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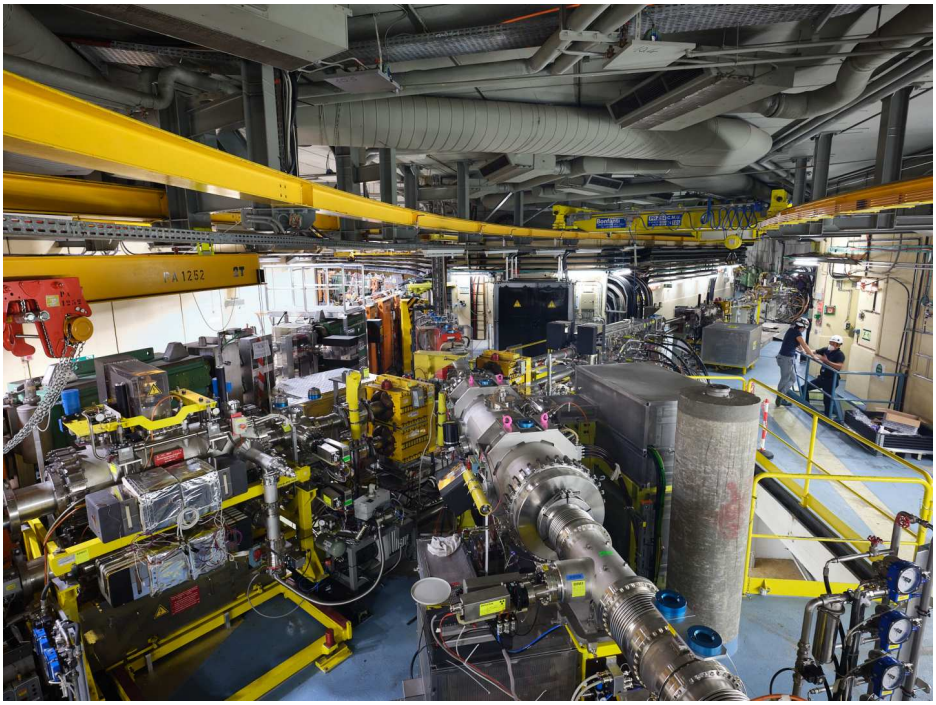
LS2 REPORT: THE PS BOOSTER RESTARTS

It's the end of Long Shutdown 2 for the PS Booster, the first accelerator to be recommissioned, alongside Linac 4



The area where the injection line to the PS Booster (on the right) and the extraction line for the PS (on the left) intersect. These two transfer lines have been completely refurbished. The ring of the Booster is visible on the left (Image: CERN)

The CERN Control Centre is back in shift work mode, with walls of screens showing the status of the beams, and coffee flowing freely day and night. On Friday, 3 July, the Long Shutdown 2 accelerator coordination team handed over the key of the PS Booster to the accelerator operators. Linac 4 and the PS Booster thus become the first two accelerators to be recommissioned, 18 months after the start of LS2.

However, recommissioning will be far more complex than simply turning a key. When the operators handed the Booster over to the LS2 teams, they were driving a model built in the last century, and now they find themselves at the wheel of a completely transformed supercar. Work has been carried out on the engine (the power supply and power converters), the accelerator (the radiofrequency cavities), the steering (the magnets), the injection, the cooling circuit, the control and safety systems... in fact, a whole host of components have been replaced or upgraded (see below). “Around 40% of the machine has been replaced,” says David Hay, the “chief mechanic”, or engineer in charge of the coordination of LS2 activities at the PS Booster.

(Continued on page 2)

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LS2 REPORT: THE PS BOOSTER RESTARTS

The aims of the work on this nearly 50-year-old accelerator, forming part of the LHC Injector Upgrade (LIU) project, were twofold: to accelerate the particles arriving at higher energies from the brand new Linac 4 and to increase the brightness of, or the concentration of particles in, the beam.

Linac 4, the new first link in the chain, accelerates negative hydrogen ions (protons surrounded by two electrons) up to an energy of 160 MeV (compared to 50 MeV previously for the protons from Linac 2). The higher energy and the new injection system, which converts the H^- ions into protons, increase the brightness by a factor of two. This means that a beam with the same dimensions will contain twice as many particles. In order to preserve this brightness in the PS, the next accelerator in the chain, the Booster will increase the energy up to 2 GeV (compared to 1.4 GeV previously), thanks to its all-new acceleration system. The electrical repulsion effect between particles of the same charge (Coulomb repulsion) lessens as the energy increases. To put it another way, higher energy helps keep the particles close together and thus contributes to maintaining the brightness. And with more brightness, comes more luminosity. “The Booster is key to increasing the luminosity of the LHC,” explains Gian Piero Di Giovanni, project leader for LIU at the PS Booster, “because it effectively determines the brightness of the beam.” The new injection mode with H^- ions and a higher energy will also considerably reduce the particle loss rate. “We will lose only 1 to 2% at injection, compared to over 30% with the old system,” says Di Giovanni.

The work at the Booster took 20 months above ground and 18 months underground. Despite the large scale of the renovations and the difficulties encountered with certain aspects of the civil-engineering work and of the cooling system for the RF cavities, not to mention lockdown, which froze activities for two months, the project has been completed on time. This achievement is down to the commitment of the teams and meticulous and proactive coordination.

Commissioning of some of the new systems started several weeks ago. The operators are now taking charge with new, cutting-edge control software. “We have spent the past two years developing the integration of these new systems,” emphasises Bettina Mikulec, who supervises the operation of the Booster and Linac 4. “We now need to implement and test all the subsystems from the Control Centre and get them working in harmony.” This complex commissioning process will take several months, initially without any beam. Whereas Linac 4 will resume tests with beam this summer, the first particles should be circulating in the PS Booster right at the end of the year.

The metamorphosis of the Booster

- **Power supply:** A new power supply system, similar to the one that was installed for the PS (POPS), based on power converters and capacitors and known as POPS-B, has been installed in a new building above ground. The power converters will supply the magnets with electrical intensities of 5500 amps, compared with 4000 amps previously. Over 95% of the Booster's power converters have been replaced since Long Shutdown 1. Some 318 new converters, ranging from 1 kW to several MW, supply all the components of the accelerator.
- **Cooling:** The Booster has a new cooling system, with cooling towers in two renovated buildings.
- **Injection and ejection:** To cope with the increase in energy and the use of negative hydrogen ions at injection, the transfer lines from Linac 4 to the Booster and from the Booster to the PS have all been replaced. This includes new magnets (kickers, septa, dipoles, quadrupoles and correctors), new instrumentation and new beam dumps. Since it comprises four superimposed rings, the Booster requires a particularly sophisticated particle distribution system.
- **Acceleration:** The new acceleration system is composed of three structures, each housing eight cavities built using a magnetic material known as FineMet.
- **Magnets:** In the transfer lines and the Booster ring itself, around 60 magnets have been replaced or renovated.
- **Safety and instrumentation:** A whole host of new sensors, beam position monitors, beam loss monitors, wire scanners, etc. have been installed to monitor and measure the particle beams. Devices to stop the beam or particles that stray from the trajectory have been added to the ring. Among these, a collimation system known as an “absorber/scraper”, is the latest device to be installed in the Booster. The role of these devices is even more crucial now that the beam is denser.

Watch the Instagram Live session (*https://www.instagram.com/tv/CCBRPAxIlvz/?utm_source=ig_embed&utm_campaign=loading*) filmed in the PS Booster just before the accelerator was closed.

David Hay, who is responsible for LS2 coordination at the PS Booster, hands over a symbolic key to Bettina Mikulec, who leads the operations team for the PS Booster and Linac 4 (BE-OP-PSB). On the left, Julie Coupard, who is in charge of LS2 coordination for the injectors, and on the right, Gian Piero Di Giovanni, LIU project leader for the PS Booster, and Rende Steerenberg, Operations group leader (BE-OP) (Image: Maximilien Brice/CERN)

Corinne Pralavorio

CMS CELEBRATES ITS 2019 THESIS AWARD WINNER

Marcel Riegler, from RWTH Aachen University, stood out among the 25 nominees

The CMS collaboration announced the winner of its 2019 PhD Thesis Award in June. The award honours the best PhD of the year based on impact, originality and clarity. The jury faced the difficult task of choosing a single winner from among the 25 nominated PhD theses in a two-round process.

This year, Marcel Riegler from RWTH Aachen University in Germany made it to the top with a thesis exploring the so-called "ttH" production, the process in which a Higgs boson is created in high-energy particle collisions in combination with two top quarks.

Marcel contributed to the first observation of ttH production in 2018 by developing methods employing neural networks and deep-learning technology. This observation was a landmark event for CMS and ATLAS, since the interaction is extremely rare and its study could confirm or disprove predictions of the Standard Model. The first studies on the interaction were unveiled earlier this year.

"A PhD is a unique opportunity to contribute to fundamental research, which, in my experience, was a rewarding and memorable time I look back on with joy," remarked Riegler. "CERN, CMS and the values they embody are a blueprint for peaceful and fruitful collaboration between people irrespective of ethnic origin, religion and nationality, and I enjoy working in this community."

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Read more about this story on the CMS website.

A "BE A SCIENTIST" PROGRAMME UNLIKE ANY OTHER!

Around 100 pupils taking part in the project ended the year by attending videoconference sessions

The participants were able to discover the contents of the boxes virtually thanks to a short video clip filmed by the organisers (Image: CERN)

The ninth year of the Be a scientist project concluded at the end of June for around 760 budding scientists from schools in the local area.

Over six months – not four as usual, due to the closure of schools – pupils aged 7 to 12 from schools in Geneva, Ain and Haute-Savoie, came up with experimental methods to determine the contents of several boxes as accurately as possible, without being able to open or damage them. In doing so, they were following in the footsteps of CERN scientists, who carry out research on elementary particles that they are not able to observe directly.

The visits to laboratories and meetings with scientists that usually form part of the programme had to be cancelled due to the COVID-19 crisis. But in spite of everything, this year's programme still ended on a high note: around 100 pupils participated in six videoconferences from home or their classroom. On the agenda, an interview with a scientist, the big reveal of the contents of the boxes in a video clip and a discussion with the organisers about the contents.

The project, which was launched in 2011, was the result of a collaboration between the University of Geneva (Physiscope and LDES), the Department of Education (Geneva) and the Ministry of Education (France).

Are you a teacher and want to take part in a future programme? Visit https://voisins.cern/be-scientist. Registration for the 2021 event will open at the end of the summer!

Marie Bouvier

OLIVER BRÜNING BECOMES THE NEW HL-LHC PROJECT LEADER

Oliver Brüning takes over from Lucio Rossi at the helm of the HL-LHC project as of 1 July

After ten years as the High-Luminosity LHC (HL-LHC) project leader, Lucio Rossi, who will leave CERN this autumn, is passing the baton to Oliver Brüning, who has been his deputy since the project was launched in 2010.

Oliver Brüning began his career in particle physics at the DESY laboratory in Hamburg, Germany. Having completed a PhD on particle dynamics in the HERA storage ring, he took part in the commissioning of the accelerator. He joined the SPS-LEP accelerator physics group at CERN as a fellow in 1995, and later became a staff member. He became the leader of the AB-ABP-LOC (Accelerators and Beam Physics – LHC Operation and Commissioning) section in 2003 and then, two years later, of the BE-ABP group. From 2008 onwards, he was in charge of the accelerator systems side of the work towards a possible large hadron–electron collider (LHeC). From 2009 to 2010, he was deputy head of the BE department. And from 2015 to 2019, he led the LHC Full Energy Exploitation study, which set out the preparatory and consolidation work required for the LHC to run at an energy of 14 TeV in Run 3 and, beyond that, for the HL-LHC.

The HL-LHC is now entering the crucial installation phase: as civil engineering work progresses, the first components have been inserted into the accelerator (see here (*https://home.cern/news/news/accelerators/installing-high-luminosity-tunnel*) and here (*https://home.cern/news/news/accelerators/hl-lhc-equipment-installed-both-sides-alice-experiment*)). "Over the last few months, the HL-LHC project has passed some significant milestones," says Oliver Brüning. "The underground structures of the High-Luminosity LHC were connected for the first time to the LHC tunnel at Point 1 and Point 5 in December 2019 and the second connexion took place in May and June 2020. Recently, a superconducting electrical transmission line developed for the HL-LHC set a new record." The next major step for the project will be the installation, this winter, of an 11 tesla dipole magnet that uses the superconductor niobium–tin (Nb_3Sn).

Lucio Rossi will leave CERN at the end of September, having devoted more than 19 years to the LHC and its successor. After taking over the leadership of CERN's Superconducting Magnets and Cryostats group in 2001, he put all his energy and enthusiasm into guiding the team responsible for developing, building, constructing, assembling and installing the thousands of superconducting magnets that make up the LHC. He is one of the main supporters of and driving forces behind the High-Luminosity LHC project, which he has led since the very beginning. As of October, the multi-award-winning physicist will be a professor at the University of Milan and an associate of INFN-LASA, his home institute. He plans to devote himself to teaching and to medical applications.

Oliver Brüning is the new HL-LHC project leader (Image: Andreas Jankoviak)

On 30 June 2020, Fabiola Gianotti, CERN Director-General, Frédérick Bordry, Director for Accelerators and Technology, Lucio Rossi, former HL-LHC project leader, and Oliver Brüning, new HL-LHC project leader, marked the second connection of the LHC tunnel with the HL-LHC at Point 5 (Image: CERN)

Anaïs Schaeffer

LHCB DISCOVERS A NEW TYPE OF TETRAQUARK AT CERN

The LHCb collaboration has observed an exotic particle made up of four charm quarks for the first time

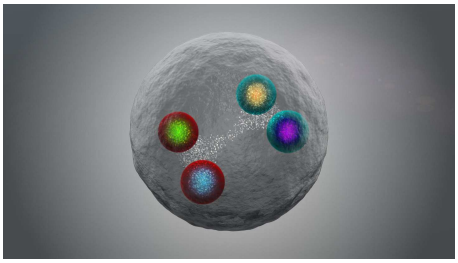

Illustration of a tetraquark composed of two charm quarks and two charm antiquarks, detected for the first time by the LHCb collaboration at CERN (Image: CERN)

The LHCb collaboration has observed a type of four-quark particle never seen before. The discovery, presented at a recent seminar at CERN and described in a paper (*https://arxiv.org/abs/2006.16957*) posted today on the arXiv preprint server, is likely to be the first of a previously undiscovered class of particles.

The finding will help physicists better understand the complex ways in which quarks bind themselves together into composite particles such as the ubiquitous protons and neutrons that are found inside atomic nuclei.

Quarks typically combine together in groups of twos and threes to form particles called hadrons. For decades, however, theorists have predicted the existence of four-quark and five-quark hadrons, which are sometimes described as tetraquarks and pentaquarks, and in recent years experiments including the LHCb have confirmed the existence of several of these exotic hadrons. These particles made of unusual combinations of quarks are an ideal "laboratory" for studying one of the four known fundamental forces of nature, the strong interaction that binds protons, neutrons and the atomic nuclei that make up matter. Detailed knowledge of the strong interaction is also essential for determining whether new, unexpected processes are a sign of new physics or just standard physics.

"Particles made up of four quarks are already exotic, and the one we have just discovered is the first to be made up of four heavy quarks of the same type, specifically two charm quarks and two charm antiquarks," says the outgoing spokesperson of the LHCb collaboration, Giovanni Passaleva. "Up until now, the LHCb and other experiments had only observed tetraquarks with two heavy quarks at most and none with more than two quarks of the same type."

"These exotic heavy particles provide extreme and yet theoretically fairly simple cases with which to test models that can then be used to explain the nature of ordinary matter particles, like protons or neutrons. It is therefore very exciting to see them appear in collisions at the LHC for the first time," explains the incoming LHCb spokesperson, Chris Parkes.

The LHCb team found the new tetraquark using the particle-hunting technique of looking for an excess of collision events, known as a "bump", over a smooth background of events. Sifting through the full LHCb datasets from the first and second runs of the Large Hadron Collider, which took place from 2009 to 2013 and from 2015 to 2018 respectively, the researchers detected a bump in the mass distribution of a pair of J/ψparticles, which consist of a charm quark and a charm antiquark. The bump has a statistical significance of more than five standard deviations, the usual threshold for claiming the discovery of a new particle, and it corresponds to a mass at which particles composed of four charm quarks are predicted to exist.

As with previous tetraquark discoveries, it is not completely clear whether the new particle is a "true tetraquark", that is, a system of four quarks tightly bound together, or a pair of two-quark particles weakly bound in a molecule-like structure. Either way, the new tetraquark will help theorists test models of quantum chromodynamics, the theory of the strong interaction.

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Read more on the LHCb website.

NEW SPOKESPERSON FOR THE LHCB COLLABORATION

Chris Parkes takes the baton from Giovanni Passaleva

The new LHCb spokesperson, Chris Parkes (Image: Arnaud Ricoult)

Chris Parkes of the University of Manchester in the UK has been appointed as the new spokesperson of the LHCb experiment collaboration. Parkes, who was previously the deputy spokesperson of the collaboration, will represent more than 1400 people from 85 institutions in 19 countries for a period of three years, beginning 1 July 2020.

Parkes takes over the LHCb leadership from Giovanni Passaleva of the National Institute for Nuclear Physics in Florence, Italy, who has served as LHCb spokesperson since 1 July 2017.

"It's an exciting time to take the reins of LHCb," say Parkes. "We are preparing many exciting physics results from analyses of the full data taken during the first decade of LHC operations. We're currently constructing and installing our new detector apparatus, the LHCb Upgrade I. It will allow us to collect larger data sets and relies on a new paradigm of real-time analysis, free of the restrictions that come with a traditional hardware trigger. The construction activities have been heavily disrupted by the COVID-19 pandemic, but we are working together across the international collaboration to complete the experiment. For the further future, we are planning an Upgrade II of the detector that will allow the full exploitation of the High-Luminosity LHC. LHCb is a growing global community that celebrates our diversity and spirit of open collaboration. It will be a pleasure and honour to lead the collaboration in the next stage of its journey."

"It has been a great pleasure serving the collaboration these last three years," says Passaleva. "During this term Chris and I have led a major renewal and improvement of the experiment for the upcoming LHC Run 3. And we had the fortune to witness historical discoveries! It was really great to work with Chris and I have no doubt he will lead LHCb to new heights."

Parkes is a professor at the University of Manchester, UK. He has been deputy spokesperson of LHCb for the past three years and has been a member of the collaboration for more than twenty years. Parkes was one of the instigators of both the LHCb Upgrade I and II, and led the UK's construction activities for the LHCb Upgrade I. He has worked extensively on physics studies involving the charm quark and on the LHCb Vertex Locator (VELO) detector, serving as the detector's Project Leader during the first LHC physics period (2010–2012). Prior to LHCb, he worked on W-boson physics with the DELPHI experiment at the previous CERN collider, LEP.

Ana Lopes

WHITE RABBIT, A CERN-BORN TECHNOLOGY, SETS A NEW GLOBAL STANDARD

The Institute of Electrical and Electronics Engineers has incorporated the White Rabbit technology into its industry standard, maximising its adoption by industry and other partners

Photos of the White Rabbit team and equipment (Image: CERN)

White Rabbit (WR) is a technology developed at CERN to provide the LHC accelerator chain with deterministic data transfer, sub-nanosecond accuracy and a synchronisation precision of a few picoseconds. First used in 2012, the technology has since then expanded its applications outside the field of particle physics and is now deployed in numerous scientific infrastructures worldwide. It has shown its innovative potential by being commercialised and introduced into different industries, including telecommunications, financial markets, smart grids, the space industry and quantum computing.

CERN developed WR as an open-source hardware and it was initially adopted by other research infrastructures with similar challenges in highly accurate synchronisation of distributed electronic devices. The R&D process and all the knowledge gained throughout its development has been made available through CERN's Open Hardware Repository. This gives other organisations and companies the freedom to use and modify existing developments. Through the proactive engagement of CERN's Knowledge Transfer and Beam Controls groups, a larger group of companies and organisations contributed to the development of hardware, software, and gateware for WR switches and nodes. The WR ecosystem quickly grew to include several organisations, developing open hardware for widespread benefit. This collaborative approach brought improvements to the original concept, allowing CERN to also benefit from the new developments.

On 16 June, the WR technology was recognised by being included in the worldwide industry standard called Precision Time Protocol (PTP), governed by the IEEE, the world's largest technical professional organisation dedicated to advancing technology for the benefit of humanity. The WR addition to the PTP standard, referred to as High Accuracy, increases PTP's synchronisation performance by a few orders of magnitude, from sub-microsecond to sub-nanosecond.

“PTP is the first IEEE standard to incorporate a CERN-born technology. This is a major step for White Rabbit. It is already widely used in large scientific facilities and its adoption in industry is gaining momentum. Its incorporation into the PTP standard will allow hardware vendors world-wide to produce WR equipment compliant with the PTP standard and consequently accelerate its dissemination on a larger scale,” says Maciej Lipinski, an electronics engineer at CERN, who led the WR standardisation effort.

Marzena Lapka

COVID-19 AND HEATWAVES: A DOUBLE CHALLENGE

The Medical Service outlines the preventive measures to be taken in with the event of a heatwave during the COVID-19 pandemic

Summer has arrived and may bring with it another heatwave at a time when, unfortunately, COVID-19 is still with us.

The World Meteorological Organization (WMO) recently published a warning about the health risks posed by the double challenge of a heatwave and the pandemic, especially for vulnerable people. Some of the measures usually recommended during a heatwave, such as the use of air conditioning, contradict those in place to combat the novel coronavirus.

Here are a few tips to help you stay safe during this time, without increasing the risk of spreading the virus:

- **Stay hydrated** : drink water regularly throughout the day (at least 1.5 litres in total). At work, use your own bottle or flask. In addition, plan meals based primarily on fruit and vegetables, either raw or cooked. Opt for vegetables with a high water content, such as cucumbers, lettuce, radishes, tomatoes, courgettes and peppers, and fruits that aren't too high in sugar, such as watermelon, melon, peaches and strawberries.
- **Dress appropriately** : choose loose, lightweight clothes (preferably in light colours) to allow sweat to evaporate. If you work outdoors, remember to protect your skin and your head from the sun (sunglasses, sun hat, sun cream).
- **Know your limits** : adapt your work pattern to your heat tolerance; avoid intense physical activity during the hottest hours of the day. Work in the shade as much as possible.

- **Ventilate** : to keep fresh air circulating, it is essential to air or ventilate offices and work spaces. If possible, leave windows open overnight and early in the morning. During the day, open windows for at least ten minutes every two hours. In addition open inside doors if possible to help air circulate. If you have a pedestal fan, use it with the windows and doors open to increase the air circulation.
- **Protect yourself** : the protective measures put in place to combat COVID-19 still apply!

In the event of a medical emergency, call 74444!

If you need support on a specific issue, the following services are available to you:

- The COVID-19 helpline: +41 22 766 77 77
- The Medical Service: +41 22 767 31 86 / medical.service@cern.ch.

(Image: CERN)

CERN Medical Service

COMPUTER SECURITY: PROTECTING THE ACCELERATOR FROM REMOTE EVIL

The IT department has started putting more and more privileged access routes to vital configuration services behind multi-factor authentication

A typical question when it comes to computer security is “What is your worst nightmare scenario?” Despite the fact that we usually sleep quite well, tranquilly and deeply, one answer would be CERN succumbing to a so-called “ransomware” attack. The second answer would definitely be the loss of the password of one of our data centre system administrators or of one of the engineers or experts running and managing our technical infrastructure and the accelerators. As we have covered ransomware attacks already in detail in past *Bulletin* issues (“Blackmailing Academia: Back to pen and paper(?)”, “Blackmailing Enterprises: You are Patient Zero”), let's see why we worry so much about your expert password...

Actually, and more importantly than ever during these days of teleworking, your CERN password is the Holy Grail for access to all your digital possessions at CERN: your CERN mailbox, your CERN storage space, your CERN PC and laptop, your documents and databases, any CERN websites you manage, the CERN computing services you run, or the accelerator or experiment control systems you operate or develop. One password and you're in. For an adversary, this is an easy target. One successful discovery of a CERN password, and he or she is in... And depending who owned that password, the adversary has all sorts of access at hand: access to your mailbox to spam the world, access to your storage space to expose your data to your friends, access to your PC or laptop to spy on you, access to your data to encrypt it and blackmail you, access to your websites ready to deface them, and access to the computing service you run or the accelerator or experiment control systems you operate or develop. In these last two cases, if the adversary has a targeted plan or is bold enough, he or she might just monitor your activities for a while: when you log in to your computing services, which settings you apply, how you manipulate the control system settings and how everything is interlinked. On day zero, the attacker will strike and abuse your expert power for his or her evil deeds. Kill computing services, delete databases, dump beams, and run control system parameters out of bounds. Nightmare fulfilled. Goodnight, CERN!

In order to protect CERN's calm sleep, the IT department has started putting more and more privileged access routes to vital configuration services behind multi-factor authentication. You might be familiar with multi-factor authentication from your bank: the smartphone app, the SMS they send you, the pocket calculator device you have to use... The same goes for CERN IT: the use of Puppet, Foreman, Tellme/Pwn/Tbag has recently started to require system administrators to authenticate themselves in a two-pronged way: with their usual CERN password (“something they know”) plus, and this is new, a so-called second factor (“something they have”), e.g. a hardware token or a dedicated token-generating app running on their smartphone. In the next couple of months, more and more essen-

tial computing services will be put behind multi-factor authentication.

And we are not done yet, as the nightmare has a second prong: access to our accelerator control systems and technical infrastructure. Discussions have therefore begun with the Beams department on how remote access to that technical infrastructure, namely the so-called Technical Network (TN) that serves it, can be put behind multi-factor authentication, too. A first step has already been taken for IT managers who need to access services hosted on the TN. Next will be an analysis of how the remote development clusters can benefit from multi-factor authentication, and how remote expert access can be better protected. . . Stay tuned and follow our discussions at the CNIC meetings. And help us rid CERN of nightmare scenarios!

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.

The Computer Security Team

Announcements

SUSPENSION OF THE CERN CAR-SHARING SERVICE

CERN's car-sharing service remains suspended due to the COVID-19 pandemic and will continue to be so for the foreseeable future

CERN's car-sharing service remains suspended due to the COVID-19 pandemic and will continue to be so for the foreseeable future.

We are taking advantage of this suspension to change service provider. Mobility.ch will therefore no longer operate this service on CERN's behalf. We hope to be able to improve the range of services we offer in order to better meet your expectations.

Thank you for your understanding.

CERN Mobility Services

SHARE YOUR EXPERIENCE ABOUT TWO-FACTOR AUTHENTICATION

CERN's identity management system – responsible for managing your computing accounts and granting you access to the thousands of online services available to CERN users – is evolving: we need your feedback by the end of July

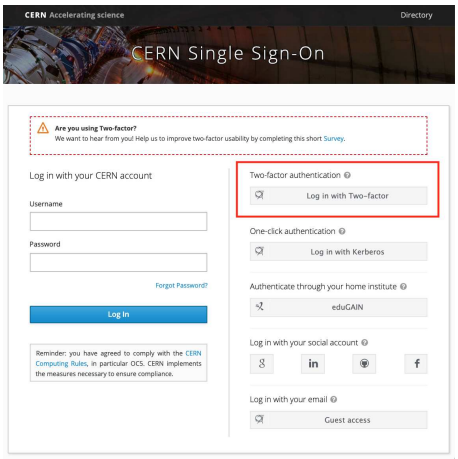
As mentioned in a Computer Security *Bulletin* article, you will gradually start seeing a new web page when you log in to CERN websites. Perhaps you've noticed it already? If not, you certainly will over the coming months! The new login page has a more modern look and feel, and is able to support a wider range of services than the previous system. You can see the new login page by accessing newdle.cern.ch, https://cern.zoom.us or one of the other many services that have already made the switch. It is the most visible part of many changes that are being made to the identity management system as part of the MALT project. CERN's identity management system is responsible for managing your computing accounts and granting you access to the thousands of online services available to CERN users.

Although most of CERN's services allow you to log in with your username and password, others require an even higher level of security. Two-factor authentication means that you provide an additional proof that shows you are truly the account owner, and haven't been hacked! You can read more about two-factor authentication in a Computer Security *Bulletin* article. Any CERN account holder can enable two-factor authentication for themselves in the new login page by using a One-time-password application (which will display a code on your phone that is valid for one login session only), or by using a hardware token such as a Yubikey (a guide is available here (*https://cern.service-now.com/nav_to.do?uri=%2Fkb_view.do%3Fsysparm_article%3DKB0006587*)): you will still have the choice to authenticate the way you prefer for websites and services for which two-factor authentication is not mandatory but will be ready to connect to the ones requiring this level of security.

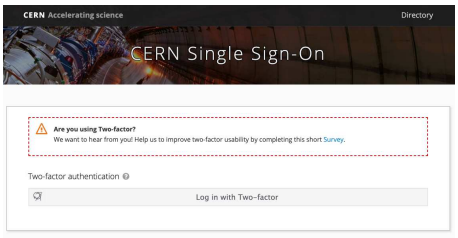
We are looking for your feedback on two-factor authentication, to make it as user-friendly as possible – please take a minute to fill in our survey (*https://cda-surveys.*

web.cern.ch/form/2nd-factor-authentication-prefer) before the end of July!

For regular updates on your computing environment, please check the CERN computing blog (sign-in to access). To receive automatic monthly updates, subscribe to the computing-blog-update e-group.



Most websites and services offer multiple ways to log in, including two-factor authentication (cf. red box), letting the user decide on the preferred solution



The services that require two-factor only offer a single choice for authentication

EUROPEAN STRATEGY AND RESTART: THE ANSWERS TO YOUR QUESTIONS

On Monday, 29 June, the Director-General and the Director for Accelerators and Technology presented to the CERN community the conclusions of the June Council and the plan for LS2 and restart of the accelerators. In particular, Fabiola Gianotti elaborated on the recently approved update of the European Strategy for Particle Physics. Members of CERN management answered many questions on the strategy, the resumption of on-site activities, measures taken against COVID-19, teleworking, annual leave donations, etc.

You can consult the presentations and watch the recording of the meeting on the Indico page (*https://indico.cern.ch/event/932053/*).

ANOTHER AGREEMENT FACILITATING OPEN-ACCESS PUBLISHING FOR CERN-AFFILIATED AUTHORS

Thanks to CERN's partnership with the Consortium of Swiss Academic Libraries, our community can now benefit from a new Publish-and-read deal with Springer Nature. This agreement has been negotiated by SwissUniversities, in collaboration with the consortium. With this new contract, all research articles with corresponding authors who have a primary or secondary affiliation to CERN can now be published in Springer's hybrid journals with no barriers and article publication charges (APCs) paid centrally. In addition, CERN readers can freely access content from all Springer journals that is otherwise behind paywalls.

This is the CERN Scientific Information Service's second such contract in 2020, after the IOP agreement signed in May, and more are expected in the near future.

Through such deals with publishers, the CERN-affiliation of the corresponding author is recognised during the submission and the publications are automatically made open-access. However, CERN SIS needs to be informed before submissions of articles in case the corresponding author is not affiliated with CERN, or when authors want to submit articles to other journals than those covered by this agreement.

Please send any question to open-access-questions@cern.ch

See the official communication from SwissUniversities.
The full agreement is available on the Swiss Consortium of Academic Libraries website.

CERN Library

9 JULY: THE CERN MOBILITY CENTRE RELOCATES TEMPORARILY

Please note that the CERN mobility Centre will remain closed on 9 July (Thursday).

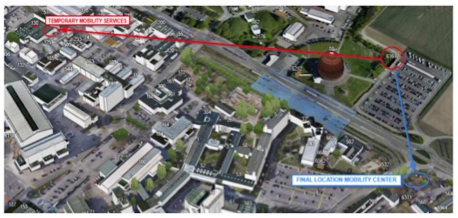
It will reopen temporarily on 10 July (Friday) at the Mobility Workshop (building 130, next to the CERN Medical Centre), where a temporary reception area will offer all the usual mobility services.

The Mobility Centre will open at its new permanent location at the beginning of September, in a dedicate building near Entrance A (Route Bohr).

Bike rental : For any bike rental or return, go directly to the Mobility Workshop (building 130).

CERN car rental : Call 72042 (+41 22 767 2042). To pick-up or return a CERN car, a representative from the Mobility Centre will join you at the Globe car park to check the car, sign the rental contract and hand over or collect the keys.

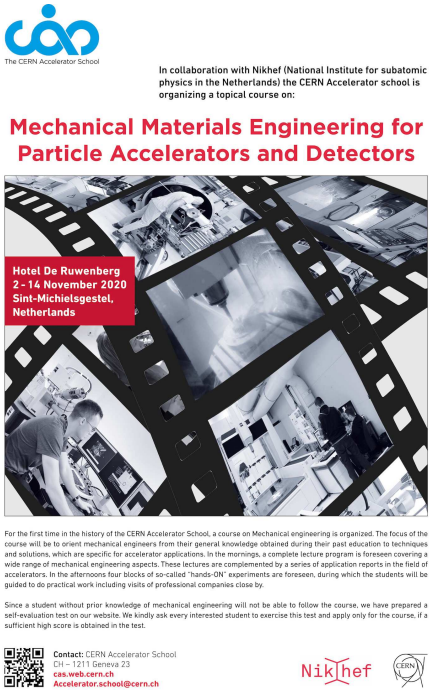
Thank you for your understanding.



CERN Mobility Services

CERN ACCELERATOR SCHOOL: MECHANICAL MATERIALS ENGINEERING | 2 - 14 NOVEMBER 2020

Registration is now open for the CERN Accelerator School's course on Mechanical Materials Engineering for Particle Accelerators and Detectors, 2 – 14 November 2020, Sint-Michielsgestel, Holland



(Image: CERN)

Registration is now open for the CERN Accelerator School's course on Mechanical Materials Engineering for Particle Accelerators and Detectors, 2 – 14 November 2020, Sint-Michielsgestel, Holland.

For the first time in the history of the CERN Accelerator School, a course on Mechanical engineering is organised. The focus of the course will be to orient mechanical engineers from their general knowledge obtained during their past education to techniques and solutions, which are specific for accelerator applications. In the mornings, a complete lecture programme is foreseen, covering a wide range of mechanical engineering aspects. These lectures are complemented by a series of application reports in the field of accelerators. In the afternoons four blocks of so-called “hands-on” experiments are foreseen, during which the students will be guided to do practical work including visits of professional companies close by.

Since a student without prior knowledge of mechanical engineering will not be able to follow the course, we have prepared a self-evaluation test on our website. We kindly ask every interested student to exercise this test and apply only for the course if a sufficient high score is obtained in the test.

For more information and application, please visit the school website: https://cas.web.cern.ch/schools/sint-michielsgestel-2020.

CERN Accelerator School

ENTRANCE A: RETURN TO NORMAL OPENING HOURS

Please note that from Wednesday, 1 July, Entrance A of the Meyrin site (Route Bohr) will be open at the usual hours, i.e. from 7 a.m. to 7 p.m.

The SMB department

EBOOKS FOR ALL!

An important role of public libraries is to ensure free access to knowledge for anyone

An important role of public libraries is to ensure free access to knowledge for anyone. The open access movement, in the beginning focusing on free and unrestricted access to journals, has recently expanded its efforts to also opening up books. Already for journals, CERN took a leading role for open access in our discipline and has now also put increasing focus on textbooks and monographs.

CERN has over the last years been experimenting with open access books, based on experience gained from the CERN Report series, better known as Yellow Reports, which the Organization has published openly on the Internet since the mid 1990s. One of the first open access titles, sponsored by CERN, was "Melting hadrons, boiling quarks: from Hagedorn temperature to ultra-relativistic heavy-ion collisions at CERN" (Springer) by Jan Rafelski. In spite of being some sort of a "niche" title, the book enjoys a tremendous popularity. Since it was published, close to 130'000 chapter downloads have been recorded, a record number compared to any book of this type.

In conjunction with the 60th anniversary of CERN, three open access books were published by World Scientific. These books constitute a valuable resource for any teacher or student interested in particle and accelerator physics.

To test other business models for open access books, the CERN Library has recently worked with the open access platform Knowledge Unlatched to open up two popular books in the field of accelerator physics, both becoming available open access in November 2019:

- "Measurement and control of charged particle beams" (Springer) by Minty, Michiko G; Zimmermann, Frank
- "Particle accelerator physics - 4th ed." (Springer) by Wiedemann, Helmut.

Online Open Access to the books listed above has been financed by CERN, but if laboratories and universities collaborate one can achieve even more. One such example is the recent biography of accelerator physicist Rolf Widerøe "Obsessed by a Dream" by Aashild Sørheim, originally published in Norwegian. Translated open access editions in English and German will be published by Springer, financed by a collaboration of European and US laboratories, coordinated by CERN.

Persuaded of the importance of opening up relevant, high-quality books in particle physics and related areas, the Sponsoring Consortium for Particle Physics Publishing (SCOAP ^{3}), yet the largest open access collaboration, hosted at CERN, is now looking into a more systematic approach to support open access books.

There are several new open access books in the pipeline, and book projects obviously tend to span over a lengthy period of time. However, the volume 3 of the long-awaited "Particle Physics Reference Library" (Accelerators and Colliders) has just been published and the 2 other volumes are expected to appear in a few months (Vol. 1 Theory and experiments ; Vol. 2 Detectors for particles and radiation). This publication includes many CERN contributions and is edited by Herwig Schopper, Chris Fabjan and Steve Myers.

Open access books selected by the CERN Library are available via the Library catalogue.

CERN authors who have manuscripts in their drawers or already work with a publisher are invited to contact the Scientific Information Service to explore the possibilities for publishing open access.

CERN Library

Obituaries

CLAUDE DÉTRAZ (1938 – 2020)

Claude Détraz, a noteworthy figure in nuclear and particle physics in France and Europe, passed away on Saturday, 20 June 2020

Claude Détraz in 2003 at CERN (Image: CERN)

Claude Détraz was born on 20 March 1938 in Albi, in the south of France. He graduated from the *École Normale Supérieure* and began his career at CNRS in 1962 as a researcher studying atomic nuclei.

Détraz then joined the *Institut de Physique Nucléaire d'Orsay*, founded by Irène and Fréderic Joliot Curie, which has now been merged with its neighbouring laboratories in Orsay to form the *Laboratoire de Physique des 2 Infinis Irène Joliot-Curie* (IJCLab).

At CERN's Proton Synchrotron (PS), in collaboration with Robert Klapisch 's team, he contributed to the discovery of the first evidence of deformation in exotic nuclei at a shell closure. Drawing on these results, he became convinced that the beams at GANIL could also become a unique tool in this field.

Détraz was a great scientist and a true visionary, who played a major role in nuclear and particle physics in France and Europe. As the Director of GANIL (the *Grand Accélérateur National d'Ions Lourds* in Caen) from 1982 to 1990, he launched several research projects on exotic nuclei. The legacy of these projects is still with us today and will continue into the future. He was one of the main founders of NuPECC (the Nuclear Physics Collaboration Committee) and was its first Chair from 1989 to 1992, cementing its position as the main coordinating committee for nuclear physics in Europe.

In 1991, Claude Détraz became a technical adviser in the office of the French Minister for Research, Hubert Curien, who was later the President of the CERN Council at the time of the LHC's approval in 1994. Through his involvement with decision-making bodies at all levels in France, Détraz made a major contribution to ensuring that the LHC project was approved. For example, he played a key role in Hubert Curien's appointment as the President of the CERN Council, a position from which he was able to exert a major influence in the final phases of the decision.

As the Director of IN2P3 (*Institut National de Physique Nucléaire et des Particules* at CNRS) from 1992 to 1998, he helped to give the impetus, first with Robert Aymar and then with Catherine Cesarsky of the CEA, to France's wholehearted participation in the LHC adventure. His involvement was essential in ensuring that France and its institutes played a leading role in the project.

In 1999, Luciano Maiani, CERN Director-General at that time, appointed him Director of Research, jointly with Roger Cashmore, until 2003. This was a period filled with important events for CERN, including the shutdown of LEP, the excavation of new caverns for the LHC and the start of a project to send neutrinos from CERN to the underground laboratory at Gran Sasso, to which Claude contributed substantially.

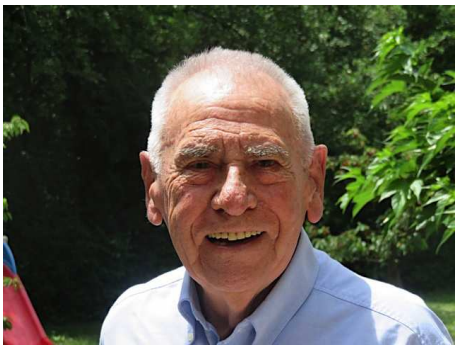
Throughout his career, Détraz promoted and supported interaction between scientific disciplines. As a nuclear physicist, he established strong links with particle physics. He was also one of the architects of the emergence of astroparticle physics, a discipline connecting the two infinities.

He received multiple honours both in France (commander of the Order of Merit, SFP Joliot-Curie prize, CNRS silver medal) and abroad (Gay Lussac-Humboldt prize from the Humboldt Foundation and an *honoris causa* doctorate from JINR Dubna).

I knew Claude Détraz throughout his time at GANIL, IN2P3 and CERN, and even afterwards. As well as being a brilliant scientist and occupying several high-level positions, he was a true “Enlightenment man” whom I appreciated for his commitment, efficiency, foresight and humanity. A man of great culture and finesse, he expressed himself in an elegant, convincing and moving way. His passing is a great loss that greatly saddens me. He was a shining light of our generation.

Michel Spiro, President of the International Union of Pure and Applied Physics, Chair of the CERN and Society Foundation Board, former Director of IN2P3 and former President of the CERN Council

HENRI LAPORTE (1928 – 2020)



Henri Laporte in 2017 (Image: CERN)

One of the key figures in the construction of LEP passed away on 18 May 2020. Henri Laporte led the civil-engineering work for the Large Electron-Positron Collider in the 1980s, the biggest construction project for fundamental research ever undertaken and which included the construction of the 27 km tunnel that now houses the LHC.

A native of Sète in the south of France, Laporte never lost his melodic accent, which, when combined with his characteristic southern loquaciousness and a talent for storytelling, always brought a smile to the faces of the people with whom he interacted. Laporte graduated from the prestigious French higher education institutes, the *Ecole Polytechnique* and the *Ecole des Ponts et Chaussées*, and began his career in marine engineering in the early 1950s. He was appointed as the chief engineer first for the construction of the port of Oran, then for the Toulon naval base, before moving to French Polynesia in 1963 to preside over the extension of the port of Papeete. In 1967, he was recruited by CERN to lead the technical services and buildings division.

Known for his relentless work ethic, his expertise and his authority, he joined the LEP project at the start of the 1980s and was given the responsibility for the hugely ambitious civil-engineering project by Emilio Picasso, the project leader. Before the excavation work could begin, however, CERN had to get the local authorities on board, since the tunnel would pass underneath about ten different Swiss and French communes and nine sites would be built on the surface. Under the leadership of Robert Lévy-Mandel, who was in charge of the impact study, dozens of consultation meetings were held. Laporte shone on these occasions thanks to his oratory and interpersonal skills. During project meetings, Lévy-Mandel and Laporte would indulge in memorable bouts of oratorical sparring, with Latin quotations generously thrown in.

The flagship construction project began in 1983 with the excavation of 18 shafts, followed by the excavation of the tunnel itself. Three tunnel boring machines were required to complete the task of digging out 23 kilometres' worth of earth under the plain. Explosives were used to excavate the section of the tunnel below the Jura due to fears that a geological incident could halt the progress of the machines. And such an incident did indeed occur in 1986, when high-pressure inflows of water flooded the tunnel, causing delays to the project. Laporte's expertise and leadership were decisive in the response to this incident and throughout the project as a whole. It was a regular occurrence for him to arrive on site at any time of the day or night to study damage and take urgent decisions. In 1988, the tunnel was finally completed.

But the main tunnel represented less than half of the total excavation work, since the ring is punctuated with access shafts, caverns and service tunnels. In addition, around 80 buildings were built on the surface. Jean-Luc Baldy, who managed the surface work, and Michel Mayoud, who was in charge of the crucial work of the surveyors, remember the trust that Laporte placed in them, giving them considerable room for manoeuvre.

Once the construction work had been completed, CERN became entangled in protracted legal proceedings involving the consortium of companies that had carried out the work. Laporte spent several years working with the Legal Service, once more demonstrating his trademark persistence. At the arbitration tribunal, Laporte distinguished himself not only for his technical knowledge, but also for his talent as an actor and his humour. Eva Gröniger-Voss, the head of CERN's Legal Service, who was a lawyer on the case at the time, recalls that he would amuse the judges by explaining that, as a *bon viveur*, he kept hearing "*confit d'oie*" (goose confit) whenever the lawyers spoke of a "*conflit de lois*" (legal conflict). Laporte retired in 1993 and devoted himself to numerous intellectual and artistic pursuits for the rest of his life.

Henri Laporte was a man of great curiosity and was highly knowledgeable in many fields. He will be remembered as a charismatic man, with a firm hand and great tenacity, but also someone who exuded a contagious joviality and and always showed compassion towards his colleagues.

His friends and former colleagues

Henri Laporte (on the right), at the start of the LEP project in 1983, with Emilio Picasso, Head of the LEP project (left), and Herwig Schopper, CERN's Director-General (Image: CERN)

Ombud's corner

WHAT'S THE POINT OF THE OMBUD?

Following my last article, some readers wanted to know what the tangible results of my consultations were: were the people who came to see me able to solve their problems? Did they resolve their conflicts? Did they find solutions? Here are some typical examples (names and contexts have been changed to respect confidentiality).

Paul*: *"My work isn't very interesting and I'm not learning much: what can I do? I don't know who to talk to."* Together, we discussed Paul's aspirations and skills. We considered the various options open to him and weighed up the advantages and disadvantages. In the end, Paul decided to broach the subject directly with his supervisor. This allowed his supervisor to better understand Paul's wishes, which have now been met through the assignment of new tasks.

Judy*: *"My brother is a director of a company that is participating in a call for tenders for my department, in which I am responsible for financial processes. Is there a conflict of interest? How can I find out?"* We decided together that I, as the Ombud, would ask the IPT department about the principle, without mentioning her specific case. In the light of the response from IPT, Judy was reassured and resolved the issue directly with them.

Stan*: *"My colleague Marysa* doesn't understand what I expect from her, which creates tensions. Can you help me?"* In agreement with Stan and Marysa, I organised a mediation session during which they were each able to express their expectations and agree on a way to work together. Thanks to this approach, communication between them was not only reestablished but also improved.

Peter*: *"My supervisor was harsh during my mid-probation period interview. I get the impression that she doesn't like me and wants to end my contract."* With Peter's agreement, I contacted his supervisor to get her version of events. She told me that, on the contrary, she really appreciates Peter's work and intends to keep him on; she just wanted to make a few adjustments. After this feedback, Peter told me that he had had a constructive discussion with his supervisor. It was just a misunderstanding and Peter is now completely reassured.

The Ombud gives members of the personnel the opportunity to be listened to in complete confidentiality and without being judged. Sometimes the people who come to see me just need someone to listen, without it leading to any particular action. In other circumstances, I can help them to see their situation more clearly and find solutions and the necessary resources to implement them. With the prior agreement of the parties concerned, I can also take certain actions. Among other measures, the Ombud can provide information, offer assistance or set up a mediation session.

*Names have been changed

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.