

Higgs10: Big Bang Day

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The scene in the CERN Control Centre on 10 September 2008, when beams went round the LHC for the first time. (Image: CERN)

It was at 9.30 a.m. on 10 September 2008 that the LHC's first beam was injected, in the full glare of the global media spotlight. Just under one hour later, a beam had been successfully steered all the way around the ring, to scenes of great emotion at the Laboratory. A long wait was over, LHC page 1 became the focus of everyone's attention around the Lab, and a new era of research seemed about to get under way, but the sense of euphoria was to be short-lived. In the days that followed, things went well, but then disaster struck: during a ramp to full energy, one of the 10 000 superconducting joints between the magnets

failed, causing extensive damage that took more than a year to recover from. Image of a LHC beam screen recorded on 10 September 2008, showing two spots corresponding to the successful circulation of protons once around the machine. (Image: CERN) It was unheard of to start a machine like the LHC in the public eye, but I'm assured we had little choice. In the months a ...

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Lyn Evans

A word from Fabiola Gianotti

News from CERN's Council

The CERN Council met this week, and high on the agenda was a topic that deeply concerns us all: the ongoing brutal invasion of Ukraine by the Russian Federation, aided by the Republic of Belarus.

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News from CERN's Council

Following the 208th session of the CERN Council, which concluded on 17 June, the Director-General sent the following message to the CERN personnel

The CERN Council met this week, and high on the agenda was a topic that deeply concerns us all: the ongoing brutal invasion of Ukraine by the Russian Federation, aided by the Republic of Belarus. Yesterday the CERN Council declared (<https://council.web.cern.ch/en/content/news>) that it intends to terminate CERN's International Cooperation Agreements with Russia and Belarus at their expiration dates in 2024. However, the situation will continue to be monitored carefully and the Council stands ready to take any further decision in the light of developments in Ukraine. These measures confirm the Council's strong condemnation of the invasion, while leaving the door ajar for continued scientific collaboration should conditions allow in the future.

The Council reaffirmed that all decisions taken to date, along with all the actions undertaken

by the Management, which have had a marked impact on the involvement of the Russian Federation and the Republic of Belarus in the scientific programme of the Organization, remain in force until further Council decision.

Non-renewal of the International Cooperation Agreements would have significant consequences for many researchers affiliated to Russian and Belarussian institutes, as well as CERN's scientific programme. Yesterday's decision allows such researchers to continue their scientific work at CERN until the current agreements expire and to plan for their future.

The Council also decided to review CERN's future cooperation with the Joint Institute for Nuclear Research (JINR) well in advance of the expiration of the current International Cooperation Agreement in January 2025.

The CERN management stands in solidarity with the people of Ukraine and condemns, in the strongest terms, the military invasion of Ukraine by the Russian Federation, deploring the resulting loss of life and humanitarian impact. Measures (<https://home.cern/solidarity-ukraine>) have already been put in place to support the Ukrainian community at CERN and Ukrainian people more generally.

I would like to invite you to an on-site meeting on 28 June at 3.00 p.m. in the Main Auditorium at which the Directors and I will give you an update on the ongoing activities and report about this week's Council meetings. More information and the agenda will follow in the coming week.

Fabiola Gianotti

Higgs10: Big Bang Day

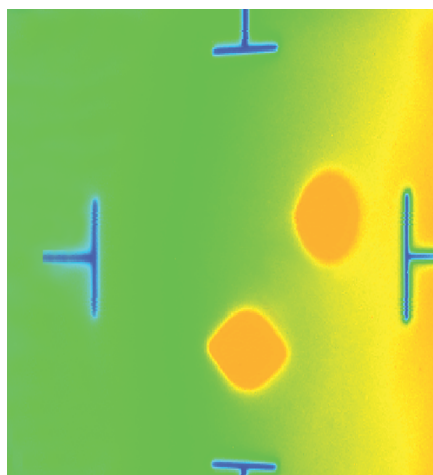
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The scene in the CERN Control Centre on 10 September 2008, when beams went round the LHC for the first time. (Image: CERN)

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(<https://cds.cern.ch/images/CERN-HOMEW/EB-PHO-2022-123-1>)

Image of a LHC beam screen recorded on 10 September 2008, showing two spots corresponding to the successful circulation of protons once around the machine. (Image: CERN)

It was unheard of to start a machine like the LHC in the public eye, but I'm assured we had little choice. In the months and weeks before the start-up, particle physics had never seen so much media attention. A small number of individuals on social media had managed to stir up the myth that the LHC would create a world-eating black hole, and the newspapers were full of it. They were going to come to CERN whether we asked them or not, so we invited them in on the basis that it would be

better to have them inside the Lab than outside, telling the world that CERN was starting up the "black hole machine" behind locked doors. Over 300 media outlets came, BBC Radio 4 did an unprecedented full day of outside broadcast from CERN (<https://www.bbc.co.uk/radio4/bigbang/>), and an estimated billion people watched as I gave the countdown to that first beam. I thought I was just talking to physicists in the main auditorium!

Those joyful events of 10 September firmly established CERN's place in the public eye, while the failure of a magnet interconnection just over a week later ensured the Laboratory would stay there. There was, and there remains, fascination with the human endeavour that particle physics represents, and the media were kind to us on the whole. But for me, the most important part of the story was somewhat lost.

The LHC is unique. Like any energy-frontier accelerator, it is its own prototype, and building it was a learning experience from the start. Despite the serious nature of the setback in September 2008, it was really just another step, albeit a big one, on a long learning curve. As with previous setbacks, the LHC team was hard at work the next day to ensure that we could recover as fast as possible. We soon understood the problem, and we had all the spares we needed. It took a year to put right, but we knew straight away what we had to do.

It's a great tribute to the global particle physics community that setbacks are confronted with a confident, positive approach. In 2004, after we'd installed a full sector of the cryogenic distribution line (QRL), it failed and had to be removed from the tunnel. To me, this was a much bigger issue than the 2008 event, since it required the whole LHC installation schedule to be rearranged while the contractor made good the problem with considerable help from CERN. Our Director-General at the time, Robert Aymar, was an engineer, and he understood the magnitude of the problem perfectly. He was the unsung hero in liberating the resources needed to get it fixed. It's also thanks to him that we have Linac4, a key part of the HL-LHC project, whose construction began during his mandate. Later, in 2007, one of the so-called inner triplets, which perform the final focus of the beams, failed a high-pressure test in the LHC tunnel. It was remarkable how quickly CERN staff came up with an innovative and elegant solution, and implemented it with

the help of colleagues from Fermilab, KEK and the Lawrence Berkeley National Laboratory.

Following repairs and consolidation, on 29 November 2009 there were beams circulating again in the LHC, and full commissioning could get under way. The experiments had had an extra year to prepare, and although I'm sure they'd have preferred beam in 2008, they were in perfect shape to start data taking. Every cloud has a silver lining. This time, start-up went very quickly. The injector chain worked beautifully, as always, with even higher performance than we'd anticipated: a great tribute to our predecessors who built those machines from the 1950s onwards. We'd also learned a lot from LEP, and instrumentation was very much improved. The LHC physics programme, at an initial energy of 3.5 TeV per beam, began in earnest in March 2010.

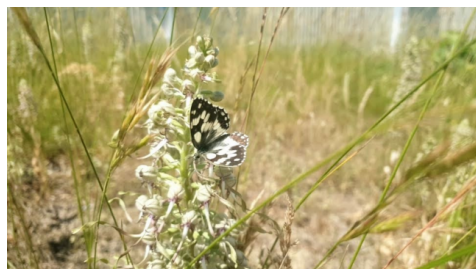
I'm an accelerator physicist, but I want to finish by talking about the experiments. It's not only

the LHC that took technology way beyond anything that had ever been done before. Like the accelerator team, the experimental collaborations had also learned much from their predecessors. The previous generation of hadron collider experiments had luminosities two orders of magnitude lower to deal with, they had around a million readout channels compared with the LHC experiments' up to 100 million, and their data rates and volumes were also much smaller. It's thanks to the efforts of a global, multidisciplinary collaboration that the LHC project delivered so well on its promise right from the moment data taking began, re-measuring everything we'd learned before about the Standard Model of particle physics in the first few months of operation, and then going on to new discoveries. But that's a story for another day.

Lyn Evans

Environmental awareness: exploring CERN's biodiversity

Take a walk around CERN to discover the rich flora and fauna that surround us



A lizard orchid (*Himantoglossum hircinum*) and a marbled white butterfly (*Melanargia galathea*) on the Prévessin site (Image: CERN)

It's morning. You're walking to your workplace. The sun is shining, and you look down at the greenery along the path. What do you see? Is that wild thyme? Sorrel? And look, a pyramidal orchid! You might know that CERN has several sites, but what you might not know is that the Organization spans 625 hectares, 415 of which are non-built environments. This land hosts a variety of species and ecosystems, including endangered species of wild orchid.

Over time, the Laboratory has implemented several measures to promote biodiversity on its land, with an approach based on low-intensity maintenance to foster biodiversity preservation, keeping watering to a minimum and eliminating fertilisers and chemicals wherever possible. CERN delays grass mowing and uses sheep grazing to allow the flora's full life cycle to complete. In addition to its fenced sites, CERN also owns 136 hectares of woodland, mainly located along the surface path of the SPS accelerator. These forests, most of which are located in France, are jointly managed by CERN and the French forestry commission (Office National des Forêts (<https://www.onf.fr/>) – ONF). To ensure minimum mechanical intervention, be more respectful of the land and reduce damage to woodland soil, horse

logging (<https://home.cern/news/news/cern/horses-help-maintain-cerns-forests>) is used to remove fallen trees, a forest management measure in regular use since 2012.

In 2020, the Organization set up a working group on biodiversity with four key objectives: conserving and protecting natural spaces in the CERN domain; developing biodiversity in fenced and unfenced areas; establishing measures for biodiversity for new development projects on CERN sites; and defining indicators to monitor biodiversity at CERN. The proposed action plan for 2021–2025 identified several measures to be approved, funded and implemented by the CERN Environmental Protection Steering board (CEPS), two of which have already been set in motion.

The first one is to draw up guidelines for biodiversity considerations concerning new construction at CERN. These 11 guidelines aim to align CERN with the French and Swiss regulations on biodiversity protection. They cover a range of subjects, such as new plantations, invasive species, green roofs and tree compensation. An example of the latter is the recent planting of 200 trees on the Meyrin site over three years, compensating for previously felled trees due to ageing and construction work. This measure is aligned with CERN's Masterplan 2040 (<https://cds.cern.ch/record/2792531/>), released at the end of 2021, which adopts principles and standards to promote biodiversity when developing the site. Specific measures have been developed not only to preserve CERN's natural heritage, but also to strengthen biodiversity on the land managed by CERN.

The second measure that has been launched involves surveys of various species of fauna and flora on the CERN sites. Conducting surveys is crucial to monitor populations and will enable CERN to identify zones of

biological interest and their importance and help put in place concrete protection measures. Based on expert recommendations, the inventories will focus on flora, amphibians, insects and birds. The first surveys have already started: during the inventory of amphibians, two species of frog as well as two protected species of newt were found. A first inventory of the flora led to the identification of a new orchid species on the CERN site, the burnt-tip orchid. The inventory of birds is still under way.

CERN's biodiversity working group will continue to investigate other issues, such as light pollution, which can negatively impact night wildlife, as well as urban heat islands (<https://climate.copernicus.eu/demonstrating-heat-stress-european-cities>). Planting more trees and vegetation on site will help mitigate this phenomenon, which occurs in areas with high artificial infrastructure and little to no greenery. While concrete and asphalt absorb heat, vegetation helps cool the air and thus keeps the temperature stable.

The Organization is also committed to improving biodiversity downstream of its activities. In 2020, CERN co-signed a charter initiated by WWF Geneva for the revitalisation of the Nant d'Avril, the second largest affluent to the Rhône in the Geneva basin. In addition to improving water quality, the project will boost the biodiversity of the entire watershed. The project will run until 2033 and the actions taken will promote recolonisation by some target species, namely the brown trout, the fire salamander and the grass snake.

Next time you take a walk on the CERN site, engage your senses and notice the many species that surround you. Meanwhile, you can catch a glimpse of CERN's biodiversity in this short video.

(Video: CERN)

Fire and rescue service newcomers successfully complete their induction

In the past few weeks, you might have noticed some of our firefighter colleagues wearing a red T-shirt that reads "Firefighter in induction"



(Image: CERN)

In the past few weeks, you might have noticed some of our firefighter colleagues wearing a red T-shirt that reads "Firefighter in induction". The red T-shirt feature – to distinguish firefighters in induction from established colleagues – was proposed by former firefighter newcomers themselves to ensure that their status was duly marked and clear to the CERN community.

On Friday, 10 June, a special ceremony was held at the CERN Fire and Rescue Service (FRS) to mark the completion of the nine-week long induction process for the seven newcomers, who joined the FRS on 1 April

2022. The induction comprises training on all the different risks and specificities of the CERN sites and activities, delivered by both FRS colleagues and external trainers. During the ceremony, the newcomers were formally presented with their official uniform, characterised by a dark blue T-shirt, as well as their full equipment for intervention in any situation on the CERN sites. It was the first such ceremony following the many months of COVID-19 pandemic restrictions, which made it a particularly special event.

HSE unit

The CERN Library gets a facelift

The renovation work will start in autumn 2022



Renovation works at the Library should end in autumn 2023 (Image: Bisset Adams)

space has changed dramatically, and the time has come for a makeover to meet the requirements of a modern library in terms of furniture quality and ergonomics and to address environmental and safety concerns.

To achieve these goals, the CERN Library is going to be renovated soon. Work will start in autumn 2022 and is due to end one year later. This makeover is the final stage of a long process, including an in-depth reflection, surveys and stakeholders' interviews to get feedback on the use of Library premises and services and to learn about readers' expectations.

You can find the guiding style of some areas of the renovated Library in the pictures below, as designed by the architecture firm Bisset Adams, which worked closely with the Site and Civil Engineering department and in

accordance with the requirements of the Scientific Information service.

Library collections and the Bookshop will remain accessible during the renovation work. Practical information on the organisation of library services as well as regular updates about the progress of the work will follow in the coming months.

In recognition of the crucial importance of library services for scientific research, measures will be taken to minimise any inconvenience caused by the renovation.

If you have any feedback or questions, please contact us at library.desk@cern.ch.

SCE department, CERN Library

I.FAST launches a new fund to support innovation in accelerator technologies

The fund aims to stimulate innovation in accelerator technologies by supporting projects with funding of up to 200 kEUR



(Image: CERN)

Since 2021, the EU-funded I.F.A.S.T. project (<https://ifast-project.eu/>) has been developing innovative technologies that are common to multiple accelerator platforms and defining strategic roadmaps for their future development. Coordinated by CERN, the project brings together 49 participants who are helping to prepare for the next step of particle physics research, improve the sustainability of accelerator-based science and meet the specific needs of applications for society.

The project's Internal Innovation Fund (<https://ifast-project.eu/iif>) (IIF) was created to stimulate

innovation in accelerator technologies. The fund's primary objective is to encourage I.F.A.S.T. partners to identify innovative solutions with viable industrial or commercial potential. This fast-track, competitive process will finance emerging technologies and innovative processes, research, business models and other solutions, at both the development and the prototype stages.

Technologies supported by the IIF must be capable of advancing the state of the art in fields related to the I.F.A.S.T. thematic areas. They must also contribute to improving the sustainability of particle accelerator facilities by reducing their electricity consumption or footprint, improving their performance without increasing their environmental impact, or directly serving the environment.

The project's thematic areas include:

- Novel particle accelerator concepts and technologies
- High-luminosity accelerators for light sources
- Innovative superconducting magnets

Innovative superconducting thin-film-coated cavities
Advanced accelerator technologies and materials
Sustainable concepts and technologies
Societal applications
Technology infrastructure

Individual projects will receive from 100 to 200 kEUR in funding until the available funds (1 MEUR) have been exhausted. To qualify for support, the projects' consortia must include at least one I.F.A.S.T. beneficiary (<https://ifast-project.eu/participants>) and one industrial partner (<https://ifast-project.eu/industrial-participation-ifast>).

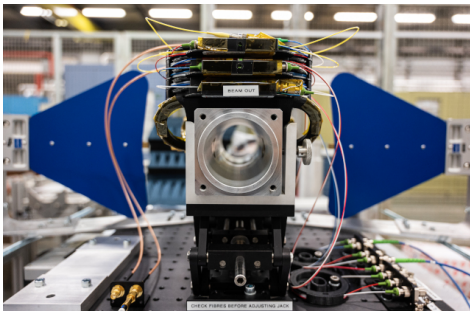
To submit your proposal, complete the submission form on the I.F.A.S.T. website (<https://ifast-project.eu/iif>) by 15 September 2022.

Find out more about the application process by visiting the I.F.A.S.T. website (<https://ifast-project.eu/iif>) or by contacting Marcello Losasso, the fund manager.

Antoine Le Gall

The ARIES project, a promoter of innovation and accessibility for accelerators, comes to a close

The EU-funded ARIES project has succeeded in opening up new avenues for the accelerator community



With the aim of providing a wide range of European researchers and industry with access to top-class accelerator research and test infrastructures, ARIES set up a network of 14 accelerator test facilities across Europe. (Image: CERN)

One of the project's main endeavours was to facilitate transnational access. With the aim of providing a wide range of European researchers and industry with access to top-class accelerator research and test infrastructures, ARIES set up a network of 14 accelerator test facilities (<https://acceleratingnews.web.cern.ch/news/issue-38/aries-ari/flexible-and-accessible-hiradmat-facility-celebrates-its-tenth-anniversary>) across Europe. Users can carry out tests within five separate domains: magnet, material, electron and proton beam, radiofrequency, and plasma beam. With over 23 000 hours of testing for 307 users, the scheme generated interesting new science and expanded the project's user community.

Video presentation (<https://videos.cern.ch/recording/2302279/embed>) of the ARIES project in its early days as a new initiative to improve particle accelerators and make them more compact and easier to use outside research. (Video: CERN)

Over the past five years, the ARIES (<https://aries.web.cern.ch/>) (Accelerator Research and Innovation for European Science and Society) project has brought together 41 partners from academia and industry from 18 different European countries with the aim of developing key accelerator technologies to make present and future machines more efficient, affordable, reliable and sustainable.

Coordinated by CERN, this Horizon-2020-funded project has broken new ground for the accelerator community, and leaves an impressive legacy: the European ecosystem of accelerator centres is now stronger than ever, with easily accessible facilities, well-highlighted synergies and new plans to improve current technologies and infrastructures.

ARIES played a critical role in investigating and promoting new prospects for accelerator research and development. It was a breeding ground for research in plasma and laser-based acceleration, a field now driven in Europe by EuPRAXIA, another promising EU-funded project. Furthermore, ARIES support was key in ensuring the continuation of initiatives such as studies on high-temperature superconductivity and the revival of the studies on muon colliders. In 2022, a prototype electron gun for electron lenses (<https://acceleratingnews.web.cern.ch/news/issue-39/aries-ari/new-prototype-electron-gun-compensate-space-charge>) was assembled and tested by four ARIES

collaborators, and breakthrough results were achieved in the fields of thin superconducting films (<https://acceleratingnews.web.cern.ch/news/previous-issues/aries-ari/aries-consortium-produces-world-class-hts-tapes>) and materials for extreme thermal management.

One of ARIES's key objectives was strong interaction with industry. The project benefited from enhanced industrial participation, with the involvement of seven industries and one association, and ran three new co-innovation programmes with industry. It also identified and supported a wealth of technologies with societal and environmental applications, such as a particle accelerator system to remove harmful emissions from ship exhausts (<https://acceleratingnews.web.cern.ch/article/bringing-particle-accelerators-ships>).

With its mission fulfilled, ARIES is now coming to a close. However, its succession is ensured thanks to two new projects. I.F.A.S.T. (<https://ifast-project.eu/>), started in April 2021, will continue and build on ARIES's legacy of joint R&D activities with industry to develop ideas and technologies for the next generation of particle accelerators. In parallel, EURO-LABS (<https://home.cern/news/news/cern/cerns-horizon-europe-projects-flying-start>) will further the transnational access tradition of ARIES, forging even closer ties between research centres by creating a new, synergetic network of research facilities for accelerator, detector and nuclear technologies.

Antoine Le Gall

Don't miss the live stream of the launch of Run 3!

On 5 July, after more than three years of long shutdown, the physics season will start at the LHC with a new energy world record



The Large Hadron Collider is set to break a new energy world-record on 5 July (Image: CERN)

A mere day after the 10th anniversary of the discovery of the Higgs boson celebrations at CERN, the LHC will make the promise of a bright future for particle physics a reality, breaking a new energy world record of 13.6 trillion electron volts (13.6 TeV) in its first

stable-beam collisions. These collisions will mark the start of data taking for the new physics season, called Run 3.

The launch of the LHC Run 3 will be streamed live on CERN's social media channels and by high-quality Eurovision satellite link on 5 July starting at 4 p.m. Live commentary in five languages (English, French, German, Italian and Spanish) from the CERN Control Centre will walk you through the operation stages that take proton beams from their injection into the LHC to collision points. A live Q&A session with experts from the accelerators and experiments will conclude the live stream.

Fitted out to cope with the more intense beam, the LHC will allow physicists to collect more data during Run 3 (which will last until the end of 2025) than they did in the first two runs combined. The upcoming physics season will be focused on the study of the properties of the

Higgs and the search for physics beyond the Standard Model of particle physics.

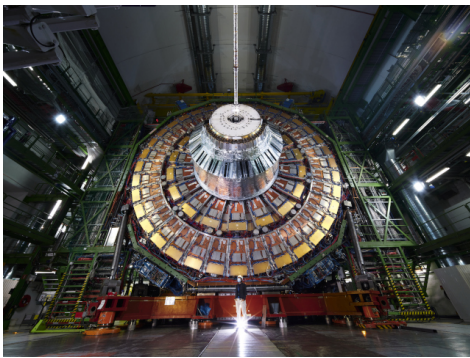
Join us for this historic event: connect on Facebook (<https://www.facebook.com/cern/>), YouTube (<https://www.youtube.com/channel/UCrHXK2A9JtiexqwHuWGeSMg>), Instagram (<https://www.instagram.com/cern/?hl=en>) or LinkedIn (<https://www.linkedin.com/company/cern/mycompany/verification/>).

Visit this page (<https://home.cern/news/news/cern/join-cern-historic-week-particle-physics>) for a list of events surrounding the start of Run 3 and the anniversary of the discovery of the Higgs boson.

(Video: CERN)

CMS on the lookout for new physics

The CMS experiment awaits LHC Run 3 to explore several analyses showing small disagreements with theory expectations

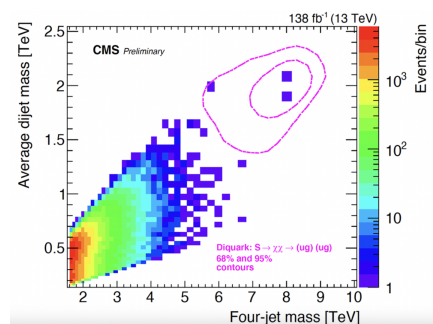


A view of the CMS detector (Image: CERN)

With Run 3 of the LHC just around the corner, the LHC experiments are still publishing new results based on the previous runs' data. Despite no new discoveries being announced, small deviations from expectations are appearing in a small number of analyses. At the current level these deviations can still be attributed to random fluctuations in data, but they indicate regions that need to be investigated closely once the new stream of collisions arrives. Below are a few examples published recently by the CMS collaboration.

In 2017 CMS recorded a spectacular collision event containing four particle jets in the final

state. The invariant mass of all four jets was 8 TeV and the jets could be divided into two pairs with a 1.9 TeV invariant mass each. Such a configuration could be produced if a new particle with an 8 TeV mass was created in the collision of proton beams, and subsequently decayed into a pair of – again, new – particles, with masses of 1.9 TeV. In a new analysis recently published by CMS, a search for such twin pairs of jets with matching invariant masses is performed for data collected up to the end of LHC Run 2. Surprisingly, a second event with similarly striking properties was found, with a 4-jet mass of 8.6 TeV and 2-jet masses of 2.15 TeV. These two events can be clearly seen in the plot below, where the 4-jet events are plotted as a function of the 2-jet and 4-jet mass.



(<https://cds.cern.ch/images/CERN-HOMEW>)

EB-PHO-2022-128-1)

Number of events observed (colour scale), plotted as a function of four-jet mass and the average mass of the two dijets. The two points in the top right correspond to the two interesting events. (Image: CERN)

While nearly all observed events with two pairs of jets are produced by strong interactions between the colliding protons, events with such high invariant masses are extremely unlikely. The probability of seeing two events at these masses without any new phenomena being present is of the order of 1 in 20 000, corresponding to a local significance of 3.9σ . While this may appear to be a very strong signal at first, given that the area of masses that are being analysed is large it is important to also look at global significance, which indicates the probability of observing an excess *anywhere* in the analysed region. For the two events the global significance is only 1.6σ .

Two other searches for new heavy particles are reporting small excesses in data. In a search for high mass resonances decaying into a pair of W bosons (that then decay into leptons) the highest deviation corresponds to a signal hypothesis with a mass of 650 GeV, with local significance at 3.8σ and global significance of 2.6σ . In a search for heavy particles decaying into a pair of bosons (WW, WZ or other

combinations, also including Higgs bosons) that subsequently decay into pairs of jets, the data diverge from expectations in two places. The signal hypothesis is a W' boson with a mass of 2.1 or 2.9 TeV, decaying into a WZ pair and the highest local significance is 3.6σ , with a global significance of 2.3σ .

Another new result comes from searches looking for extra Higgs boson particles decaying into tau pairs. For a new particle with a 100 GeV mass there is a small excess seen in the data with 3.1σ local and 2.7σ global significance. Interestingly, this coincides with a similar excess seen by CMS in a previous search for low-mass resonances in the two-photon final state. Another excess is visible in the high-mass range, with the largest deviation

from the expectation observed for a mass of 1.2 TeV with a local (global) significance of 2.8σ (2.4σ).

The tau pair final state was also used to look for hypothetical new particles called leptoquarks. This is of particular interest since leptoquarks could potentially explain the flavour anomalies that have been observed by the LHCb experiment (<https://home.cern/news/news/physics/intriguing-new-result-lhcb-experiment-cern>), so if the anomalies are indeed a manifestation of some new phenomena, this would be a way to independently look at these phenomena from a different angle. No excess has been found by CMS so far, but the analysis is only just beginning to be sensitive to the range of leptoquark parameters that could fit

the flavour anomalies, so more data is needed to fully explore the leptoquark hypothesis.

The new LHC data-taking period is set to start in July, at higher energy and with significantly upgraded detectors, promising a fresh stream of data for searches for new phenomena.

Read more in the *CERN Courier* (<https://cerncourier.com/a/dijet-excess-intrigues-at-cms/>) and CMS publications here (<https://cds.cern.ch/record/2803723>), here (<https://cds.cern.ch/record/2803845>) and here (<https://cds.cern.ch/record/2803739>)

Piotr Traczyk

Computer security

Computer Security: Permanent chess

Providing computer security for an organisation, company or university resembles playing a permanent game of chess

Providing computer security for an organisation, company or university resembles playing a permanent game of chess. Developing a strategy, putting your pieces in place, thinking of your next moves and those of your adversary, and sweating over the unknowns of the attacker's intentions. Fancy a game?

Strategy-wise, computer security requires a so-called defence-in-depth approach, with protections throughout the digital landscape applied on preferably every layer. Protections for accounts, laptops, smartphones, servers and other devices, which are integrated in running control systems and IT services, incorporated into software development as well as hardware production, and part of processes and procedures. Thereby reducing the overall risks – financial, legal, reputational and operational – to the Organization, avoiding identity theft and impersonation, controlling its assets and ensuring that its IT systems do not become unsecured, vulnerable or weak.

With that, are you ready to position your pieces? CERN's holy grail is, of course, its physics programme – the king – with its accelerator and experiments as well as its back-end IT infrastructure ("About risks and threats (<https://home.cern/news/news/computing/computer-security-about-risks-and-threats>)"). The king must be well protected by the queen – two-factor authentication (<https://home.cern/news/news/computing/computer-security-log-click-be-secure>) – such that the loss of a single password does not compromise the king. Well positioned on her right and left flanks are the bishops of spam filtering and anti-malware protection for emails and their attachments. These bishops are supposed to let only the good emails through, filtering out malicious links and attachments and providing an additional layer of protection for the king and

his well-being ("Email equals letters (<https://home.cern/news/news/computing/computer-security-email-equals-letters>)"). As in real life, the rooks corner the scene at the outer perimeter, like the fortress of CERN's redundant pair of outer-perimeter firewalls with their sophisticated thread protection ("CERN's new first line of defence (<https://home.cern/news/news/computing/computer-security-cerns-new-first-line-defence>)") and its dedicated intrusion detection systems on the network and the central domain name servers ("Scaling out intrusion detection (<https://home.cern/news/news/computing/computer-security-scaling-out-intrusion-detection>)"). Between the rooks and the bishops you find the most sophisticated bits of protection: the knights. As complicated in their moves as the implementation of a decent software-development life cycle ("Beauty under the hood (<https://home.cern/news/news/computing/computer-security-beauty-under-hood>)") via the IT department's new operations model, software dependency curation tools ("Unwanted presents (<https://home.cern/news/news/computing/computer-security-unwanted-presents>)") and business continuity and disaster recovery plans ("Disaster for your crown jewels (<https://home.cern/news/news/computing/computer-security-disaster-your-crown-jewels>)"). But, once deployed in the right position, the power of the knights provides an additional level of assurance. And, finally, a dense line of pawns is scattered among the other pieces, close to the people, just like antivirus software (end-point detection and response, EDR) is close to your computer. The board is set. Ready to protect.

Overall, this set of pieces is governed by the Computer Security team, its overall strategy and its expertise in incident response. If they are properly deployed, the king – CERN's digital assets – is well secured. At the core is the security operations centre (SOC), providing

intelligence, looking out for so-called "indicators of compromise" (IoCs) and coordinating the moves of the bishops, rooks and pawns – aka email filters, firewall protection and EDR – to provide maximum protection. The pieces cover each other to achieve defence in depth, and redundancies avoid single points of failure. In addition, thanks to the SOC, this core can agilely adapt to new situations (like the deployment of a new email infrastructure or the extensive flexibility of CERN's bring-your-own-device approach). Anticipating the attackers' moves, bishops, rooks and pawns are redeployed to provide maximum protection to the king. Overshadowing him is the queen, the real power on the board once she can move freely. She is the silver bullet when deployed as two-factor authentication, but only comes to power when thoroughly deployed. This is why the Computer Security team is pushing for two-factor authentication to be used to protect all "critical" user accounts. Similarly, CERN's knights deserve more attention. Software life cycles, software curation and business continuity and disaster recovery plans require greater coordination, funding and priority. Knights can be an effective force coming from behind when well positioned and must not be neglected because of their unusual and complicated style of movements.

The past has shown that CERN's pieces have been well positioned so far. But this does not necessarily extrapolate to the future. We must all continue contributing ("STOP – THINK – DON'T CLICK", remember?) and invest in our chessboard in order to counter any attackers. The permanent game of chess, of protection and defence, has just begun for another day.

Do you want to learn more about computer security incidents and issues at CERN? Follow

Official news

Nomination of Data Protection Commission members

The Director-General has nominated Laura Kiviharju, Massimo Marelli and David Taylor as members of CERN's new Data Protection Commission (DPC), which took up its functions on 1 June 2022

The Director-General has nominated Laura Kiviharju, Massimo Marelli and David Taylor as members of CERN's new Data Protection Commission (DPC), which took up its functions on 1 June 2022.



(<https://cds.cern.ch/images/CERN-HOMEW/EB-PHO-2022-125-2>)

Laura Kiviharju is a data protection specialist for the Data Protection Commissioner of Lucerne Canton, Switzerland. Laura also has her own company advising organisations on data protection compliance and certifications. She is a lawyer with several years' experience in implementing and managing data protection frameworks and assessing information security in the private and public sectors in Switzerland and Finland. She is an IAPP-certified Information Privacy Manager (CIPM), Certified Information Systems Security Professional (CISSP) and Certified Auditor for the Europrivacy Certification Scheme. Among other roles, she has previously been a global data protection officer and adviser at Swiss multinational companies, worked in the Finnish National Cybersecurity Centre supervising information-security certification bodies and participated in EU and international cooperations.



(<https://cds.cern.ch/images/CERN-HOMEW/EB-PHO-2022-125-1>)

EB-PHO-2022-125-3)

Massimo Marelli is the Head of the Data Protection Office at the ICRC. Massimo is a member of the Advisory Board and a Fellow of the European Centre on Privacy and Cybersecurity (<https://www.maastrichtuniversity.nl/ecpc>) at the University of Maastricht, and the co-editor of the DigitHarium (<https://www.icrc.org/en/digitharium>), a global forum to discuss and debate digital transformation within the humanitarian sector, with a focus on humanitarian protection, policy, ethics and action. He is also a member of the Brussels Privacy Hub (<https://brusselsprivacyhub.eu/>) Advisory Board, and he co-led the Data Protection in Humanitarian Action Working Series, which resulted in the publication of the Handbook on Data Protection in Humanitarian Action (<https://www.icrc.org/en/data-protection-humanitarian-action-handbook>). Prior to his current role, Massimo held several positions as a field delegate and legal adviser at the ICRC. Before joining the ICRC, Massimo worked as a lawyer at the UK Office of Fair Trading, as *référénaire* at the General Court of the Court of Justice of the European Union and as a solicitor in private practice.



(<https://cds.cern.ch/images/CERN-HOMEW/EB-PHO-2022-125-1>)

David Taylor is the Senior Lead Privacy and Data Protection Counsel for the Digital and Technology Tower at CBRE, the world's largest commercial property and investment company. David entered the privacy and data protection sector working in academia for 14 years, including as a professor of law. He is a privacy and IT attorney with over 20 years' experience working with multinational companies to find pragmatic, global-privacy-respectful solutions to their information technology and

cybersecurity compliance problems. David has also been a data protection officer (DPO) in a global IT services company, as well as an acting chief information security officer. He has substantial experience with data protection in intergovernmental organisations (IGOs), having worked as a DPO for Europe's largest life sciences and bioinformatics IGO. He is also known for his work as founder and board member of the Swiss non-profit IGOPA, which works on privacy and data protection issues in IGOs.

The DPC's mandate is to monitor CERN's compliance with its data protection framework Operational Circular No. 11 (OC 11), entitled "The processing of personal data at CERN", to ensure the implementation of OC 11 and, in particular, of data subject rights, and to evaluate and investigate complaints lodged by data subjects, regardless of their connection to CERN.

The recruitment panel, composed of one representative each from the Staff Association and the Office of Data Privacy (ODP) and one person appointed by the Director-General, had an impressive longlist of over 100 candidates to choose from. It reached the unanimous conclusion to recommend the appointment of the three above-mentioned candidates – subsequently appointed as members by the Director-General – for their demonstrated, recognised expertise and experience in various areas of data protection, thus covering a broad range of specialities.

All the new DPC members are highly knowledgeable and widely recognised data protection experts with extensive professional experience at the international level.

We are excited to welcome them to CERN. The DPC will play a crucial role in ensuring CERN's compliance with its data privacy framework and protecting data subject rights.

Office of Data Privacy

Policy on personnel travelling together

In addition to the duty travel rules established by AC33 (https://cds.cern.ch/record/2703986/files/Circ_Admin_33_Rev0.pdf?), a policy on personnel travelling together was issued in January 2022. It aims at strengthening controls in favour of CERN's duty of care responsibility and ensure business continuity.

The Directorate has thus decided that no more than three Directors (Director-General included) should travel together (by plane, train, car, etc.). Similarly, as a general guideline, it is recommended that no more than 60% of the personnel belonging to the same department/group/section should travel together on a duty trip.

A warning report has been put in place with the help of the Business Computing group (FAP-BC). This report, sent by email to the relevant departmental travel manager, will be triggered from the EDH Travel document (<https://edh.cern.ch/Document/Claims/Travel>) every time it identifies that the above ceilings are exceeded for any given department/group/section. This will have no direct consequence on travel arrangements and implementation details of this guideline are left to the discretion of department heads and group leaders.

Members of the personnel are informed that they benefit from a travel assistance provided by International SOS when going on duty

travel. This assistance, both medical and security related, can be used at any time before, during or after the trip through its CERN Portal (<https://www.internationalsos.com/MasterPortal/default.aspx?membnum=22ATSM650801>) or its mobile app (<https://www.internationalsos.com/subscriber/assistance-app>).

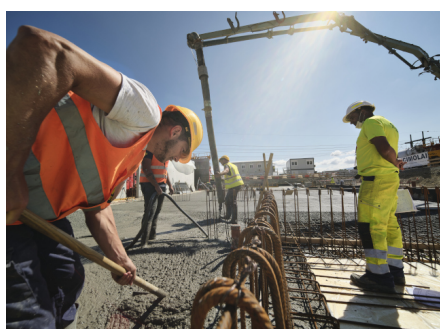
Questions can be addressed to Departmental Travel Managers (<https://admin-eguide.web.cern.ch/en/contact/departmental-travel-managers>).

FAP department

Announcements

Sunshine, heat and your safety

Benefits and risks to be aware of at work and at leisure



(<https://cds.cern.ch/images/CERN-PHOTO-202108-113-10>)

(Image: CERN)

May was skin cancer awareness month (<https://www.skincancer.org/get-involved/skin-cancer-awareness-month/>) and, as the days grow longer and we are more exposed to the sun, it is worth reflecting on the benefits and risks this brings.

The sun is the main source of natural ultraviolet (UV) radiation ([https://www.who.int/news-room/questions-and-answers/item/radiation-ultraviolet-\(uv\)](https://www.who.int/news-room/questions-and-answers/item/radiation-ultraviolet-(uv))). The intensity of exposure to UV rays depends on many factors, such as season, altitude, duration and time of day. Although UV rays are neither seen nor felt, they have a direct impact on our physiology: notably, they help our skin synthesise vitamin D, which is key for good muscle, bone and dental health.

Beyond a certain intensity, however, these UV rays have harmful consequences for us all. In the short term, frequent and prolonged exposure to the sun can induce unpleasant sunburn and conjunctivitis. In the long term, it can cause premature skin ageing, cataracts and – more seriously – skin and eye cancers. And UV rays are not the only risk associated with the sun: higher temperatures, humidity and sunlight can induce sun- or heat-stroke, and carrying out heavy work in the heat intensifies the strain on the human body.

Working outdoors and being exposed to the sun is considered an occupational hazard. Working near white or metal surfaces can further increase sun exposure through heightened reflection. In Switzerland, 1000 of the 25 000 new cases of non-melanoma skin cancer recorded each year are of occupational origin (Suva (<https://www.suva.ch/fr-ch/prevention/themes-specialises/soleil-uv-chaueur-et-ozone>), 2022).

What can you do to protect yourself from the potential harmful effects?

Firstly, seek shade and avoid full exposure to sunlight between 11.00 a.m. and 3.00 p.m., when the most harmful UV rays are at their strongest. Secondly, wear clothing that covers all exposed skin areas, if possible. You should also apply good quality sunscreen every two hours, minimum factor 30, to all parts of the

body not covered by clothing, including lips and ears. If you must perform your activities in direct sunlight during June and July, wear a helmet or cap with a front visor and neck protection. If possible, carry out any outdoor duties early in the morning. If you work indoors, keep windows and shutters closed during the day where possible and follow these tips to beat the heat (<https://home.cern/news/announcement/cern/beat-heat>). And whether you work indoors or outdoors, it is vital to stay hydrated.

With the summer ahead likely to be hot and sunny, equipped with this knowledge you can take all necessary precautions to ensure you reap the benefits of the sunshine at work and at leisure while minimising the risks to your health.

For further information:

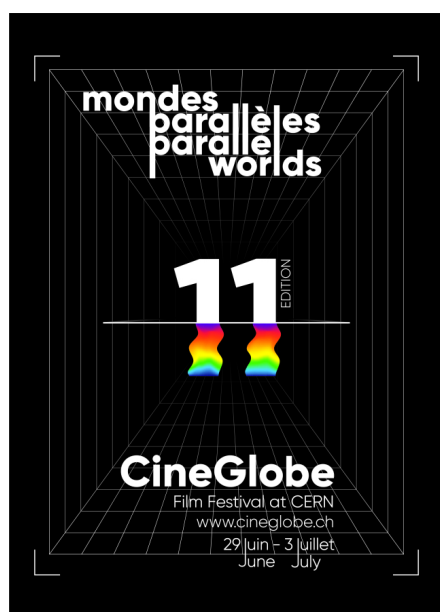
Swiss Federal Office of Public Health – sun and UV rays (https://www.bag.admin.ch/bag/fr/home/gesund-leben/umwelt-und-gesundheit/strahlung-radioaktivitaet-schall/elektromagnetische-felder-emf-uv-laser-licht/sonne_uv-strahlung.html) (page automatically translated into English)

Suva – sun, heat, UV rays and ozone (<https://www.suva.ch/fr-ch/prevention/themes-specialises/soleil-uv-chaueur-et-ozone>) (available in French only)

HSE unit

Don't miss CineGlobe at CERN this summer!

From 29 June to 3 July, the CineGlobe international film festival will return to CERN's Globe of Science and Innovation for its 11th edition.



(<https://cds.cern.ch/images/CERN-HOMEWEB-PHO-2022-100-1>)

Through the theme "Parallel Worlds", CineGlobe 2022 will explore the similarities that lie behind apparent opposites. Fifty-two short films from 17 countries have been

shortlisted for the Jury's Prize and the Public Prize in the various categories (fiction, documentary, youth and immersive).

From 29 June to 3 July, come along to watch the films and help to name the winners of the Public Prize.

And there's a lot more going on at CineGlobe besides the short films:

- Try out twice as much virtual reality as usual this year, with both interactive VR experiences and a VR cinema on offer.
- Learn the basics of cinema at our Tetra Pak Camera and Moviola Animation workshops.
- Take part in two special masterclasses: the first with Mark Levinson, producer of the documentary *Particle Fever*, and the second with Walter Murch, the film's editor and a three-time Oscar winner.
- Join us in the evenings, from 9.00 p.m. onwards on Wednesday, Thursday and Friday, for the screening of feature films (two of them in collaboration with our partners FIFDH and Filmar).
- Sign up for the Saturday evening Jury's Prize and Public Prize awards ceremony, which will be followed by an aperitif with our specially invited guests and the festival's filmmakers. Attendees will receive a pair of VR glasses to watch the winning immersive film.

On Sunday, take part in a special evening, organised in partnership with CERN, to celebrate the tenth anniversary of the discovery of the Higgs boson, one of the greatest scientific discoveries of the 21st century. A screening of *Particle Fever*, with Mark Levinson and Walter Murch in attendance, will be followed by a discussion with Fabiola Gianotti, CERN's Director-General.

A few tips for those who are interested:

Registration is mandatory for the workshops, interactive VR experiences and special events (awards ceremony and *Particle Fever* and *Higgs@10* evening). It is possible (and advisable) to sign up in advance. The short films in the "youth" category will be screened continuously every day. Don't hesitate to bring your family. To make the most of CineGlobe, why not combine a workshop with a short-film screening? Feeling peckish? Thirsty? The Novae food truck will be serving tasty snacks and refreshments throughout the festival. As usual, thanks to our sponsors, all the festival activities (except for food and drinks) are free.

You can find the full programme and registration details at cineglobe.ch (<https://cineglobe.ch/>).

Saturday, 23 July: the Hardronic Music Festival is back!



(Image: CERN)

After a two-year hiatus, the CERN MusiClub is very pleased to announce that the Hardronic Music Festival is back!

For more than 30 years, Hardronic has been an opportunity for CERN staff, students, users and their friends and families to come to the site and enjoy live music, delicious food and cool drinks. This year's edition, featuring nine of the CERN MusiClub's finest bands, will take place on Saturday, 23 July 2022 on the Restaurant 3 terrace on the Préessin site. Music will start at 3.00 p.m., and there will be lots more on offer to entertain you.

Thanks to the kind support of the CERN Staff Association and Management, entry to the festival is completely free. A regular free shuttle bus will also be provided from the Meyrin site thanks to the SCE department. What's more, 100% of the profits from the bar will support the work of AidforAll, a local charity helping poor communities with basic needs, education and

emergency health care in Viet Nam, India, Laos and, most recently, Ukraine.

For more information, please check out the festival website: <http://cern.ch/hardronic/>

Environmental awareness: your feedback and opinion

CERN's Year of Environmental Awareness campaign will soon come to a close, with the last infographic on biodiversity to be published on 5 July. The campaign has been rich and varied, including 13 articles and 13 infographics spanning diverse subjects of environmental concern for the Organization.

Now is your chance to share your thoughts and feedback on the campaign by completing this short survey (<https://hse.cern/environment-survey>) (please log in (https://auth.cern.ch/auth/realms/cern/protocol/openid-connect/auth?client_id=webframeworks-drupal-home&response_type=code&scope=openid%20email&redirect_uri=https%3A//home.cern/openid-connect/generic&state=YLoCQBgBUmVBZEzPAeeR_NqNVv_nAbodFFX6CYCfI0) before clicking on the link*, deadline 30 July).

The results of this survey will be presented on the occasion of the closing event on 15 September, for which further details will follow in due course.

Thank you for taking the time to share your views!

**If you encounter any problems in accessing the page, please log in (SSO (https://auth.cern.ch/auth/realms/cern/protocol/openid-connect/auth?client_id=webframeworks-drupal-home&response_type=code&scope=openid%20email&redirect_uri=https%3A//home.cern/openid-connect/generic&state=YLoCQBgBUmVBZEzPAeeR_NqNVv_nAbodFFX6CYCfI0)) and paste the following link into a browser: <https://hse.cern/environment-survey>. Thank you!*

The 2021 CERN Annual Report is available

You can read it online or get a paper copy at the Library

(<https://cds.cern.ch/images/CERN-HOMEWEB-PHO-2022-121-2>)

(Image: CERN)

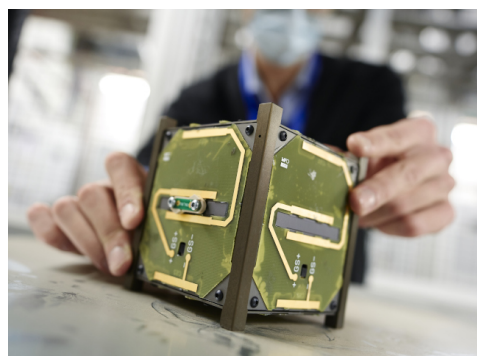


The 2021 CERN Annual Report, which highlights CERN's main achievements and activities from last year, was presented to the CERN Council in their June meeting.

You can read this, and previous, Annual Reports online here (<https://cds.cern.ch/collecton/CERN%20Annual%20Reports?ln=en>) – paper copies are also available at the CERN Library.

Tune in for the launch of the first CERN-driven satellite

On 7 July, the first CERN-driven space mission will be launched from Europe's Spaceport



The CELESTA satellite underwent testing at the CHARM facility (Image: CERN)

On 7 July, CELESTA will be launched into space: this microsatellite is the first space mission driven by CERN, in collaboration with the University of Montpellier and the European Space Agency (ESA).

The CERN community is warmly invited to tune in for the launch of CELESTA (<https://kt.cern/aerospace/celesta>) on 7 July at 12.15 CET. Note that the launch requires exceptionally good weather conditions, which might mean that it is

delayed by a few days, but the time will not change. The live footage will be made available in CERN restaurants, shared on CERN social media channels and available on ESA's WebTV (https://www.esa.int/ESA_Multimedia/ESA_Web_TV) and ArianeSpace's YouTube channel (<https://www.youtube.com/channel/UCRn9F2D9j-t4A-HgudM7aLQ>).

The satellite's payload is the Space RadMon (<https://kt.cern/aerospace/spaceradmon>), an instrument used to monitor radiation effects on electronics, entirely based on off-the-shelf components and calibrated at CERN's

irradiation facilities. The satellite itself has been tested at system level at CHARM (<https://kt.cern/aerospace/facilities>), CERN's mixed-field irradiation facility, showing the potential of this innovative approach for future space missions.

With CELESTA, CERN is seeking to showcase the impact of these technologies and facilities on society, in particular in the aerospace field. Learn more about aerospace applications of

CERN technologies here (<https://kt.cern/aerospace>).

Antoine Le Gall

1 July: CERN Alumni Virtual Company Showroom with ISIS

Join representatives from ISIS to find out more about the company, potential job opportunities and the skills and talents they are now seeking.

The event will start at **11:00 CET on 1 July** with a general presentation and will be followed by a Q&A session, come armed with your questions.

Please register here (<https://alumni.cern/events/90248>) for the event to receive the zoom link.

About ISIS

ISIS Neutron and Muon Source is a world-leading centre for research in the physical and life sciences. It is owned and operated by the Science and Technology Facilities

Council. The centre produces beams of neutrons and muons that allow scientists to study materials at the atomic level using a suite of instruments, often described as 'super-microscopes'.

More information on the Alumni website (<https://alumni.cern/events/90248>).

Alumni event on 30 June: "News from the lab" on Quantum Machine Learning in High Energy Physics

The latest edition of the "News from the Lab" event series will give an overview of the current state of the art in terms of machine learning on quantum computers with a focus on their

application to High Energy Physics. It will take place on Thursday 30 June from 6 p.m. to 7 p.m.

For more information on the talk and Zoom details, please visit the Alumni website (<https://alumni.cern/events/89015>).

Ombud's corner

Videoconferencing and creativity: a wobbly coupling

Creativity is one of the five values of CERN. That's why, when I heard on my favourite radio programme that *Nature* had published an article¹ on **the impact of virtual interactions on creativity**, I reached out to the online journal to find out more about this piece of research.

Creativity is defined in the CERN core values as "being at the forefront of one's professional field, furthering innovation and organisational development". Under this heading, CERN contributors are advised to be "open to new ideas and approaches", and to "adopt alternative outlooks in order to generate new thoughts and concepts".

Because of the COVID-19 pandemic, most interactions between CERN collaborators were virtual in 2020 and 2021, with Zoom very rapidly becoming part of our work lives. We, willingly or less willingly, have become experts in fine-tuning sound and camera settings and in opening and closing the door of our virtual meeting room. We have adapted to the rules of virtual team interactions. Raising virtual hands

and waiting to be given the floor (or rather the screen), asking our questions in the chat and voting on the most popular questions. We have shared screens and applauded virtually at the end of presentations, progressively discovering the options available to express our reactions and feelings using the tools at hand.

This has worked surprisingly well and, today, when teleworking is still very much part of our working lives, we continue interacting virtually within our team, section or group.

In my view, this *Nature* article throws a curveball.

Recent research demonstrates that **collaborative idea generation**, which is at the heart of scientific progress, is actually inhibited by videoconferencing.

How can this be when videoconferencing, owing to advances in network quality and display resolution, conveys many of the same aural and non-verbal information cues as face-to-face interactions?

The *Nature* article explains that, when we interact in person, we share the same physical space. When virtual team members meet, they inhabit a virtual space that is bounded by the screen in front of them. In this way, looking at their Zoom screens, they narrow their visual field and filter out peripheral visual stimuli.

And here is the link with creativity: because research has shown that visual attention and cognitive attention are linked, when we **narrow our visual field**, we **narrow our cognitive focus**. In turn, this narrowed cognitive focus constrains the process underlying idea generation.

QED² : idea generation within teams, which is at the heart of their creativity, is impaired by videoconferencing.

On a positive note, this piece of research also shows that virtual interactions do not affect the logical next process after idea generation: the **selection of the best ideas** by the team.

This finding may also explain why it's so much more effective for the Ombud to receive visitors in person rather than meeting them virtually. Indeed, much of what happens in the Ombud's office is idea generation, exploring with the visitors all possibilities to move forward out of a challenging situation, and brainstorming possible steps to take.

We're now back on the CERN sites and very happy to be here. It's a joy (who would have thought?) to see full car parks and queues in the restaurant; it's great to find ourselves once again struggling to find a free conference room for a meeting. And most of all, it's great to meet

colleagues in person, see their smiles and sit down with them to talk!

Based on the findings of this research paper, now that we're back on site, in the coming months we should see a surge of creativity and of new ideas for solving both scientific challenges and conflictual situations or management issues. Something to look forward to! Have a great summer!

¹Nature, April 2022, 'Virtual communication curbs creative idea generation', <https://www.nature.com/articles/s41586-022->

04643-y (<https://www.nature.com/articles/s41586-022-04643-y>)

²QED = quod erat demonstrandum

Laure Esteveny

I want to hear from you – feel free to email ombud@cern.ch with any feedback or suggestions for topics you'd like me to address.

NB: If you would like to be notified about posts, news and other communications from the CERN Ombud, please register to receive the CERN Ombud news (<https://e-groups.cern.ch/e-groups/EgroupsSubscription.do?egroupName=cern-ombud-news>).