are organising two events, on 28 and 29 November, to officially launch the OSPO. On the first day, we will host distinguished open source experts and advocates from Nvidia, the World Health Organization and the Open Source Hardware Association to discuss the impact and future of open source, followed by an aperitif. Seats are limited – please register in advance: <https://cern.ch/ospo-1>.

The second day will be dedicated to the role of the OSPO within CERN; the new office will be driven by engagement from the CERN community and will strive to meet its needs. We will briefly present the plans for the OSPO and listen to your ideas, questions, projects and concerns. Please join us on this occasion: <https://cern.ch/ospo-2>. You are welcome to submit your questions before the event on our forum: <https://ospo.web.cern.ch/tag/opening-event>.

# A journey from CERN to entrepreneurship

**Through CERN Venture Connect, a new programme that helps launch startups at CERN, ideas can grow to shape the future of technology**

In the ever-evolving landscape of entrepreneurship, there exists a profound belief in the transformative power of collaboration. This belief holds true at CERN, where cutting-edge technologies are developed for accelerators, detectors and computing through international collaborative efforts. CERN's unique environment fosters an atmosphere where talented individuals collaborate, ideas flourish and technologies with the potential to revolutionise the world are born. It is within this extraordinary setting that remarkable stories have unfolded, such as that of Andrea Apollonio, former LHC hardware commissioning coordinator. While working at CERN, Andrea immersed himself in the intricate world of fault tracking, risk and reliability analysis, data management, machine learning and performance monitoring for the CERN accelerator complex. After a decade at CERN, his entrepreneurial spirit prompted him to envision the creation of a venture centred around the cutting-edge Accelerator Fault Tracker (AFT) technology developed at CERN.

Reshape.systems s.r.l. was thus born out of Andrea's vision to leverage AI-driven risk analysis to create robust, fail-safe systems for a variety of applications. Teaming up with co-founder Thomas Cartier-Michaud, another CERN alumnus, Andrea embarked on a transformative journey to secure funding for crucial prototype development and gain access to advanced computing infrastructure and AI services.

Pivotal to this journey was the newly created CERN Venture Connect programme (CVC), launched in 2023, which aims to connect startups with the best operators in the entrepreneurial sphere – venture capitalists, corporate partners, incubators and mentors. CVC sets up streamlined and standardised licensing agreements that are optimised for fast execution with a novel deal structure – 2% royalty payable only when the startup reaches 1 MCHF in sales.

In establishing CVC, CERN's Entrepreneurship team entered discussions with Microsoft, with the aim to better leverage the Microsoft for Startups Founders Hub within the CVC programme, and, crucially, introduced Reshape.systems s.r.l. to Microsoft. The partnership between Microsoft and CVC proved to be a game-changer for Andrea's startup that initiated a formal application into Founders Hub. By qualifying for access to the Microsoft for Startups programme, Reshape.systems is now able to access industry-leading AI services, expert guidance and the essential technology needed to build a future-proofed startup."

"Working with Andrea to reshape fault tracking for CERN's accelerator complex resulted in much improved operational visibility and brought high strategic value. Now, through Reshape.systems s.r.l., other organisations can also benefit from working with Andrea to boost their own value streams," says Chris Roderick, leader of the Controls Software and Services group in the Beams department at CERN.

"Andrea Apollonio's journey from CERN to entrepreneurship serves as a testament to the boundless possibilities that emerge when passion, expertise and the spirit of innovation converge and are supported by visionary organisations like CERN. CERN Venture Connect (CVC) is designed to nurture such ambitions, empowering the next generation of scientist entrepreneurs and shaping the future with technology," says Ash Ravikumar from the CERN Entrepreneurship team within CERN's Knowledge Transfer group.

If you would like to find out more about CERN Venture Connect, hear how Microsoft is supporting startups and listen to Andrea's journey, come to the Venture Connect event at CERN on 30 October or join online via Zoom. To register, visit: <https://indico.cern.ch/event/1306729/>.

*Marzena Lapka*

# Computer Security: Data Centre Nightmares

What a bad weekend. I didn't sleep well. Not. At. All. I tossed and turned. Sweated. Woke up and fell asleep again. I had data centre nightmares.

You know, computer security comes with clear mantras. One is "Defence-in-depth", where security controls are applied at every level of the hardware and software stack, e.g., agile and timely updating and vulnerability management, secure and professional software development, as well as an inventory known as Software Bill of Materials (SBOM), tested business continuity and disaster recovery plans, logging and intrusion detection, access control, network segregation and compartmentalization, firewalls and email quarantines, data diodes, bastion hosts, gateways and proxies. A second mantra is "KISS" – "Keep it simple, stupid". It tells us not to overcomplicate things, to avoid unnecessary complexity and to not deviate too far from the "standard".

But nothing is "KISS" anymore. Gone are the days when the accelerator sector, the physics experiments and the IT department used a multitude of dedicated PCs – PC farms – to do the job. The same PCs that could be found in offices. And, security-wise, PCs were easy back then: the motherboard and its "BIOS" (operating system) and your favourite application. Three layers to secure. Easy. Although we had separate computer centres in the past, this is not affordable anymore. The combined requirements of the accelerator sector, experiments and IT, as well as the user community, are simply too large.

A modern data centre, on the other hand, is complex. Instead of three layers, we have five: the motherboard (but now running a full-blown operating system), a hypervisor, one or several virtual machines benefitting from the multiple CPUs on the motherboard, and the containers inside running – finally! – your favourite application. And since everything is virtualized, the same hardware runs a multitude of other applications in parallel. This is called being "agile" or "elastic", and it allows for load balancing, business continuity and disaster recovery. It accommodates the infrastructure for "Big Data" – machine learning and, just around the corner, ChatGPT. It provides public/hybrid/private cloud

resources, as well as GPUs, and it will eventually enable quantum computing. It is, to use the German phrase, "eine eierlegende Wollmilchsau". Enter the third mantra of computer security: "AC/DC", or rather, "all convenient and damn cheap". After all, nobody prioritises security over convenience and value for money. "AC/DC" is therefore complex and not without significant security challenges – my worst nightmare... Let's start dreaming.

## Dreaming of dedicated networks

Let's try. One network for the hardware and its BIOS, now called IPMI or BMC – a fully-fledged operating system. One network for the provisioning of the virtual machines and containers. One network for CERN's Intranet – the Campus Network. Several networks for running the accelerators, infrastructure and experiments. "Security" would require those networks to be physically separate from one another, as using the same hardware (routers, switches) – e.g. to spin up VLANs – might have flaws and, when exploited, could allow a hacker to jump from one network to another. I start tossing and turning in bed.

Also, the network needs to be managed: DHCP, DNS, NTP. Ideally, there should be one system for each network. Unfortunately, they need to be synchronised, either by connecting them or just having one central system. One system to rule them all. One system to fail. My mind is racing.

And it might not even matter. By using hypervisors, we are already bridging networks. Unless we have separate hypervisors for separate duties, which would violate the third mantra – by not being elastic, convenient or cheap. Unfortunately, we have already seen cases in which vulnerabilities in the hypervisor have spread, jumping from one virtual machine to another, bridging networks, and more: "Spectre", "Meltdown" and "Foreshadow" (2018), "Fallout" (2019), "Hertzbleed" (2022), "Downfall" (2022) and "Inception" (2023). I'm sweating.

But it can get worse. Our hardware, our computer centre, is supposed to serve. And sometimes it must serve several masters. The accelerator sector and the experiments and at the same time the



Campus Network. Or, even worse, the Campus Network and the Internet. Full exposure. One server, one service, one application (like the “e-logbook”) visible to the accelerator control room, the experiments, the Campus Network, and the whole wide world. Ready to fall prey to ransomware. Waking up.

### **Hallucinating about controlled administration and provisioning**

But let’s forget those complications. I’m falling asleep again. This time I’m dreaming of data centre administration. Ideally, admins have one console for the IPMI/BMC network and one for provisioning. But who wants to have two consoles on their desk? Three, if you count the one for the Campus Network. Mantra three: Nobody. So, we bridge the networks once more. One console – an office computer – to administer them all. Ideally reachable from the Internet for remote maintenance. Not that this comes with any risk... Tossing and turning again.

And we have not yet mentioned provisioning, that is, the use of Puppet and Ansible tools to “push” virtual machines and containers out from the storage systems and databases and deploy them in the hypervisor, thereby “orchestrating” the data centre. But this orchestration, the storage systems and the databases must also be available to our user community: CERN allows its community to run their own services, their own virtual machines and their own containers. So, we ultimately bridge the provisioning network and the Intranet once more. Sweating. Lots of sweating.

### **The cloud trance**

The above configuration – with all its complications – can also be called a “private cloud”. But modern people don’t stop here. Enter public clouds. Connecting our data centre with that of Amazon, Google, Microsoft or Oracle. Bridging our networks, sigh, and theirs. Via the Internet. And using, in parallel, other Internet resources: publicly shared virtual machines, commonly available containers, shared (open source) software libraries and packages. The Internet is full of all sorts of useful things. And malicious things, too. Compromised virtual machines, malicious containers, vulnerable software. All of them channelled straight into our data centre. No filtering, nothing. Aarrgh. I’m wide awake again.

### **Data centre nightmares**

Voilà. I’m having data centre nightmares. Common hardware vulnerabilities threaten the security of data centres. As do basic services crossing network boundaries (DNS, SSO/LDAP, orchestration, storage, DBs, etc.). A rapidly growing cacophony of dependencies, agility, heterogeneity and complexity violates the second mantra: “KISS” (“Keep it simple, stupid”) becomes “AC/DC” (“All convenient and damn cheap”). And that’s without mentioning the increasing dependency on external cloud services and software importations... So, if you have any bright ideas – and please don’t suggest sleeping pills – let us know at [Computer.Security@cern.ch](mailto:Computer.Security@cern.ch).

*Computer Security team*

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## **Official News**

### **CERN Safety Rules: “Fire Safety and Radiation Resistance requirements for Cables”**

The CERN Safety Rule listed below has been published on the CERN website dedicated to the Safety Rules:

Safety Guideline SG-FS-2-1-1 (revised version)  
The Guideline complements the specific Safety Instruction SSI-FS-2-1 “Fire Safety and Radiation

Resistance requirements for Cables” published in December 2021. It provides guidance as to the implementation of SSI-FS-2-1 in particular with regard to the certification and selection of Cable materials. The Guideline has been updated to define the conditions under which the HSE Unit accepts exceptions to Safety requirements with

respect to fire performance of certain types of Cables.

The CERN Safety Rules apply to all persons under the Director General’s authority. They are available under the following link: <http://www.cern.ch/safety-rules>.

*HSE Unit*

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## **Tunnel linking the CERN sites: notice required in the event of exceptional opening**

Use of the tunnel linking various parts of the CERN site is a special facility granted to the Organization by its Host States, France and Switzerland, to assist in its operations. The general principles for the use of the tunnel are laid down in agreements concluded between the Host States and between them and CERN (cf. Internal Rules CERN/DSU-DO/RH/8200). Failure to observe these rules may result in disciplinary action. The tunnel is open from 7.30 a.m. to 6.00 p.m., Monday to Friday, excluding CERN's public holidays.

Outside the normal opening hours, members of the CERN personnel may request that the tunnel be opened exceptionally for the urgent transport of property belonging to CERN or the collaborating institutes. The request must be made to the Fire and Rescue service (tel. 74444) at least two hours before the intended time of passage through the tunnel to allow the Host State authorities to make any checks.

As with Gate E, people, goods and equipment passing through the tunnel may be subject to checks by the relevant French or Swiss authorities at any time. Members of the personnel are therefore reminded that, in addition to the transfer slip, if applicable, they must carry with them a travel document and their valid Swiss and French legitimation cards. Those who do not hold legitimation cards issued by the Host States due to the short duration of their contract with the Organization must carry with them the following documents:

- their national identity card, if accepted by the French and Swiss regulations, or a passport (with visa(s) if required by the French and/or Swiss regulations) and
- their blue CERN access card.

*Host State Relations service*  
<http://www.cern.ch/relations/>  
*Tel. 75152*

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## **Fraudulent telephone calls: warning from the Swiss authorities**

The Swiss Mission has informed CERN that the Geneva police force regularly receives reports of fraudulent telephone calls from scammers posing as bank employees, police officers or representatives of the authorities. The Geneva police force warns the public to

beware of such scams and advises anyone receiving a seemingly fraudulent telephone call to hang up immediately and avoid communicating any personal or banking details. More information on what to do if you are contacted by a scammer is available on the following web pages:



- <https://www.ge.ch/actualite/faux-employe-banque-nouvelles-escroqueries-telephoniques-aupres-seniors-4-05-2023> (in French)
- <https://www.bazg.admin.ch/bazg/en/home/teaser-homepage/focus-teaser/warnung-telefonanrufe-mit-automatisierter-ansage-des-zolls.html>

Centre (NCSC), which lists all known cyber threats and provides practical information about fraud risks. Incidents can be reported on the website: <https://www.ncsc.admin.ch/ncsc/en/home.html>.

*Host State Relations service*  
<http://www.cern.ch/relations/>  
 Tel. 75152

In addition, the Swiss Mission draws our attention to the website of the National Cyber Security

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## Announcements

### 17 November: Raising the flag for LGBTQ+ STEM day

Join us on Friday 17 November at 1 p.m. on the Esplanade des Particules as we raise the LGBTQ+ flag



*On 17 November, CERN will raise the LGBTQ+ flag designed by Valentino Vecchiotti in 2021. This version, known as the Progress Pride flag, overlays the familiar rainbow with a purple circle representing the intersex community and coloured arrows to represent transgender people and LGBTQ+ people of colour. The arrows point to the right to indicate progress. (Image: Nikki/Wikimedia Commons)*

The CERN community is warmly invited to participate in raising the LGBTQ+ flag on the

occasion of LGBTQ+ STEM Day. Please join us on **Friday 17 November at 1 p.m. on the CERN Esplanade des Particules** to celebrate this historic moment for diversity and inclusion (D&I) at CERN, more information on Indico.

By approving the D&I Programme's proposal to raise the flag, the Directorate acknowledges the valuable contribution of the LGBTQ+ community in the fields of science, technology, engineering and mathematics (STEM). This decision also reinforces CERN's commitment to diversity and inclusion in STEM and underlines the Organization's message that science is for everyone.

In solidarity with other scientific organisations, scientific institutes, and public institutions, CERN raises the flag for LGBTQ+ STEM Day as a sign of respect, of community, and of recognition.

# A steampunk guide to quantum thermodynamics – join us for the special edition of the CERN QTI lecture series

On 17 November, Dr Nicole Yunger Halpern, theoretical physicist at the National Institute of Standards and Technology (NIST), fellow of the Joint Center for Quantum Information and Computer Science, and adjunct assistant professor at the University of Maryland, will give a talk as part of the CERN QTI lecture series.

Launched in March 2023, the CERN QTI lecture programme aims to increase awareness and understanding of the recent developments, opportunities, and challenges in various areas of quantum research. It welcomes both emerging and established researchers to jointly unlock the full potential of quantum technologies and provide new insights into the rapidly evolving field of quantum science. Guest speakers showcase their work, share knowledge and skills and exchange new ideas and practices, thus helping to shape the quantum expertise of tomorrow.

In her upcoming talk, Dr Nicole Yunger Halpern will explore a new branch of science – quantum thermodynamics – through the lens of steampunk. Holder of the International Quantum Technology Emerging Researcher Award, the US ASPIRE Prize

and the Mary Somerville Medal, and author of the award-winning book *Quantum Steampunk: The Physics of Yesterday's Tomorrow*, she will present an overview of how quantum information theory can revolutionise thermodynamics and the way we understand computation, cryptography and measurement.

If you are interested in the interplay of quantum physics, information theory and thermodynamics or if you would like to see how steampunk blends inventions of the past with futuristic technology – save the date now!

Free and open to all, the lecture will be held in hybrid format: physically at CERN (the IT Amphitheatre) and online via a webcast. There will also be a Zoom link available to those with a valid Indico account.

For full details, visit:  
<https://indico.cern.ch/event/1336271/>

*\*Please note that one day before the lecture, on 16 November, Dr Halpern will give a public talk at the Sparks! Future Quantum event, held at the CERN Science Gateway. To find out more, check the Sparks! website at: <https://sparks.cern/>*

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## Become an ambassador for Women and Girls in Science and Technology!

**From 5 to 9 February 2024, female science ambassadors are invited to share their passion for science with local schoolchildren. Volunteer to take part!**

For the eighth year running, CERN, the UNIGE Faculty of Science, EPFL and the Laboratoire d'Annecy de Physique des Particules (LAPP) are joining forces to celebrate the International Day of Women and Girls in Science. During the week of 5 to 9 February 2024, female scientists and engineers will be visiting local schools to inspire younger generations to explore the world of science.

As a female science ambassador, you will talk about your career path, share your projects and professional experiences and maybe even give a

short demonstration. Our aim is to change the way schoolchildren view scientific, technical and technological professions, making them accessible to both girls and boys. And who knows, these presentations might even inspire some future careers!

Every year, the Women and Girls in Science and Technology week proves to be a great success. In 2023, over 240 presentations were given by 100 or so female science ambassadors to 5220 schoolchildren! **This is why we're always looking for more female scientists willing to give up a bit**

**of their time to give talks in schools.** So come and join the adventure by signing up: **the deadline is 10 December 2023 (11.59 p.m.).**

**Conditions of participation:**

- 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, UNIGE, EPFL and LAPP. If you are not from one of these institutions but would like to take part, please contact us.
- Volunteers will deliver one-hour presentations for a maximum of 35 pupils aged 7 to 15.
- The majority (95%) of the presentations will be given in French, but presentations in English are also possible.

- Volunteers are required to attend a briefing session.

**Sign up and find out more:** <http://cern.ch/fds-interne>

**Deadline for signing up:** 10 December 2023 (11.59 p.m.)

**For CERN volunteers only:** we are also looking for a female scientist who is available on Saturday, 24 February at 10.30 a.m. to talk (in French) to children aged 7 and over about her job and about particle physics in general. This event is being organised by the Bourg-en-Bresse multimedia library. Transport expenses will be covered. For more information and to volunteer, contact [education.locale@cern.ch](mailto:education.locale@cern.ch).

Thank you for volunteering!

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## Join us for “Voxxed Days” at CERN Science Gateway

**A new Voxxed Days event is coming to CERN on 22 and 23 January 2024, and everyone is invited**

Voxxed Days are a series of tech events organised by local community groups and supported by the Voxxed team. Sharing the Devovx philosophy that “content comes first”, these events see both internationally renowned and local speakers converge at a wide range of locations around the world. Content on Voxxed is generated by the developer community, “from developers, for developers”. Supported by local user groups, Voxxed Days CERN will offer the chance to hear from experts on a range of important topics **on 22 and 23 January 2024 at CERN Science Gateway.**

**More information on Indico:**  
**<https://indico.cern.ch/event/1335658/>**

If you are a developer whose curiosity is piqued by technological developments around Java, JVM, performance, productivity, web technologies or

developer practices, this event is for you. We promise an outstanding two days filled with amazing content, all at an iconic location at the new CERN Science Gateway.

Speakers include Dr Venkat Subramaniam, Sebastian Daschner, Josh Long, Ivan Lopez, Victor Rentea, Dr Philippe De Ryck, Oliver Drotbohm, Simone De Gijt, Ana-Maria Mihalceanu, Piotr Przybyl, and Adam Bien.

Tickets for Voxxed Days CERN are available now.

**Register here:** <https://cern.voxxeddays.com/>  
There will also be a limited number of **free places** available for members of the **CERN personnel**. More information on how to obtain these places will be available soon on Indico.

# The CERN Library offers now an online access to all the SNV, IEC, SIA, Electrosuisse and ISO standards

Do you need to refer to standards for work? Via the SNV-Connect platform, you can access more than 45'000 standards in English, French or German, including the access to historical and current versions. The access is available using CERN SSO with the Microsoft Office 365 institutional account. With this platform, you can also create alerts on

selected standards to receive a notification on the future updates.

In case you cannot find what you need on the platform, fill in the request form and our librarians will be happy to assist.

Please send your feedback or questions to: [library.desk@cern.ch](mailto:library.desk@cern.ch).

*CERN Library*

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## Watch: safety concerns us all

Watch this new video from the HSE department on how you can help make CERN a safer place to work

CERN strives for excellence in matters of safety, which covers occupational health and safety, the safe operation of CERN's installations and the protection of the environment. Prevention is at the heart of this endeavour.

To raise awareness and support the effort to make CERN a safer place for everyone, the HSE unit publishes safety flyers and posters, such as the newcomer safety awareness flyer, recalling the basic prevention principles and the people and services that provide support in matters of safety. The video is the latest of these communications and aims to remind everyone of the variety of hazards present on the CERN site and the prevention measures to adopt.

General safety communications by the HSE unit are complemented by more specific information

provided by the departments and the LHC experiments, tailored to their activities, the specific risks these entail and their organisation.

Safety starts with all of us. During our workday we encounter a variety of hazards, from the general to the more specific. Common risks, such as trips and falls or incidents involving our movements around the site, concern us all, while more specific hazards depend on the workplace and/or the nature of our activities. It is thus important to stop and think before beginning an activity and then act, taking account of the risks involved and the corresponding mitigation measures.

Watch the video on the CERN restaurant screens or at: <https://videos.cern.ch/record/2298669>.

*HSE Unit*

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## The November/December issue of the CERN Courier is out

Welcome to a special issue of the Courier to celebrate the opening of CERN Science Gateway. In addition to lifting the lid on this new flagship facility for science education and outreach, we explore the broader issues surrounding education, communication and outreach in particle physics (p27). Delving into Science Gateway's exhibition spaces, experts reflect on four stunning art

installations (p36), the secrets of success for an interactive exhibit (p31) and the power of objects (p39). Following a deep dive into the new educational labs (p41), learn about CERN's activities in physics-education research (p43), the impact of its hugely popular teacher programmes (p45), and how particle physics is integrated in school curricula (p47). From empowering children

(p49) to taking physics to festivals (p50) and transcending physical and neurological boundaries (p51), three articles emphasise the importance of reaching out as far and wide as possible. Last but certainly not least, we consider the invaluable role played by physicists (p52 and 53) and weave the rich experiences of CERN guides throughout the pages.

It's business as usual in the rest of the issue – that is, if you consider the first measurement of the

freefall of antimatter (p7), the first high-energy observation of entanglement (p15) or a  $5\sigma$  discrepancy between theory and experiment (p8) business as usual. Other highlights include an interview with the incoming KEK director-general (p58), the latest conference reports (p19), careers (p62) and reviews (p60).

Read the digital edition of this new issue on CDS:  
<https://cds.cern.ch/record/2879381>

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## Ombud's corner

### Pivoting: a basketball metaphor for addressing conflicts

In basketball, a *pivot* is a rotation to face another direction, in order to pass or shoot the ball more effectively. I have recently been reviewing a variety of reading material about conflict resolution and was surprised to find that the book *The Conflict Pivot* by Tammy Lenski uses this basketball term as a highly visual metaphor for a unique approach to addressing conflicts.

This excellent book focuses on how you can find peace of mind when faced with a conflict, without focusing on what the other party can do. I find the approach innovative, well argued, well documented and highly practical.

The approach proposes three successive pivots to address any situation of conflict you may experience:

#### **Pivot 1: Away from your “stuck story” and towards its message**

This first pivot asks you to stop ruminating on your stuck story and, instead, attend to what this stuck story is telling you. A conflict story can hold a meaningful message for us if we take the time to consider it with an open mind.

#### **Pivot 2: Away from their behaviours and towards your hooks**

In a conflict, we normally view the other party's behaviour as the reason we feel hurt, rejected, insulted, angry, etc. Instead, this pivot asks us to consider what has hooked us to the situation and which of our needs has not been respected. For example:

- *Competence* – our need to be recognised as capable, intelligent or skilled, or as having expertise
- *Autonomy* – our need to be acknowledged as independent and self-reliant and to have our boundaries respected
- *Fellowship* – our need to be included and viewed as likeable, cooperative and worthy
- *Status* – our need to be admired for our tangible and intangible assets, such as attractiveness, reputation and power
- *Reliability* – our need to be seen as trustworthy, dependable and loyal
- *Integrity* – our need for others to respect our dignity, honour, virtue and good character

In other words, this second pivot asks us to look at ourselves and what has been hurt, rather than at what the other party did.

#### **Pivot 3: Away from the past and towards the now**

Conflict thrives in the uncertain past of who said what, who did what, who's to blame or what really happened. Focusing instead on the present and future can set you free. Conflict also thrives on our reliance on the other person to set things right. By focusing on what you can do about the conflict, you take back your power.

Tammy Lenski's book elaborates in quite some detail on each of these pivots, using many practical examples. It is definitely worth a read!

The "conflict pivot" approach offers a path to finding peace of mind when faced with a conflict without involving an external and independent third party, such as a mediator. The approach does not resolve conflicts but suggests that you view conflicts differently and trust your own self-awareness and ability to distance yourself from your usual thought patterns and gut reactions. The Ombud is available, should you need a discussion

and/or guidance on how to apply this approach to a conflict that may be bothering you.

*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/>.*

*More information on the role of the CERN Ombud and how to contact her can be found at <https://ombud.web.cern.ch>*