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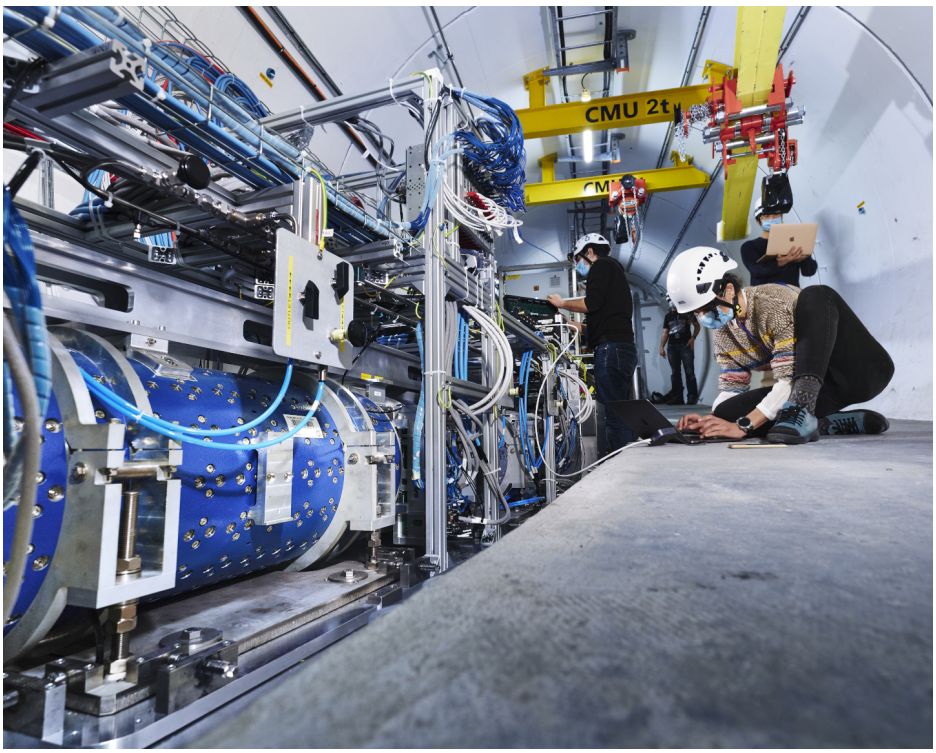
LS2 REPORT: FASER IS BORN

FASER, the Forward Search Experiment, has been installed in the LHC tunnel during Long Shutdown 2. It is currently being tested and will start taking data next year



The final elements of FASER were put into place this month. (Image: CERN)

FASER* (Forward Search Experiment), CERN's newest experiment, is now in place in the LHC tunnel, only two years after its approval by CERN's Research Board in March 2019. FASER is designed to study the interactions of high-energy neutrinos and search for new, as-yet-undiscovered light and weakly interacting particles. Such particles are dominantly produced along the beam collision axis and may be long-lived particles, travelling hundreds of metres before decaying. The existence of such new particles is predicted by many models beyond the Standard Model that attempt to solve some of the biggest puzzles in physics, such as the nature of dark matter and the origin of neutrino masses.

FASER is located along the beam collision axis, 480 m from the ATLAS interaction point, in an unused service tunnel that formerly connected the SPS to the LEP collider – an optimal position for detecting the particles into which light and weakly interacting particles will decay.

The first civil engineering works started in May 2020. "Because of the sloped geometry of the tunnel, the beam collision axis was actually passing under the ground," says Jamie Boyd, FASER spokesperson.

(Continued on page 2)

A WORD FROM CHARLOTTE LINDBERG WARAKAULLE

EXCELLENCE IN SCIENCE THRIVES ON GLOBAL INTERACTION

A year ago, it seemed that the world closed around us. From one day to the next, travel and movement became restricted. The usual in-person exchanges with colleagues from across the world suddenly became a rare occurrence.

(Continued on page 2)

In this issue

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A WORD FROM CHARLOTTE LINDBERG WARAKAULLE

EXCELLENCE IN SCIENCE THRIVES ON GLOBAL INTERACTION

Yet, while the pandemic may have changed how we interact, it has also highlighted the inherently global nature of our discipline and of research generally. Excellence in science is driven by inclusive interaction, by bringing together diverse ideas and input from all corners of our globe.

As we look ahead to the future of CERN, this global dimension takes on added importance. An ambitious future for the Laboratory and for the field is only possible through a global effort, with our Member and Associate Members at the heart of it.

Five years ago, the International Relations Sector was established with the task of enabling CERN to accelerate science and serve society on a global level, now and for the future. This mission is even more relevant now, five years on, as we focus on support for the implementation of the recommendations of the 2020 update of the European Strategy for Particle Physics. There is an international dimension across all of the 20 statements of the Strategy. Our task in IR is to facilitate that international dimension, generating understanding and building support for the scientific aspirations encapsulated in the Strategy.

Reaching out, making CERN visible and making its impact understood, is critical to sustaining long-term support. This requires engagement in our Member and Associate Member States, and beyond. For the IR sector, whose core business involves engaging with people either on-site or further afield, it seemed for a while as if everything would grind to a halt in 2020. "La visite est annulée" became almost a mantra, until our fantastic teams learned how to move online with virtual talks and visits tailored for VIPs, schools, the media and the general public. These will continue, and as we hopefully move back towards normality, they will enhance our work going forward.

The CERN Science Gateway, our new education and outreach centre, will be pivotal in our efforts to enhance the engagement for CERN's future. Construction got underway towards the end of last year and is now very visible around the Globe of Science and Innovation and next to entrance A. In parallel, work is ongoing to develop new exhibitions, along with educational and outreach programmes ready for the opening in 2022/23. This year's Sparks! event is an important precursor in this respect. The new materials, joint events through the auditorium, temporary exhibitions at the Globe and more capacity to welcome visitors will all serve to strengthen the link between CERN and our Member and Associate Member States.

The next five years are important ones for all of the CERN community in a global perspective. The top priority remains, of course, the physics – excellent science that thrives on interaction on a worldwide scale. With the experience of the first five years, the IR sector will be working hard over the coming mandate to ensure that the vision and impact of the Laboratory are shared, understood and owned by all of our stakeholders. As we emerge from the pandemic, we want to look forward to a bright and even more greatly integrated future for our field.

Charlotte Lindberg Warakaulle
Director for International Relations

LS2 REPORT: FASER IS BORN

"Measurements from the CERN survey team showed that, by excavating a 50-cm-deep trench, sufficient space would be created to house the 5-m-long FASER detector." In the summer, the first services and power systems were installed, and in November, FASER's three magnets were put in place in the trench.

A pretty simple experiment

At the entrance to the detector, two scintillator stations are used to veto charged particles coming through the cavern wall from the ATLAS interaction point; these are primarily high-energy muons. The veto stations are followed by a 1.5-m-long dipole magnet. This is the decay volume for long-lived particles decaying into a pair of oppositely charged particles. After the decay volume is a spectrometer consisting of two 1-m-long dipole magnets with three tracking stations, which are located at either end and in between the magnets. Each tracking station is composed of layers of precision silicon strip detectors. Scintillator stations for triggering and precision time measurements are located at the entrance and exit of the spectrometer.

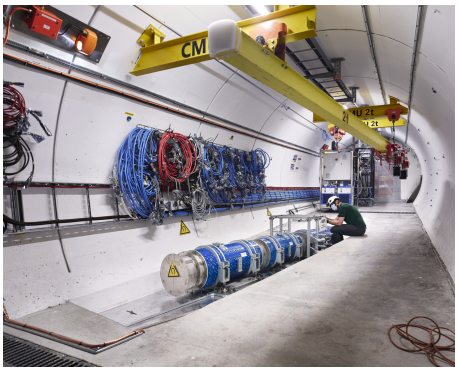
The final component is the electromagnetic calorimeter. This will identify high-energy electrons and photons and measure the total electromagnetic energy. The whole detector is cooled down to 15 ℃ by an independent cooling station.

"FASER uses spare pieces from the ATLAS (for the tracker) and LHCb (for the calorimeter) experiments, which made possible its installation during Long Shutdown 2, so quickly after its approval," highlights Jamie Boyd.

FASER will also have a subdetector called FASERν, which is specifically designed to detect neutrinos. No neutrino produced at a particle collider has ever been detected, despite colliders producing them in huge numbers and at high energies. FASERνis made up of emulsion films and tungsten plates to act as both the target and the detector to see the neutrino interactions. FASERνshould be ready for installation by the end of the year. The whole experiment will start taking data during Run 3 of the LHC, starting in 2022.

“We are extremely excited to see this project come to life so quickly and smoothly,” says Jamie Boyd. “Of course, this would not have been possible without the expert help of the many CERN teams involved!”

**The FASER collaboration consists of 70 members from 19 institutions and 8 countries. FASER is supported by the Heising-Simons and Simons Foundations.*



The installation of FASER's three magnets took place in November, in the narrow trench excavated by CERN's SCE team. (Image: CERN)

Anaïs Schaeffer

CERN AND FERMILAB MAP OUT HL-LHC COLLABORATION

A memorandum of understanding (MoU) between CERN and Fermilab, signed on 23 March, details Fermilab's contributions to the High-Luminosity LHC project

Nigel Lockyer, Director of Fermilab (left, on the screen) and Fabiola Gianotti, CERN Director-General, sign a Memorandum of Understanding in the presence of Mike Lamont, CERN Director for Accelerators and Technology (Image: CERN)

Representatives of CERN and Fermilab have reinforced the collaboration between the two leading particle physics laboratories around the High-Luminosity LHC (HL-LHC) project through the signature of a memorandum of understanding (MoU) detailing the US laboratory's technical contributions to the accelerator upgrade project. Fabiola Gianotti, Director-General of CERN, and Nigel Lockyer, Director of Fermilab, signed the official document in a ceremony which was held via videoconference on Tuesday, 23 March.

The MoU further defines Fermilab's involvement in the HL-LHC project, the comprehensive overhaul of CERN's flagship accelerator which aims for a tenfold increase of integrated luminosity compared to the nominal LHC. Fermilab's longstanding involvement was formalised in a 2015 cooperation agreement, under which this MoU comes, to transition to final production. Through the signature of the MoU, Fermilab pledges the delivery to CERN of 10 units of Q1 and Q3 inner triplet quadrupole cryo-assemblies and 10 units of radiofrequency dipole crab cavities, two crucial components for the upgrade of the LHC. The MoU also outlines a schedule for the production and delivery of the components (all deliveries are planned to be completed by 2025) and details funding for the project.

The United States, through the Department of Energy and the National Science Foundation, has been heavily involved in CERN activities and vice versa, both within the framework of the HL-LHC project and outside of it. The country was granted Observer status for the project in 2020, shortly after the successful test of short niobium-tin 11 Tesla magnets at Fermilab in the same year. This outstanding achievement was hailed as a milestone on the road to the HL-LHC, which will rely on this technology to focus the intense proton beams. Conversely, the strong performance of the ProtoDUNE installation at CERN, a detector prototype for the future DUNE experiment (Deep Underground Neutrino Experiment), presages the successful development of the large neutrino-detecting experiment on US soil in the coming years.

Thomas Hortala

LHC KEY HANDED BACK FOR OPERATION

Two and a quarter years after it was delivered to the LS2 intervention teams, the key to the LHC is back in the hands of the Operations group

On 15 March 2021, Maria Barberan (Accelerator Coordination and Engineering group, left, holding the key) handed back the LHC key to Matteo Solfaroli (Operations group, right), in CERN's Control Centre (CCC). (Image: CERN)

On 10 December 2018, LHC Run 2 came to an end, and the symbolic key to the machine was handed over to the aptly-named ACE (Accelerator Coordination and Engineering) group in the Engineering Department. Two years and one pandemic later, it is now back in the hands of the operators, and preparations are underway to bring the LHC back to life later this year.

During Long Shutdown 2 (LS2), major equipment has been installed within the framework of several projects. The LIU project, in addition to the large number of injector upgrades, was also very active in the LHC tunnel, with the implementation of a new design for the transfer lines from the SPS to the LHC. Even if most of the activities for the HL-LHC project will take place during LS3, major works were performed during LS2: the upgrade of the cryogenics system at LHC Point 4, the installation of numerous innovative collimators, civil engineering at LHC Points 1 and 5, to list only a few. As part of the DISMAC project, the electrical insulation of all 1232 LHC dipole diodes was consolidated and 22 magnets were replaced in the machine.

FASER (Forward Search Experiment) has also been installed in the LHC ; it will be taking data during Run 3.

The LS2 was a fundamental milestone for allowing the LHC to reach unprecedented energy levels for the new era of high luminosity, opening the door to new discoveries, but it was also instrumental for the building of strong and trustful relationships between all stakeholders. By consolidating, upgrading, maintaining and optimising the accelerator complex, teams worked towards more powerful and reliable discovery factory. “Long Shutdown 2 federated people around a common project,” explains Marzia Bernardini, in charge of the organisation, scheduling and support section in the EN-ACE group, “especially when circumstances require constant rescheduling. The LS2 helped us to understand each other as we listen and debate to find common solutions, putting aside our egos and working towards a common goal.”

When the LHC key was handed back to the Operations group in the Beams Department, on 15 March, it was an opportunity for the LS2 teams to celebrate a mission accomplished. “This key somehow represents the values and knowledge of the scientific community,” says Marzia, “the work of hundreds of Cernois, collaborators, contractors, fellows, project associates: everyone has contributed with passion, commitment and professionalism to the success of LS2. It was a wonderful challenge that we were able to take on together.”

CMS LAUNCHES INITIATIVE TO SUPPORT LEBANESE COLLEAGUES

The CMS collaboration is looking for support for the Lebanese scientific community

Young Lebanese scientists at CERN: Donations to this fundraiser will support the setup and running of a computing centre dedicated to research in Lebanon (Image: CERN)

Lebanon joined the CERN family in 2016 through the signature of an International Cooperation Agreement. This triggered a strong development of the country's contributions to CERN projects, particularly through the affiliation of four of its top universities to CMS. Yet the country is dealing with an unprecedented economic crisis, food shortages, Syrian refugees and the COVID-19 pandemic, all in the aftermath of the Beirut port explosion on 4 August. Even the most resilient higher-education institutions in Lebanon are struggling to survive. Despite these challenges, the Lebanese scientific community has reaffirmed its commitment to CERN and CMS, but it needs support. To help, CMS, in collaboration with the Sharing Knowledge Foundation (SKF) is launching a fundraising initiative.

One project, initiated to build the research capacity of the country, is particularly at risk: High-Performance Computing for Lebanon (HPC4L). This project was supposed to benefit from servers donated by CERN to Lebanon, but the hardware was unfortunately unable to leave CERN so far because of a lack of available funding for its shipping. HPC4L is designed to enable computing capacity development to support all research activities, including HEP and other scientific disciplines. The objective is also to transfer CERN and CMS knowledge and expertise to train a dedicated support team in Lebanon

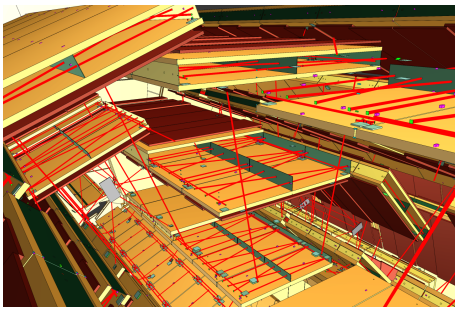
that will run the HPC facility there. This HPC centre will bring together the four Lebanese institutes contributing to CMS and should serve as a coordination hub for cooperation and communication across local key research players. But despite the opportunities that it will bring to the research community, these institutes are no longer able to absorb the cost of the programme. CMS and SKF are therefore fundraising to (1) Cover the shipping costs of the donated hardware to Lebanon, (2) purchase hardware to allow the installation of the aforementioned equipment and (3) support Lebanese experts while they get trained at CERN by the CMS offline computing team.

At this pivotal moment, every effort to help Lebanon counts. CMS is reaching out for donations to support this initiative, to help both the Lebanese research community and the country itself. Please visit cern.ch/fundraiser-lebanon to find out more, including how you can be involved.

May Alali, Martin Gastal

ALIGNING THE ATLAS MUON SPECTROMETER

In new results, ATLAS physicists describe novel techniques used to accurately align the muon spectrometer



A schematic view of the muon spectrometer and its optical alignment system in the barrel region of the ATLAS experiment. The optical lines (red) form a network of alignment detectors that continuously monitors the positions of the chambers relative to each other and their deformations. (Image: ATLAS collaboration/CERN)

The muon spectrometer is made up of several thousand chambers and is the outermost layer of the ATLAS detector. It identifies and measures the momentum of muons that fly out of the collision point. Key to this is a precise understanding of the muon spectrometer's geometry.

At small scales, the geometry of the muon spectrometer is almost constantly changing, albeit slowly. Small temperature variations make the chambers and their support structures contract, expand and deform. Further, some of the chambers are mounted on the ATLAS toroid magnets, which themselves can occasionally move and deform.

The muon spectrometer is therefore equipped with an optical alignment system that monitors in real time the positions of chambers relative to each other and to calibrated reference objects in the detector, as well as their deformations. This information can be combined with data from muon tracks in order to fully understand the muon spectrometer's position.

But when new chambers are added or existing ones repaired, the spatial relationship between the alignment sensors and active detector elements is altered. Such changes require the entire muon spectrometer to be realigned.

ATLAS physicists implemented a new alignment procedure for the data-taking periods of 2017 and 2018. The resulting alignment is almost – but not quite – perfect. Judging from observed deviations, the alignment is accurate to around 50 μm in a large part of the spectrometer volume, with some slightly poorer regions being closer to 100 μm.

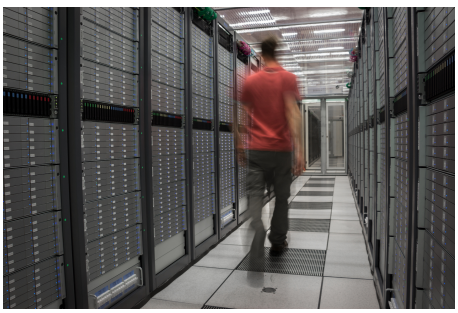
In other words: the entire muon spectrometer has been kept aligned to better than the diameter of a human hair. Such incredible precision is key to an experiment's success, as evidenced by the excellent ATLAS results from Run 2 data.

Read the full ATLAS Experiment Briefing (https://atlas.cern/updates/briefing/aligning-muon-spectrometer) to learn more.

ATLAS

TACKLING TOMORROW'S COMPUTING CHALLENGES TODAY AT THE 2021 CERN OPENLAB TECHNICAL WORKSHOP

CERN openlab held its annual technical workshop on 9-11 March. Due to the pandemic, the 200 participants joined the workshop this year via Zoom



Today, 34 R&D projects involving computing technologies are being carried out through CERN openlab. (Image: CERN)

CERN openlab held its annual technical workshop on 9-11 March. Due to the pandemic, the 200 participants joined the workshop this year via Zoom.

CERN openlab is a unique public-private partnership, through which CERN collaborates with leading technology companies to accelerate innovation in the computing technologies required by the LHC research

community. Today, there are over 20 companies and research organisations working together in CERN openlab.

The 34 R&D projects carried out through CERN openlab today are all related to computing technologies, but are spread across departments at CERN, as well as across experiments. CERN openlab's annual technical workshop is an opportunity for those working on these projects to come together – along with representatives of the external members of the collaboration – to discuss the latest developments. "It was great to see the innovative ways in which the project teams are working to tackle the computing challenges we face – particularly those related to the ambitious upgrade programme for the LHC," says Maria Girone, CERN openlab CTO.

The workshop was spread across three days: Tuesday was dedicated to exascale high-throughput and high-performance computing technologies, Wednesday to artificial intelligence (AI) and Thursday to quantum technologies. Another important aspect of CERN openlab's work is its support for communities beyond high-energy physics. The second half of Wednesday's session was dedicated to these activities.

At the end of the workshop, Alberto Di Meglio, the head of CERN openlab, presented a high-level roadmap for CERN openlab's new three-year phase, which is now getting under way. "Together, we are shaping an R&D programme for the coming years – focused on exascale, AI and quantum technologies – that will provide important support to the LHC research community, as well as to other scientific fields," says Di Meglio. He also highlighted CERN openlab's 20th anniversary, which will be celebrated later this year.

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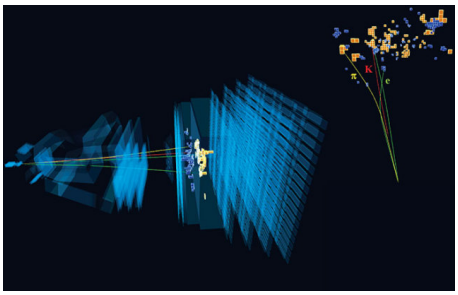
Read the original, full-length version of this article on the CERN openlab website.

INTRIGUING NEW RESULT FROM THE LHCB EXPERIMENT AT CERN

The LHCb results strengthen hints of a violation of lepton flavour universality



Very rare decay of a beauty meson involving an electron and positron observed at LHCb (Image: CERN)

Today the LHCb experiment at CERN announced new results which, if confirmed, would suggest hints of a violation of the Standard Model of particle physics. The results focus on the potential violation of lepton flavour universality and were announced at the Moriond conference on electroweak interactions and unified theories, as well as at a seminar held online at CERN, the European Organization for Nuclear Research.

The measurement made by the LHCb (Large Hadron Collider beauty) collaboration, compares two types of decays of beauty quarks. The first decay involves the electron and the second the muon, another elementary particle similar to the electron but approximately 200 times heavier. The electron and the muon, together with a third particle called the tau, are types of leptons and the difference between them is referred to as "flavours". The Standard Model of particle physics predicts that decays involving different flavours of leptons, such as the one in the LHCb study, should occur with the same probability, a feature known as lepton flavour universality that is usually measured by the ratio between the decay probabilities. In the Standard Model of particle physics, the ratio should be very close to one.

The new result indicates hints of a deviation from one: the statistical significance of the result is 3.1 standard deviations, which implies a probability of around 0.1% that the data is compatible with the Standard Model predictions. "If a violation of lepton flavour universality were to be confirmed, it would require a new physical process, such as the existence of new fundamental particles or interactions," says LHCb spokesperson Professor Chris Parkes from the University of Manchester and CERN. "More studies on related processes are under way using the existing LHCb data. We will be excited to see if they strengthen the intriguing hints in the current results."

The deviation presented today is consistent with a pattern of anomalies measured in similar processes by LHCb and other experiments worldwide over the past decade. The new results determine the ratio between the decay probabilities with greater precision than previous measurements and use all the data collected by the LHCb detector so far for the first time.

The LHCb experiment is one of the four large experiments at the Large Hadron Collider at CERN, situated underground on the Franco-Swiss border near Geneva. The experiment is designed to study decays of particles containing a beauty quark, a fundamental particle that has roughly four times the mass of the proton. The results presented today focus on lepton flavour universality, but the LHCb experiment also studies matter-antimatter differences.

Looking towards the future, the LHCb experiment is well placed to clarify the potential existence of new physics effects hinted at in the decays presented today. The LHCb experiment is expected to start collecting new data next year following an upgrade to the detector.

Additional material:

Photo of the LHCb experiment : http://cds.cern.ch/record/2302374?ln=fr#24

Caption: "The LHCb experiment is one of the four large experiments at the Large Hadron Collider at CERN, situated underground on the Franco-Swiss border near Geneva."

VNR : https://videos.cern.ch/record/2758757 *LHCb paper* : https://arxiv.org/abs/2103.11769

LHCb article : https://lhcb-public.web.cern.ch/Welcome.html#RK2021

CERN MARKED DATA PROTECTION DAY WITH ESA AND ESO

On 28 January, CERN teamed up with fellow EIROforum organisations ESA and ESO to deliver an eye-opening online event to mark Data Protection Day

(Image: CERN)

On 28 January, CERN teamed up with fellow EIROforum organisations ESA and ESO to deliver an eye-opening online event to mark Data Protection Day.

Over 350 participants learned about the snooping virtual eyes and ears of popular social media platforms and web browsers, and were introduced to an AI robotic companion to astronauts on the International Space Station.

Data protection issues affect us all. Lively question and answer (Q&A) sessions followed each of the presentations, confirming that many of us are thinking more and more in our daily lives about how and where our personal data is being collected and used, often in ways we do not expect. During the Q&A, the speakers provided valuable practical methods to mitigate the many risks we all face. Polls taken at the start and end of the event showed that there is keen interest in data privacy topics and it was encouraging that, after hearing from the three speakers, 90% of attendees said they had learned something new and would implement something that they had learned during the event!

This unique opportunity to exchange views and discuss best practices across three different organisations was an excellent complement to the important work that is already taking place here at CERN. The Office of Data Privacy (ODP) is now well established and continues its crucial work to ensure that CERN adopts best practices for handling personal data, in line with Operational Circular No. 11, " The processing of personal data at CERN ". The ODP is supported by the Data Privacy Coordinating Committee (DPCC), which, with its nominated departmental representatives, is ensuring a coherent and harmonised implementation of the rights and obligations set out in OC11.

If you were not able to join the Data Protection Day event, you can still watch a recording on the ODP website.

Our warm thanks to the ODP and the representatives of ESA and ESO for this great initiative.

If you want to learn more about data privacy at CERN, sign up for the privacy training and keep up to date with all data privacy issues via the ODP website.

Office of Data Privacy, Data Privacy Coordination Committee

CERN LAUNCHES TECHNOLOGY IMPACT FUND TO ADDRESS GLOBAL CHALLENGES

First selected project could save lives by providing earlier earthquake alerts

The applications of CERN technologies extend beyond high-energy physics to a vast range of areas such as aerospace, medical & biomedical, industry 4.0, cultural heritage, safety and towards a better planet. (Image: CERN)

CERN is launching a new Technology Impact Fund to bridge the gap between the technology developed for research at CERN and its potential applications to address societal challenges. The Fund was launched with support from CERN's Knowledge Transfer group and the CERN & Society Foundation, which is actively seeking external donors.

Financial support provided via the CERN Technology Impact Fund will enable CERN technologies to be adapted for use in wider society, with a particular focus on potential contributions to the 17 Sustainable Development Goals (SDGs) adopted by all United Nations Member States.

"The CERN Technology Impact Fund has the ambition to increase CERN's contribution to the common good," says Olivier Coutau, Delegate representing the Geneva Canton to International Geneva and member of the CERN & Society Foundation Board. "It is particularly appropriate to launch this initiative in Geneva, where most of the international organisations in charge of building a better world are based."

CERN personnel will be able to propose innovative CERN technologies with high potential to create societal impact. Thanks to funds sought through the CERN & Society Foundation, these technologies will be actively developed to the level of maturity needed for their proposed application in areas beyond particle physics. The projects will, whenever possible, take place in partnership with external organisations in academia, the public sector and industry to maximise the chances of a successful technology transfer to society.

The first technology selected under the Fund is the Compact Precision Laser Inclinometer (CPLI), originally developed by CERN and the Joint Institute for Nuclear Research (JINR), Russia, to measure the ground movements around CERN's ATLAS detector. This novel solution could serve as a lower-cost and more precise alternative to existing earthquake detection devices. Every year millions of lives are at risk of being devastated by earthquakes, disproportionately affecting already vulnerable communities. While existing seismic monitoring solutions rely on a network of expensive devices to provide early-warning information, the CPLI measures fluctuations of the local gravity field. Its high precision means it has potential also to provide early warning for other natural disasters, such as landslides and rapid glacial melt.

The CPLI would contribute to three SDGs in practice: making cities and human settlements safer (SDG 11), helping to reduce poverty (SDG 1), and helping to combat the impact of climate change (SDG 13).

"The CERN Technology Impact Fund is an exciting new initiative. Supporting technological solutions that target some of the most difficult challenges facing our world will ensure that society will benefit further from the innovation taking place at CERN," explains Amy Bilton, a CERN Knowledge Transfer Officer.

About the CERN & Society Foundation

The CERN & Society Foundation is a private charitable foundation, established by CERN and funded by individuals, trusts, organisations and companies. Its mission is to spread the CERN spirit of scientific curiosity, for the inspiration and benefit of society. All CERN & Society projects are inspired or enabled by CERN, but lie outside of its specific research mandate. To learn about partnership opportunities, contact partnerships.fundraising@cern.ch.

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For more information:

- *CERN Technology Impact Fund (https://cernandsocietyfoundation.cern/projects/cern-technology-impact-fund)*
- *Precision Laser Inclinometer (https://cernandsocietyfoundation.cern/page/precision-laser-inclinometer)*

AMS REVEALS PROPERTIES OF IRON COSMIC RAYS

The properties are unexpectedly different from those of other heavy primary cosmic rays

The AMS detector on the International Space Station (Image: NASA)

The more results it delivers, the more surprises it reveals. That pretty much sums up the outcome so far of the AMS experiment – a space-based detector that was assembled at CERN and has been detecting electrically charged particles from outer space, known as cosmic rays, since 2011. And, surprise, surprise, the latest result from the experiment, described in a paper published in *Physical Review Letters*, is no exception. The new result shows that the properties of iron nuclei – the most abundant primary cosmic rays beyond silicon nuclei and the heaviest cosmic rays measured by AMS until now – are surprisingly different from those of other heavy primary cosmic rays.

Historically, cosmic rays are classified into two classes, primaries and secondaries. Primary cosmic rays are produced in supernovae explosions in the Milky Way and beyond, whereas secondary cosmic rays are produced by interactions between the primary cosmic rays and the interstellar medium. But an AMS study from last year revealed that, contrary to expectations, primary cosmic rays have at least two distinct classes, one made of light nuclei and another made of heavy nuclei. And now the new AMS study shows that iron nuclei, which are much heavier than any other nuclei measured by AMS so far, belong unexpectedly not to the same class as the other heavy nuclei but instead to the class of light nuclei.

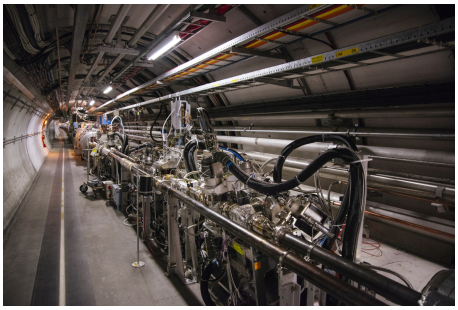
The AMS team arrived at this conclusion using AMS data on the number, or more accurately the flux, of iron nuclei and how this flux varies with rigidity – a measure of a charged particle's momentum in a magnetic field. Analysing the data in the rigidity range from 2.65 GV to 3.0 TV, the team found that, above a rigidity of 80.5 GV, the rigidity dependence of the flux of iron cosmic rays is identical to the rigidity dependence of the fluxes of the light primary helium, carbon and oxygen cosmic rays, which is different from the rigidity dependence of the fluxes of the heavy primary neon, magnesium and silicon cosmic rays.

"Our results are mind-bending, defying again conventional models of cosmic-ray origin and propagation in the interstellar medium," says AMS-experiment spokesperson Samuel Ting. "It will no doubt be interesting to see what theorists and modellers make of them."

Ana Lopes

TOTEM AND DØCOLLABORATIONS ANNOUNCE ODDERON DISCOVERY

The TOTEM collaboration at the LHC and the DØcollaboration at the Tevatron collider at Fermilab have discovered an elusive state of three gluons



Part of the TOTEM installation in the LHC tunnel 220 m downstream from the CMS experiment (Image: CERN)

The TOTEM collaboration at the LHC, together with the DØcollaboration at the Tevatron collider at Fermilab, have announced the discovery of the odderon – an elusive state of three fundamental particles called gluons that was predicted almost 50 years ago. The result was presented on Friday 5 March during a meeting at CERN, and follows the joint submission in December 2020 of a CERN/Fermilab preprint by TOTEM and DØreporting the observation.

"This result probes the deepest features of the theory of quantum chromodynamics, notably that gluons interact between themselves and that an odd number of gluons are able to be 'colourless', thus shielding the strong interaction," says TOTEM spokesperson Simone Giani of CERN. "A notable feature of this work is that the results are produced by combining the LHC and Tevatron data at different energies."

States comprising two, three or more gluons are usually called "glueballs", and are peculiar objects made only of the carriers of the strong force. The advent of quantum chromodynamics (QCD) led theorists to predict the existence of the odderon in 1973. Proving its existence has been a major experimental challenge, however, requiring detailed measurements of protons as they glance off one another in high-energy collisions.

While most high-energy collisions cause protons to break into their constituent quarks and gluons, roughly 25% are elastic collisions where the protons remain intact but emerge on slightly different paths (deviating by around a millimetre over a distance of 200 m at the LHC). TOTEM measures these small deviations in proton–proton scattering using two detectors located on either side of the CMS experiment 220 m from the interaction point, while DØemployed a similar setup at the Tevatron proton–antiproton collider.

At lower energies, differences in proton–proton vs proton–antiproton scattering are due to the exchange of different virtual mesons – particles made up of a quark and an antiquark. At multi-TeV energies, on the other hand, proton interactions are expected to be mediated purely by gluons. In particular, elastic scattering at low-momentum transfer and high energies has long been explained by the exchange of a pomeron – a "colour-neutral" virtual glueball made up of an even number of gluons.

However, in 2018, TOTEM reported measurements at high energies that could not easily be explained by this traditional idea. Instead, a further QCD object seemed to be at play, supporting models in which a three-gluon compound, or one containing higher odd numbers of gluons, was being exchanged. The results were sufficient to claim evidence for the odderon, although not yet its definitive observation.

The new work is based on a model-independent analysis of data at medium-range momentum transfer. The TOTEM and DØteams compared LHC proton–proton data (recorded at collision energies of 2.76, 7, 8 and 13 TeV and extrapolated to 1.96 TeV), with Tevatron proton–antiproton data measured at 1.96 TeV, and found evidence again for the odderon. When the teams combined the result with measurements at much smaller scattering angles at 13 TeV by the TOTEM collaboration, the significance of the result was boosted to the discovery level.

"When combined with the measurements at 13 TeV, the significance of the result is in the range of 5.2–5.7 standard deviations and thus constitutes the first experimental observation of the odderon," said Christophe Royon of the University of Kansas, who presented the results on behalf of DØand TOTEM last week. "This is a major discovery by CERN and Fermilab."

In addition to the new TOTEM-DØmodel-independent study, several theoretical papers based on data from the Intersecting Storage Rings, the Super Proton Synchrotron, the Tevatron and the LHC, and on model-dependent inputs, provide additional evidence supporting the conclusion that the odderon exists.

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This update is a modified version of a story originally published in the CERN Courier.

Video: https://videos.cern.ch/record/2754247

COMPUTER SECURITY: YOUR REMOTE LOGINS

As the very last line of defence, CERN employs automatic monitoring tools that will send a short notification for every login from a "new" location to the email address you have registered with CERN

A "standard" attack scenario against computing accounts is known as "phishing", i.e. luring you into inadvertently disclosing your password to the maliciously evil attacker (see our latest *Bulletin* article " Email Senders: Pretence vs Reality "). Once successful, that malicious evil will either sell your credentials on the Dark Web to other evil people (and we checked for this in 2020, see " Digital stolen goods of CERN? ") or try to log in directly using your credentials together with your password. Boom, once the attacker is in, your professional and private life is in peril (" What do apartments and computers have in common? ").

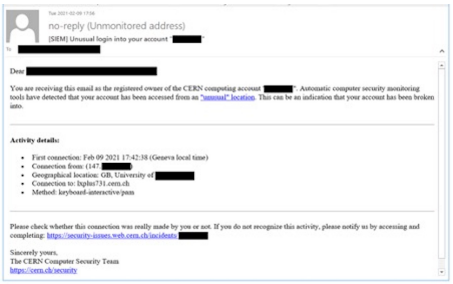
As the very last line of defence, therefore, CERN employs automatic monitoring tools that will send a short notification for every login from a "new" location to the email address you have registered with CERN. As an attacker is unlikely to log in from your standard devices and locations like home, work, your university or your friend's house, you should be able to spot the difference, identify this "new" location as a place where you have not been, and alert Computer.Security@cern.ch. The notification looks like this:

If you receive such a notification, please check. The embedded link leads to a webpage providing you with all the necessary help. If the location is unknown to you, or you did not log into CERN at that time, you had better be safe than sorry and change your CERN password as well as letting us know through the webpage.

Note that notifications will only be sent for each new domain, or geographical location, but not for every new IP in that domain. Once checked, the new domain or location will be whitelisted, so you are not notified again when using it again. Only if this domain/location remains idle for about three months, will we purge it from the whitelist. In case you would like to be notified earlier, you can review and remove your locations on this dedicated webpage.

Thanks a lot for being vigilant and alert, and helping us secure the Organization!

Do you want to learn more about computer security incidents and issues at CERN? Follow our Monthly Report. For further information, questions or help, check our website or contact us at Computer.Security@cern.ch.


no-reply (Unmonitored address)
[SIEM] Unusual login into your account [redacted]

To [redacted]

Date [redacted]

You are receiving this email as the registered owner of the CERN computing account [redacted]. Automatic computer security monitoring tools have detected that your account has been accessed from an "unusual" location. This can be an indication that your account has been broken into.

Activity details:

- First connection: Feb 09 2021 17:42:38 (Geneva local time)
- Connection from: (147.[redacted]
- Geographical location: GB, University of [redacted]
- Connection to: lxplus731.cern.ch
- Method: keyboard-interactive/pam

Please check whether this connection was really made by you or not. If you do not recognize this activity, please notify us by accessing and completing: https://security-issues.web.cern.ch/incident[redacted]

Sincerely yours,
The CERN Computer Security Team
https://cern.ch/security

The Computer Security Team

Official communications

ONE-TO-ONE MEETINGS WITH THE FRENCH TAX AUTHORITIES FOR CERN MEMBERS OF PERSONNEL

In order to help Members of Personnel who may need assistance, the Organization has decided to set up individual tax consultation sessions with the French tax authorities (Service des Impôts des Particuliers (SIP) de Valserhône) to answer questions on income tax matters in France.

Due to the pandemic, these consultations will take place by video only and will be run by two representatives of the SIP. The sessions will require pre-booking an appointment on one of two possible dates: 1 April and 15 April 2021 from 1:30 pm to 4:30 pm.

Please note that these video-meetings will be in French. Should you need any assistance with the language, we advise you to ask a French-speaking colleague for help. There are only a limited number of time slots available, so we recommend you sign up early, on this portal: https://planning-hr.web.cern.ch/.

For any questions regarding these meetings, please contact SIPTax-support@cern.ch .

HR department

EXCHANGE RATE FOR THE TAX DECLARATION FORM OF 2020 INCOME: FOR THE ATTENTION OF MEMBERS OF THE PERSONNEL AND PENSIONERS LIVING IN FRANCE

For the tax declaration form of 2020 income, the average annual exchange rate to be used is **EUR 0.92* for CHF 1**.

*Communicated by the French Tax Authorities.

HR department

TAXATION IN FRANCE

Memorandum concerning the internal tax annual certificate and individual annual statement for 2020 (for the 2021 declaration of 2020 income in France)

The Organization would like to remind members of the personnel that they must comply with the national legislation applicable to them (cf. Article S V 2.02 of the Staff Rules).

I - Internal tax annual certificate and individual annual statement for 2020

The internal tax annual certificate or the individual annual statement for 2020, issued by Finance and Administrative Processes Department, is available since 12 February 2021 via HRT (under "My e-Documents and Self Services"). It is intended exclusively for the tax authorities.

1. If you are currently a member of the CERN personnel, you will have received an e-mail containing a link to your certificate or statement, which you can print out if necessary.
2. If you are no longer a member of the CERN personnel or are unable to access your certificate or statement as indicated above, you will find information explaining how to obtain one on this page (*https://admin-eguide.web.cern.ch/en/procedure/annual-certificates*).

In case of difficulty in obtaining your certificate or statement, send an e-mail explaining the problem to service-desk@cern.ch.

II - 2021 tax declaration form of 2020 income in France

The 2021 tax declaration form of 2020 income must be completed following the general indications available on this page (*https://admin-eguide.web.cern.ch/en/procedure/income-tax-declaration-france*).

IF YOU HAVE ANY SPECIFIC QUESTIONS, PLEASE CONTACT YOUR LOCAL " *SERVICE DES IMPÔTS DES PARTICULIERS* " (SIP, PRIVATE CITIZENS' TAX OFFICE) DIRECTLY.

This information does not concern CERN pensioners, as they are no longer members of the CERN personnel and are therefore subject to the standard national legal provisions relating to taxation.

HR department

HUMAN RESOURCES DEPARTMENT: CHAPTER OF THE 2020 ANNUAL REPORT ON THE SETTLEMENT OF DISPUTES AND DISCIPLINE

The Organization is committed to a fair and respectful work environment. Behavioural concerns or administrative disputes brought to the attention of the Organization are addressed in a timely manner using, whenever possible, informal resolution mechanisms such as mediation. In cases where informal resolution is not achievable or appropriate, the Organization or the member of personnel concerned may decide to initiate formal proceedings under the Organization's settlement of disputes procedure or conduct-related frameworks, as applicable[(1)]. This report provides an overview of the cases handled under Chapter VI of the Staff Rules and Regulations.

Introduction

The Annual Report under Chapter VI ("Settlement of Disputes and Discipline") of the Staff Rules and Regulations serves to report on:

- requests for review;
- internal appeals;
- cases in which disciplinary action was taken; and
- complaints before the Administrative Tribunal of the International Labour Organization (ILOAT).

Requests for review and internal appeals

Under Article S VI 1.01 of the Staff Rules, members of the personnel may challenge an administrative decision by the Director-General where it adversely affects the con-

ditions of employment or association that derive from their contract or from the Staff Rules and Regulations.

If permitted by the Staff Rules and Regulations, a decision may be challenged internally within the Organization:

- through a review procedure; or
- through an internal appeal procedure. In this case, the Joint Advisory Appeals Board (JAAB) shall be consulted by the Director-General prior to taking any final decision on the merits.

Disciplinary Action

Under Article S VI 2.01 of the Staff Rules, the Director-General may take disciplinary action against members of the personnel who, whether intentionally or through carelessness, are guilty of a breach of the Rules and Regulations or of misconduct that is to the detriment of the Organization.

Article S VI 2.02 of the Staff Rules stipulates that, having regard to the gravity of the breach or misconduct in question, the disciplinary action shall be:

- a warning;
- a reprimand;
- suspension without remuneration or pay for a period not exceeding six months;
- downward adjustment of the staff member's salary;
- demotion;
- dismissal.

The Director-General shall consult the Joint Advisory Disciplinary Board (JADB) prior to taking any disciplinary action other than a warning or a reprimand (Article S VI 2.04 of the Staff Rules). In cases of particular serious misconduct, the Director-General may decide to dismiss without notice and without consulting the JADB (Article S VI 2.05 of the Staff Rules).

Complaints before the Administrative Tribunal of the International Labour Organization (ILOAT)

A decision may be challenged externally by filing a complaint before the ILOAT:

- when internal procedures have been exhausted and the decision is final;
- when an internal challenge is not permitted by the Staff Rules and Regulations; or
- when the complainant is authorised to proceed directly to the Tribunal.

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Requests for review:

From 1 January to 31 December 2020, no new requests for review of administrative decisions were introduced.

- In December 2019, a staff member had requested review of the decision to recognize their illness as occupational, contesting the illness consolidation date and the indemnity rate for deterioration of physical health. The decision has been suspended pending settlement of a dispute of a medical nature initiated in 2020, the outcome of which is expected in 2021.

Internal appeals (Joint Advisory Appeals Board (JAAB)):

During the period from 1 January to 31 December 2020, 198 internal appeals were introduced:

- In April 2020, five appeals were introduced by associated members of the personnel further to the introduction of ceilings for the processing of subsistence allowances by CERN on behalf of third parties[(2)]. These appeals were deemed irreceivable since no changes had been made to their conditions of association. In addition, one appeal was time-barred.
- In April 2020, 192 appeals were introduced by associated members of the personnel against the decision to replace the 2019 internal tax annual certificate by an individual annual statement for associated members of the personnel for whom CERN processed subsistence allowance payments on behalf of third parties. Following the decision of the Director-General to exceptionally issue tax certificates for 2019, the appeals were deemed irreceivable as the dispute had thus been rendered moot.
- In July 2020, an appeal was introduced by a staff member against the decision to qualify their performance as “fair” for the reference year 2019. The procedure is ongoing and a conclusion is expected in the first quarter of 2021.

In 2020, the Director-General took the following decisions concerning appeals lodged in 2019:

- In February 2019, a staff member had introduced an appeal against the decision not to be awarded an indefinite contract at the outcome of a selection procedure. In January 2020, the Director-General decided to follow the JAAB's recommendation to reject the appeal.
- In October 2019, a staff member introduced an appeal against the decision not to qualify their commuting accident as being of occupational nature. In October 2020 the Director-General decided to follow the JAAB's decision to reject the appeal.
- In July 2019, a staff member had introduced an appeal against the decision to qualify their performance as “fair” for the reference year 2018. In November 2020, the Director-General decided to follow the JAAB's recommendation to reject the appeal.
- In June 2019, a staff member had introduced an appeal against the decision to qualify their performance as “insufficient” for the reference year 2018. In November 2020, the Director-General decided to follow the JAAB's recommendation to renew the performance assessment and qualification.
- In March and April 2019, four staff members had introduced appeals against the outcome of their career reviews. The reviews had been carried out further to a recommendation made in the context of their previous internal appeals. In November and December 2020, the Director-General decided to follow the JAAB's recommendation to reject three of the appeals. The hearing for the fourth appeal has been postponed due to medical reasons; the procedure is expected to resume in 2021.

Other appeals:

- In December 2019, a staff member had introduced an appeal against the decision not to be awarded an indefinite contract at the outcome of a selection procedure. The staff mem-

ber decided to withdraw the appeal prior to the hearing.
- An appeal that had been introduced in November 2018 by a staff member against the refusal to grant reimbursement of medical expenses at the occupational rate, on the basis that the accident had been consolidated for a period of more than 10 years, was suspended in June 2019 by mutual agreement pending revision of Administrative Circular No. 14 with regard to the definition of, and time limit for, "relapse". The revised Circular was published in January 2020 suppressing the 10-year time limit, and hence allowing the staff member eligibility for full reimbursement and consideration for an indemnity. The appeal is pending revision of the appellant's medical status under the new provisions.
- In July 2019, a staff member had introduced an appeal against the decision to reject their request for removal of personal information from their CERN medical file. The hearing for this appeal has been postponed due to health reasons; the procedure is expected to resume in 2021.

Warnings and reprimands:

In 2020, the Organization issued four reprimands:

- One reprimand was issued to a User, following the outcome of a harassment investigation, for behaviour towards a colleague creating a stressful and hostile working environment.
- One reprimand was issued to a staff member for refusing to comply with the instructions given by a security agent on entering the site and for aggressive behaviour including physically grabbing the agent's clothing.
- Two reprimands were issued to Users involved in falsifying a letter sent outside the Organization concerning a private matter, and which led the recipient to believe that the letter was sent on behalf of the Organization.

The Joint Advisory Disciplinary Board (JADB):

In 2020, the JADB was not convened.

In 2019, a procedure had been introduced, with regard to a staff member, following the outcome of a harassment investigation. In 2020, the Board submitted its report to the Director-General. The Board considered that the behaviour in question indeed constituted misconduct. The Director-General decided to follow the majority recommendation of the Board to demote the staff member.

Dismissal notified during the probation period:

In 2020, three employment contracts of staff members were terminated due to insufficient performance during the probation period (as per Article S II 5.01 g of the Staff Rules).

Particularly serious misconduct:

In 2020, no actions were taken pursuant to Article S VI 2.05 of the Staff Rules.

Complaints before the Administrative Tribunal of the International Labour Organization (ILOAT):

During the period from 1 January to 31 December 2020:

- In April 2020, a former staff member filed a complaint with the ILOAT against the Director-General's decision not to grant them an indefinite contract (IC). The Tribunal's ruling is expected in 2021.
- In October 2020, three associated members of the personnel filed individual complaints with the ILOAT against a change in the conditions governing the processing by CERN of subsistence allowance payments on behalf of third parties (introduction of a 'cap'). The Tribunal's ruling is expected in 2022.

The ILOAT ruled in eight cases involving the Organization, which had been filed in 2018:

- In a case filed by a former staff member against the decision of the Director-General to terminate their employment at the end of the probation period, due to unsatisfactory performance, the Tribunal found in favour of the Organization on all counts.

- In six cases filed by staff members against the outcome of the 2015 five-yearly review, specifically the implementation of the new career structure, the ILOAT rejected the Complainants' claims and found in favour of the Organization on all counts. All requests for intervention in the proceedings were dismissed by the Tribunal.
- In a case filed by a staff member against the outcome of the 2015 five-yearly review, specifically the implementation of the new career structure, as well as the qualification of their performance for the reference year 2016, the ILOAT set aside the decision to qualify the Complainant's performance as "fair" and remanded the matter to the Organization to take a new decision. The Complainant was awarded costs by the Tribunal. All claims relating to the five-yearly review were rejected and the requests for intervention in the proceedings were dismissed by the Tribunal.

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(1) See Chapter VI of the Staff Rules and Regulations on "Settlement of Disputes and Discipline", also OC9 on "Principles and procedures governing complaints of harassment"; OC10 on "Principles and procedure governing investigation of fraud".

(2) As from 1 January 2021, these allowances are henceforth entitled 'cost-of-living allowance'.

HR department

Announcements

TRAINING FOR THE PROCUREMENT OF SUPPLIES AND SERVICES AT CERN – A NEW "À LA CARTE" APPROACH

(Image: CERN)

In order to support technical officers buying goods with high financial costs as fully as possible, the Procurement Service has reshaped its training programme and now offers a "Purchase of supplies greater than 200 kCHF" *à la carte* course, split into three independent sessions.

These sessions are highly recommended for any technical officer in charge of a procurement project who has not already attended a face-to-face training course with the Procurement Service. They will help you navigate the six to nine-month process of buying materials as a technical officer, which can be broken down into three separate phases, each carried out in close collaboration with CERN's Procurement Service:

- Phase 1: The launch of the project, including the definition of a purchasing strategy, leading to the publication of a market survey and the selection of firms;
- Phase 2: The invitations to tender resulting from this market survey;
- Phase 3: The kick-off and subsequent monitoring of one or more contracts.

Each training module will be available every quarter, giving technical managers the opportunity to register according to their needs and as close as possible to their project schedule.

A way to put your skills into practice immediately and in a targeted manner!

In addition, the Procurement Service is expanding its training options by making available a new course for price enquiries of more than 50 kCHF. This two-hour course will cover the main aspects to be considered before embarking on a purchasing process, from strategy definition to good contract management practices.

Finally, the one-day training module for the procurement and management of industrial service contracts will enable technical managers to deepen their knowledge and awareness of good practices for industrial service contracts on the CERN site.

More information on the procurement training catalogue here (*https://lms.cern.ch/ekp/servlet/ekp?TX=STRUCTUREDCATALOG&CAT=EKP000000471*).

Individual courses can be accessed below:

- Procurement of supplies greater than 200 kCHF – Module 1: Procurement Rules, Strategy and Market Survey
- Procurement of supplies greater than 200 kCHF – Module 2: Invitations to Tender
- Procurement of supplies greater than 200 kCHF – Module 3: Contract Management
- Price enquiries for supplies greater than 50 kCHF
- Industrial service contracts

CERN OPENLAB TALK: "THE COMPUTING CHALLENGES FACED BY THE HIGH-ENERGY PHYSICS COMMUNITY" – 25 MARCH

The EuroHPC Summit Week is currently taking place online. The event brings together the main stakeholders in high-performance computing (HPC) in Europe, including technology suppliers, those running major infrastructures, and HPC users – from both science and industry.

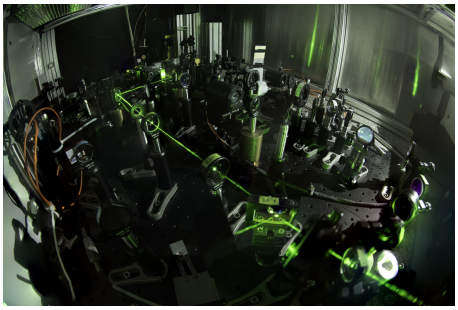
Maria Girone, CERN openlab CTO, will give a keynote talk on Thursday 25 March about the computing challenges faced by the high-energy physics community (10:00-10:45 CET). The presentation is available to all who have signed up for the EuroHPC Summit Week, which is free of charge.

Girone's presentation will summarise the unprecedented computing and data challenges posed by the ambitious upgrade programme for the Large Hadron Collider (LHC). The anticipated increase in the complexity of particle-collision events, as well the higher rate of data collection rate, will substantially outstrip the gains ex-

pected from technology evolution. Further increasing the efficiency of how we use the HPC facilities at our disposal could potentially address the resulting resource gap. Girone will discuss the identified common challenges for integrating HPC centres into the HEP computing ecosystem.

More information on the CERN openlab website.

JOIN THE AUDIENCE FOR CERN COURIER'S LIVE WEBINAR AT 2 P.M. GMT ON 31 MARCH, PRESENTED BY HEAD OF CERN OPENLAB ALBERTO DI MEGLIO



CERN's AEGIS experiment is able to explore the multi-particle entangled nature of photons from positronium annihilation, and is one of several examples of existing CERN research with relevance to quantum technologies (Image: CERN)

Quantum technologies have the potential to revolutionise science and society, but are still in their infancy. In recent years, the growing importance and the potential impact of quantum technology development has been highlighted by increasing investments in R&D worldwide in both academia and industry.

Cutting-edge research in quantum systems has been performed at CERN for many years to investigate open questions in particle physics. However, only recently, the different ongoing activities in quantum computing, sensing communications and theory have been brought under a common strategy to assess the potential impact on future CERN experiments.

This webinar, hosted by CERN Courier in partnership with IOP Publishing, will introduce the new CERN Quantum Technology Initiative [[link to https://cerncourier.com/a/cern-and-quantum-technologies/], give an overview of the laboratory's R&D activities and plans in this field, and give examples of the potential impact on research. It will also touch upon the rich international network of activities and how CERN fosters research collaborations.

Register through the CERN Courier website: https://cerncourier.com/a/the-cern-quantum-technology-initiative/

Alberto Di Meglio is the head of CERN openlab in the IT department at CERN and co-ordinator of the CERN Quantum Technology Initiative. Alberto is an aerospace engineer (MEng) and electronic engineer (PhD) by education and has extensive experience in the design, development and deployment of distributed computing and data infrastructures and software services for both commercial and research applications.

He joined CERN in 1998 as a data-centre systems engineer. In 2004, he took part in the early stages of development of the high-energy physics computing grid. From 2010 to 2013, Alberto was project director of the European Middleware Initiative, a project responsible for developing and maintaining most of the software services powering the Worldwide LHC Computing Grid.

Since 2013, Alberto has been leading CERN openlab, a long-term initiative to organise public–private collaborative R&D projects between CERN, academia and industry in ICT, computer and data science, covering many aspects of today's technology, from heterogeneous architecture and distributed computing to AI and quantum technologies.

ONLINE NETWORKING EVENT WITH TWO ENGINEERING COMPANIES: DAES AND FAGERSTRÖM INDUSTRIKONSULT - 26 MARCH AT 12 P.M.

Representatives from the two companies, which are currently recruiting, will be giving presentations and taking your questions as part of the CERN-Alumni-organised "Company Showroom" series

(Image: CERN)

Join representatives from DAES-Geneva and Fagerström Industrikonsult to find out more about the companies, potential job opportunities and the skills and talents they are currently seeking. CERN Alumnus Cyril Kharoua, co-founder and associate director of DAES, will be speaking along with colleagues from both companies.

DAES is a Swiss engineering company experienced in complex technical projects and advanced engineering simulations. The company's team of engineers provides

expertise and advanced skills for engineering studies in various domains from energy, watches, mobility, life sciences, industries to scientific facilities.

Fagerström Industrikonsult is a Swedish technical consultant company offering its own product portfolio. Its team of engineers and designers is involved in the Big Science market.

The event will start at 12:00 with a general presentation and will be followed by a Q&A session. For more information including access to the conference room, visit the CERN Alumni website.

JOIN THE 14TH "GERMANY AT CERN" INDUSTRIAL EXHIBITION AND DISCOVER THE COMPONENTS OF TOMORROW

The Federal Ministry of Education and Research (BMBF), together with CERN, is holding the 14th "Germany at CERN" industrial exhibition – for the first time in a digital format

(Image: CERN)

Around 30 German companies will showcase highly innovative products and services to CERN scientists, engineers, technicians and procurement officials on the occasion of the "Germany at CERN" exhibition on 28 April 2021. The event is an opportunity for CERN staff and companies to exchange ideas, establish leads for future contracts and address the upcoming challenges at CERN.

Everyone at CERN is welcome to attend the event, which will be opened by CERN Director-General Dr Fabiola Gianotti and Dr Volkmar Dietz, Deputy Director-General of the Large Facilities and Fundamental Research unit at the BMBF.

The event consists of an information webinar aimed at the companies, followed by company presentations in an online exhibition. Individual video meetings between company representatives and CERN staff can be scheduled.

For CERN staff interested in getting in touch with the exhibitors, additional information regarding the programme, the participants and their profiles will be available online shortly:

- https://germanycern.cern.b2match.io/
- https://www.bmbf.de/de/germany-at-cern-4902.html

If you are not a CERN contact person for the Industrial Days and wish to make appointments with the German companies, please send an email to germany-at-cern-contacts@cern.ch in order to obtain an invitation.

While the global situation has evolved since the last iteration, the purpose of the event remains unchanged: to expand the commercial relationship between CERN and leading companies in its Member States. Procurement is a fundamental aspect of CERN's economic impact in its Member States and, conversely, advances in accelerators, detectors and computing are taking shape through successful commercial collaborations with a wide range of industries.

Contact information:

- **Federal Ministry of Education and Research, Germany**
  Division 713 – European Research Organizations
  D-53170 Bonn

Ms Elke Apelt
Tel. +49-(0)228-9957-3444
Email: GermanyAtCERN@ bmbf.bund.de

- **German Industrial Liaison Officer**
  CERN, CH-1211 Geneva 23

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Email: friedrich.haug@lo-desypt.de

TRAINING SESSION: FINDING HAPPINESS IN PATENT INFORMATION DATABASES, 22-23 APRIL

(Image: CERN)

CERN's Knowledge Transfer group will be offering a training course on "Finding Happiness in Patent Information Databases", tackling the anatomy of patents, patent information databases and their importance.

The training course will be delivered on Zoom:
22 April 9.00 a.m. – 12.30 p.m.
23 April 9.00 a.m. – 12.30 p.m.

Description of the course:

- Brief introduction to knowledge transfer at CERN
- Fundamentals of intellectual property and patents
- Anatomy of a patent compared to scientific publication
- Patent classification
- Introduction to publicly accessible patent information databases
- Searching public-access patent information databases (Espacenet and Google Patents)
- Data analysis on patent information

If you are interested, please contact technical.management.training@cern.ch or sign up directly through the CERN Training Catalogue.

This course is aimed at CERN personnel, but is also open to users and alumni.

Obituaries

GERD-JÜRGEN BEYER (1940 – 2021)

(Image: CERN)

Gerd Beyer, who passed away on 20 January at the age of 81, left his mark by developing the biomedical field of research, both at ISOLDE (CERN) forty years ago and at many other laboratories. He will be remembered as a tireless worker in the field of nuclear and applied nuclear physics combined with new radiochemical methods.

Gerd was born in Berlin in 1940 and went to secondary school in Aschersleben, in the foothills of the Harz in Saxony-Anhalt. After studying radiochemistry at the Technical University of Dresden, he went straight on to the Joint Institute for Nuclear Research (JINR) in Dubna, where he developed advanced production methods of rare short-lived radioisotopes for use in nuclear spectroscopy.

At the Central Institute for Nuclear Research in Rossendorf, he became proficient in the use of the U-120 cyclotron and the RFR research reactor to produce medical radioisotopes, and in the development of the associated radiopharmaceuticals.

He completed his Dr. habil at TU Dresden, on the production of radionuclides by means of rapid radiochemical methods in combination with mass separation.

In 1971 he was invited to ISOLDE (CERN) to team up with Helge Ravn to prepare extremely pure samples of rare long-lived nuclei for studies of their electron capture decay, in view of their potential for neutrino mass determination.

Back in Rossendorf, he continued to develop radiopharmaceuticals and introduce them into the practice of nuclear medicine in the former East Germany and the Eastern Bloc countries.

In this context, he developed a number of new methods for labelling and synthesising radiopharmaceuticals, which attracted a great deal of attention on the international stage. In particular, the rather difficult problem of efficiently separating fission-produced Mo-99 from large samples of low enriched uranium brought him into many collaborations all over the world, with a view to transferring his know-how to other laboratories.

His appointment as head of Cyclotron Radiopharmaceuticals also allowed him to take the initiative to introduce a PET scanner programme in the GDR, based on the Rossendorf positron camera, using gas detectors derived from pioneering work at CERN.

During his visits to CERN, Gerd spotted the potential of the ISOLDE mass-separation technique as a tool in modern nuclear medical research that would allow the introduction and use of better-suited but hitherto unavailable nuclides.

In 1985, in close collaboration with ISOLDE, he began to prepare for the future use of large nuclear physics experiment facilities to produce such radionuclides. He reactivated ISOLDE's contacts with the Department of Nuclear Medicine at the University Hospital of Geneva (HUG), starting up a collaboration on the use of exotic positron-emitting nuclides for PET imaging. This resulted in the development of new radiopharmaceuticals, exploiting radionuclides of the rare earths and actinides.

Shortly after the fall of the GDR, Gerd lost his job at his home base of Rossendorf and had to start a new career elsewhere. Via a CERN Scientific Associateship, Gerd became a guest professor in the Department of Medical Biochemistry and Nuclear Medicine at the HUG. Later, he became head of their Radiochemistry group, with responsibility for setting up and operating their new cyclotron. This allowed him to continue his work on developing new approaches to labelling monoclonal antibodies and peptides with exotic lanthanide positron emitters produced at ISOLDE, determining their in vivo stability and demonstrating their promising imaging properties. Gerd was also the first to demonstrate the promising therapeutic properties of the alpha emitter terbium-149.

When he retired from the HUG, keenly interested in the availability of these rare radioisotopes, he proposed, together with a group of colleagues, that CERN build a new radiochemical laboratory in connection with ISOLDE. Here, the large knowledge base on target and mass separator techniques for the production and handling of radionuclides could be used to make samples of these high-purity nuclides available for use in a broader biomedical research programme. Years later, Gerd's initial idea was eventually realised with the creation of the new CERN-MEDICIS facility.

Gerd was a first-rate experimental scientist, highly skilled in the laboratory, and he stayed professionally active to the very end. As a guest professor, a member of numerous professional societies and a holder of many consultancy positions, he spared no effort in sharing and transferring his know-how, recently to the young generation of scientists at CERN-MEDICIS. During Gerd's outstanding career, his work on the production of radiopharmaceuticals saved innumerable lives. His R&D towards new radiopharmaceuticals and, in particular, his pioneering work on terbium-149 for targeted alpha therapy, is opening up new perspectives for efficient cancer treatment. It is therefore particularly tragic that the development of efficient antiviral drugs came too late to support Gerd in his brave fight against COVID-19.

Our thoughts are with his wife, Ludmilla, and his two children, Thomas and Darja.

His friends and colleagues

Ombud's corner

SEXISM: LET'S FACE THE FACTS

"We don't feel safe and relaxed when we're at work. There are wolf whistles when we walk by, disparaging comments on our looks, stares that follow us from one end of the cafeteria to the other, lewd remarks from the next table when we sit down. Our ideas don't get enough credit and we're often interrupted when we speak. Not to mention the propositions, some more subtle than others, even including promises in exchange for 'favours'. And when we refuse, clearly and unambiguously, we might as well be speaking a different language."

During my four-year term of office, the daily experiences of some people – mainly women – have regularly been brought to my attention.

Why does gender-based discrimination persist within organisations of all types and sizes? And what's the situation at CERN?

"Of course sexism exists... but not here!" To answer the above questions, we first need to stop seeing the situation through the prism of our beliefs and admit that sexism may indeed exist here. Because only once we've admitted the possibility can we begin to address the problem.

"I really didn't mean to offend you." This particular belief comes up a lot: that it's only sexism if there's intent behind it. Once you put this idea aside, cases of sexism prove to be much more common that we might think.

"We are aware of the incidents, which have been reported to us, but these are isolated cases. There is no systemic problem." Due to obstacles that are often difficult to overcome, many victims of sexism decide not to report what they've experienced. It's therefore very tempting to take only the small number of reported cases into account, and to consider them as isolated, unconnected incidents.

Sexism can emerge within a group or society only if the environment lends itself to it. Most members of a community are simply swept along by the tide, not thinking for themselves, just going with the flow. Others swim resolutely *with* the tide. And then there are those who swim against the tide, with strength, courage and determination. Our individual behaviours collectively determine the dynamic of a group. Understanding this dynamic is just as important as explaining the reasons behind individual actions.

To address this sensitive topic, we must step outside our comfort zone. Are we really prepared to do so? Organisations that decide to combat sexism accept that they must take this step. Their Management has answered the essential question: *"What priority do we want to give to the fight against sexism?"* It's only by asking ourselves the right questions that we can find the right answers.

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If you've experienced or witnessed sexism or sexual harassment, you should speak up. Several support services are available to you. Use them!

Pierre Gildemyn

If you'd like to comment on any of my articles or suggest a topic that I could write about, please don't hesitate to e-mail me at Ombuds@cern.ch.