CERN Bulletin

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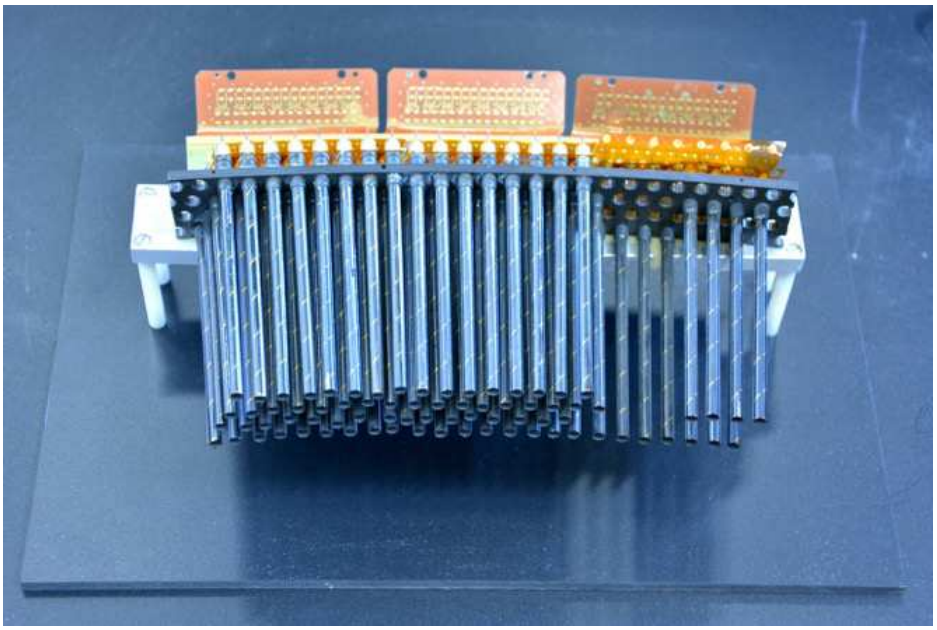
ENRICHING CERN'S HERITAGE OBJECT COLLECTION



A piece from the CERN heritage object collection - a sample of the ATLAS transition radiation tracker, made of straw tubes. Filled with a gas mixture and threaded with a wire, each straw is a complete mini-detector in its own right. (Image: CERN)

Ever since its foundation, CERN has been constantly developing new technologies and putting existing ones to new use. The scientific heritage of the Organization is embodied not only in its scientific works, but also in its scientific instruments and other objects. In its 63-year-long history, many artefacts have been kept and still remain today to tell their story and to inspire current and future generations.

Around 200 pieces of unique historic importance form CERN's scientific heritage object collection. It is being run by the Exhibitions and global engagement section of the Education, communications and outreach group, which provides appropriate storage and protection of the pieces and administers loans under guidance from the scientific information policy board (SIPB). A special database has also been created in CDS, with a complete description of the collection.

"In addition to their historical significance, objects of scientific heritage are increasingly valued as a means of disseminating CERN's research to a wider audience. For a long time now our collection has been popularising CERN's activities and achievements," says Afroditi Anastasaki, currently working on a project to make a complete overview of the database.

Indeed, the collection has a worldwide impact. Recently 15 objects were borrowed by the award-winning Collider exhibition of the Science Museum in London, which went on an international tour across Europe, Asia and Australia.

Not only museums, but also user institutes of the CERN experiments often borrow objects to present the Laboratory's work to the public.

(Continued on page 2)

In this issue

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ENRICHING CERN'S HERITAGE OBJECT COLLECTION

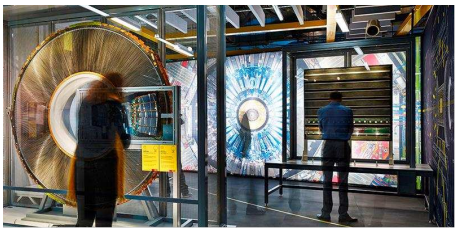
In March 2017 the Chulalongkorn University in Bangkok, Thailand, organised an exhibition to celebrate its 100th year anniversary.

Recently the exhibitions section initiated a project aiming to collect new objects, especially ones related to the LHC or belonging to the four large experiments – ATLAS, CMS, ALICE and LHCb.

"There are certain inclusion criteria. The object has to be created at CERN, for a CERN experiment, machine or accelerator, it has to tell an interesting story. It also has to be in good condition. Not all objects belong to CERN . We have pieces from ATLAS for example, which are owned by institutes participating in the collaboration. We only store them and take care of them. There is a strict procedure of arranging a loan to a museum and we always ask the owner for permission first," – explains Afroditi.

In order for an object to be able to delight and fascinate, it has to tell a good story. Unfortunately, the tales of some pieces have faded through the years and still remain unidentified. A list of these "mystery" objects can be found here (*https://cds.cern.ch/yourbaskets/display_public?bskid=23340*).

If you have an object which can be included in the heritage collection, if you want to add details to any object's description or if you were able to identify a mystery object, contact *afroditi.anastasaki@cern.ch*. Help us tell CERN's story even better!



More than half a million visitors got the chance to go on a behind-the-scenes tour of CERN and the Large Hadron Collider (LHC) during the Collider exhibition's intercontinental tour. (Image: Science Museum)

Visitors enjoying the CERN exhibition at the Chulalongkorn University in Bangkok, Thailand, called "Particle physics: accelerator for the future of humankind". (Image: Vichayanun Wachirapusitanand, Norraphat Srimanobhas/CERN)

Iva Raynova

BIRTH OF THE HIGH-ENERGY NETWORK

With over 60 years of history and currently more than 13,000 users from all over the world, CERN clearly has great potential to bring together a varied alumni community. Today, CERN alumni are distributed around the world, pursuing their careers and passions across many fields including industry, economics, information technology, medicine and finance. Several have gone on to launch successful start-ups, some of them directly applying CERN-inspired technologies.

Setting up and nurturing this important network is a strategic objective for CERN management. Following 12 months of careful preparation, the new CERN Alumni Programme will be launched this week.

The new community, united by a shared pride in having contributed to CERN's scientific endeavours, will provide an opportunity for alumni to maintain links with the Organization. It will allow them to continue to share CERN's values and support its activities, and serve as a valuable resource for members of personnel in the transition to work outside the laboratory. Physicists, in particular, often consider CERN as a "prime environment" that comes just after academia. The prospect of having to leave CERN may be daunting, with no guarantee that one's professional future will offer a similar environment and possibilities. However, preliminary statistics on the CERN alumni community demonstrate that professional experience at CERN nurtures skills and talents that are highly sought after by employers and can aid the development of alumni careers in many different fields.

We are aware that it will be a challenge to reach all of our alumni spread across the planet. If you are one of them, do not hesitate to leave your contact details at https://alumni.cern/. It is the best way to show your interest, join the new community and stay connected with CERN. We also invite you to get in touch with any questions by emailing alumni.relations@cern.ch. We will be very happy to welcome you back to CERN again!

This text is part of a Viewpoint originally published in the May 2017 issue of the CERN Courier.

Laure Esteveny project leader for the CERN Alumni Programme

LHC REPORT: MOVING FAST FORWARD

According to the official LHC schedule first stable beams were scheduled for 12 June, following a 5-week beam recommissioning period and a 7-day scrubbing run.

The excellent availability of the LHC and its injector chain, together with the dedication of the many specialists made it possible to be much ahead of this schedule, as first stable beams could already be declared on Tuesday, 23 May, only 25 days after the first beam was injected. From that moment onwards the remaining commissioning activities were interleaved with longer stable beam periods for physics.

This also triggered the so-called intensity ramp-up period during which a well-defined scheme of increases in the number of bunches and thus beam intensity is rolled out and formal checks for each intensity step are made until 2556 bunches per beam are reached, which is the objective for 2017. This scheme starts with 3 bunches per beam and then goes up to 12, 72, 300, 600, 900, 1200, 1800, 2400 and ends with 2556 bunches per beam. For each step the requirement is a minimum of 20 hours of stable beam in total, but also that the machine is filled three times. The goal of this controlled and step-wise intensity increase is to ensure that all systems work well with many bunches and a high total beam intensity.

Like every year, but even more importantly this year because of the magnet exchange in sector 1-2, there is also a scrubbing run, which aims at conditioning the vacuum chamber in order to reduce the so-called Secondary Electron Yield (SEY) emission, that is the number of secondary electrons produced on average per incident electron on the inner walls of the vacuum chamber. Reducing the SEY lessens or avoids the build-up of electron clouds in the vacuum chamber that can lead to beam instabilities and an increase in the demand for cryogenic cooling power. In an unconditioned machine the electron cloud build-up becomes more important when the bunch trains get longer and reduces when the bunch trains are further apart along the circumference of the machine. Therefore, the scrubbing run initially starts with bunch trains of 72 bunches well-spaced. Once the scrubbing shows its effect (reduced SEY measured by the reduction in heat load on the cryogenics system) the spacing between the bunch trains is reduced.

Since the intensity ramp up was well-advanced and longer bunch trains were required, 24 hours of the planned 7-days scrubbing run were advanced by one week to Monday, 29 May with the aim to perform an initial conditioning and allow the injection of longer bunch trains in the process of the intensity ramp-up.

At present, the remaining 6-day long scrubbing run is in full swing and the LHC is being prepared to receive the full number of 2556 bunches per ring with 144 bunches per injection from the injector chain.

Rende Steerenberg for the Operations group

ARIES PROJECT KICKS OFF AT CERN

ARIES members attend the kick-off meeting at CERN's Globe of Science and Innovation, May 2017 (Image: CERN)

The ARIES project officially began on 1 May 2017 and activities were launched with a kick-off meeting hosted at CERN on 4 and 5 May. ARIES, which stands for "Accelerator Research and Innovation for European Science and Society", is a Horizon 2020 Integrating Activity, co-funded by the European Commission with a contribution of €10 million.

ARIES will last for four years and aims to promote particle accelerator R&D, developing European accelerator infrastructures and facilitating the discoveries of tomorrow. The consortium brings together 41 participants from 18 different European countries, including accelerator laboratories, technology institutes, universities and industry.

The project fosters interdisciplinary collaboration between academia and industry to share technology and information for excellent accelerator science. In addition, it will provide enhanced access to accelerator infrastructures, strengthen innovation and ensure long-term sustainability in the accelerator field.

ARIES will develop new technologies to ensure future accelerators are more affordable, reliable, sustainable and better performing. Considerations include energy efficiency, new accelerator concepts, new high-temperature superconductors, new superconducting coatings and new materials for thermal management.

Fourteen different European test facilities will be made available under ARIES for magnet, material, electron and proton beam, radio frequency and plasma acceleration testing.

In an effort to promote innovation and accelerator applications, ARIES includes co-innovation actions with industry, such as the "Proof-of-Concept" programme, which offers funds to develop accelerator spin-off technologies in partnership with industry.

Finally, ARIES will create a training programme to secure the sustainability of accelerator research, ensuring the next generation of scientists and engineers are equipped with the best tools for the future of accelerator science.

ARIES Project Coordinator, Maurizio Vretenar (CERN), said: "Accelerators are at a critical transition moment, with new concepts, technologies and applications emerging all the time. ARIES will develop new technologies for a variety of projects and accelerator types, and promote innovation in the field with new ideas, synergies, applications and ways of working together."

Jennifer Toes on behalf of the ARIES consortium

COMPUTER SECURITY: IMPROVE YOUR CODE WITH GITLAB CI

Well-tested code is the cornerstone of a reliable and robust software stack: nothing is more annoying than a crashing, failing or misbehaving application, the loss of time and service(!) as a result of this, and the cumbersome debugging process to find the origin of the flaw. Not to mention the frustration of the user community. Although the production of bug-free code is impossible due to the complexities of software and the limited skills of most human programmers, reducing the number of bugs and flaws early in the development process significantly lowers debugging costs later. For the sake of software quality, the IT department provides you and your clients with a few simple tools to save precious time and cerebral pain.

Writing perfect code is far from easy and requires a deep knowledge of the programming language(s) being used, plus lots of experience. The introduction of flaws and bugs is inevitable, it happens and will continue to happen to even the most skilled coders among us. But these skilled coders – the Gandalfs of coding – know how to turn the odds in their favour. They follow common best practices on modularity, isolation, simplicity and readability; they validate every bit of input data and discard unreasonable input; they limit the execution scope and reduce the necessary privileges; they choose safe defaults; they know how to keep secrets secret; and they pay attention to compiler messages (e.g. gcc –wALL anyone?) as, very often, compiler warnings flag code that is in a sub-optimal state. Ideally, code should compile without any complaints at all.

Want to become a software magician yourself? Easy, if you apply the best practices mentioned above. Even easier if you use CERN's Gitlab instance as your primary software repository. Its Continuous Integration framework, Gitlab-CI, lets you introduce additional, automatic static code analyses, running on top of your code repository in a very simple way, to ensure that your code is clean of known security issues and bad practices. This is especially efficient when working in groups or teams, because it allows you to focus more on your task, rather than on which tools everyone should use and how. Since you will not need to prepare your testing environment for every change, you will save a lot of time.

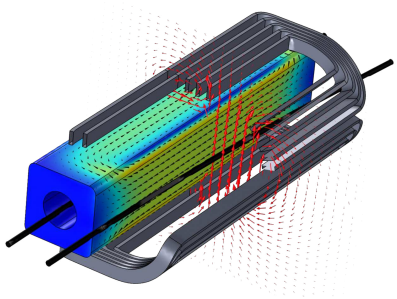
All these static code analysis tools are also available for download. If you are interested in finding out how to better secure your website – in particular if it is directly exposed to the Internet – see our recommendations and our tools for Oracle/APEX. Remember that one of the basics is simple: consider using CERN IT's central web service!

And of course there are many other opportunities to improve your software. The Computer Security team, in collaboration with CERN's Technical Training team, has arranged several different "Secure Coding" courses on web development and good programming practices. For those who want to learn "hacking", we provide regular hands-on capture-the-flag courses where you can learn to become a penetration tester. Join our WhiteHat Challenge in September 2017! And if you prefer a book, here (*http://cern.ch/security/recommendations/en/more_on_software.shtml*) is a list of further reading on the subject.

Do you want to learn more about computer security incidents and issues at CERN? Follow our Monthly Report (http://cern.ch/security/reports/en/monthly_reports.shtml). For further information, questions or help, visit our website (http://cern.ch/Computer.Security) or contact us at Computer.Security@cern.ch.

The Computer Security Team

HOW WILL SUSHI PROTECT THE FCC?



The SuShi septum principle where the black arrows indicate the shielding currents in the superconductor and the red arrows indicate the magnetic field in the mid-plane of the device (Image: SuShi/ CERN)

A brand new piece of technology called SuShi, a Superconducting Shield septum magnet, is being developed for CERN's Future Circular Collider study, to protect the future machine from the beam's anticipated extremely high energy.

To ensure the continuity of CERN's diverse scientific programme, the Future Circular Collider (FCC) study was launched in 2014 to explore scenarios for post-LHC circular colliders. The unprecedented size of this future machine creates exciting technological challenges, as it requires as-yet-unimagined concepts for many of its key subsystems. The huge amount of energy stored in the circulating beams is expected to be around 8.4 GJ – equivalent to the energy of 24 TGV trains, running at a speed of 150 km/h. Since the energy is so high, a completely new extraction system will be crucial for machine protection, as the beam must be safely disposed of in the event of a failure or at the end of an experimental cycle.

The extracted beam is kicked into the high-field region of the septum magnet by a fast-pulsed kicker magnet to receive the final, and significant, deflection towards an external beam dump. At the same time this magnet must produce a very low field in the circulating beam. The transition between the two regions of the septum magnet must be as sharp as possible to reduce the required strength of the upstream kicker system.

The new solution is based on the concept that a passive superconducting shield can create a zero-field region inside a strong external magnetic field by inducing persistent eddy currents on its surface, automatically arranged in such a way as to fully cancel out the field in its interior.

A collaboration between CERN and the Wigner Institute for Physics (Budapest, Hungary) was established, under the framework of the FCC Study, to evaluate the feasibility of a new concept for this part of the machine, and to propose realistic materials and technologies.

Three possible candidates have been selected for the first tests: a bulk MgB2 tube, a multilayer, helically wrapped, high-temperature superconductor tape on a copper tube, and a sheet made up of layers of niobium titanium, niobium and copper. The first prototype was successfully tested in February 2017 at CERN's SM18 facility, and could shield 2.6 T at its surface with a wall thickness of 8.5 mm. This is already around 2.5 times more efficient than the Lambertson septum magnets used in the LHC.

Tests for the two other prototypes are planned for later this year. Once the performance of all three prototypes has been evaluated, the best candidate will be chosen for more sophisticated tests and further prototyping.

For more information, visit the project website: http://cern.ch/sushi-septum-project.

Daniel Barna and Miroslav Atanasov

Official communications

CERN'S EMERGENCY NUMBER

The number to call in case of an emergency at CERN is +41 22 767 4444 from any mobile phone at CERN. It's a good idea to programme this number into your mobile phones.

The short number 74444 can be used from any fixed telephone on the CERN site.

Both numbers will put you through to the Safety Control Room, which is staffed round the clock, 365 days per year.

HSE Unit

CHANGES TO PDF SOFTWARE AT CERN AND WHAT IT MEANS FOR YOU

The IT Department launched a "**PDF replacement project**" last year to investigate and test alternative products to Adobe Acrobat. Security vulnerabilities in Adobe Acrobat are indeed very high and the company also recently changed its pricing structure and business model which makes a site licence prohibitively expensive for CERN. The IT Technical User Meeting (http://cern.ch/itum) was regularly informed of the progress of the PDF replacement project, and the proposed new software has been available since February. Given the positive results, it is now time to replace the PDF software at CERN.

New PDF software

There is no like-for-like replacement. The software below represents the best tools found.

The new recommended PDF software depends on your operating system:

Mac:

- PDF Reader: please use Mac Preview (comes with MacOS)
- PDF Editor: **PDF Expert** available via Mac Self-Service (*http://cern.service-now.com/service-portal/article.do?n=KB0003677*).

PC:

- PDF Reader and Editor: **PDF-XChange** available via CMF (*http://cern.service-now.com/service-portal/article.do?n=KB0002276*).

Linux:

- No change as Adobe has not been available since 2011; Evince appears to be the best (*http://wiki.gnome.org/Apps/Evince*).

What this means for you

Here we simply outline our recommended solutions depending on the PDF functions used:

- **Basic functions:** if you simply open PDF files to read and/or print them, then please install the **Reader** solutions mentioned. In fact, your web browser usually has a PDF reader incorporated.
- **Editing functions:** if you edit PDFs, such as replacing text and/or images, please install the **Editor** solutions mentioned. The feedback we received is very positive, many stating that the editing functions are easy to use.
- **Advanced functions:** obviously there will be some use cases that cannot be satisfied, e.g. opening specialised PDF files incorporating 3D models, or embedding fonts on a Mac; where Adobe may be required. We recommend checking the "use case matrix", testing the **Editor** solutions, and if your specific needs are

not met, please follow the instructions below to purchase yearly access.

Please choose the appropriate solution for your needs and install the new software now!

The replacement timeline

As of September 2017, PC users will be prompted via CMF to remove Adobe Acrobat, while Mac users will be reminded via the usual channels. As of 15 October 2017, Adobe will stop supporting Adobe Acrobat XI Pro: the company will neither update its software any longer nor provide security updates.

How to purchase Adobe Acrobat DC

Should you still require Adobe **Acrobat** DC, please complete this request form (*http://cern.service-now.com/service-portal/report-ticket.do?name=Adobe-Creative-Cloud-access&fe=mac-support*).

Please note that Adobe **Reader** DC will be made available as a CMF package for special cases (e.g. reading 3D PDFs). However, other PDF software should be installed as the default to help strengthen security.

Further details are available at the following websites:

- Mac (*http://information-technology.web.cern.ch/services/fe/mac-support/howto/changes-pdf-software*)
- PC (*http://espace.cern.ch/winservices-help/NICEEnvironment/Pages/NICE-changes-to-PDF-Software.aspx*)

OFFICIAL NEWS REGARDING THE CERN SAFETY RULES

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

- Safety regulation "Chemical Agents", SR-C (*http://cern.ch/safety-rules/SR-C.htm*).
- General Safety Instruction "Prevention and protection measures", GSI-C-1 (*http://cern.ch/safety-rules/GSI-C-1.htm*).
- General Safety Instruction "Explosive atmospheres", GSI-C-2 (*http://cern.ch/safety-rules/GSI-C-2.htm*).
- General Safety Instruction "Monitoring of exposure to hazardous chemical agents in workplace atmospheres", GSI-C3. (*http://cern.ch/safety-rules/GSI-C-3.htm*)

These rules cancel and replace the previous version of the same documents that have been revised to take into account changes in the referenced legislation.

The CERN Safety Rules apply to all persons under the Director General's authority. They are available under the following link.

GLOBE CAR PARK: P+R ZONE FOR PERMIT HOLDERS ONLY

In accordance with the agreement between CERN and the *Fondation des parkings*, the parking spaces located in the P+R zone of the Globe car park, which are marked with blue lines, are reserved exclusively for holders of permits issued by the *Fondation des parkings* until 10 a.m. every morning. All users of the Globe car park, whatever their status, must respect the function of the P+R spaces. Checks will be carried out.

Relations with the Host States service
www.cern.ch/relations
72848 / 75152

Announcements

SIGN UP TO THE DIVERSITY IN ACTION WORKSHOP

This interactive workshop, is designed to help you explore the meaning and importance of diversity at CERN.
Using participative multimedia methods and case studies from the CERN work environment, the participants are provided with insights into the different dimensions of diversity which help develop greater sensitivity to differences.

At this workshop, we explore ways to recognise and overcome biases and thereby strengthen our tradition of inclusiveness at CERN.

Register here (*https://indico.cern.ch/event/630537/*).

Obituaries

JOCELYNE JERDELET (1959-2017)

Jocelyne Jerdelet (Photo : CERN)

Jocelyne Jerdelet joined CERN in November 1983 as an operator in the Experimental Physics (EP) division analysing images of collisions produced by the detectors. Shortly thereafter, she joined the Scientific Information Service.

In that role, she worked on cataloguing preprints, which, at the time, the Library received in paper form. For a long time, she was involved in preparing the legendary "weekly list of preprints and reports". Then, with the development of computer tools, the web and the arXiv preprint server, her work evolved and she contributed actively to the automation of these processes, allowing the Library to move from paper to the electronic realm. An article in the CERN Courier in 2002 paid homage to her competence and her contribution to the modernisation of the processing of scientific literature.

Thanks to her commitment, care and attention to detail, documents produced by the LEP and then the LHC collaborations were quickly made available on both the CERN Document Server (CDS) and Inspire – a

crucial service for the CERN and global scientific communities.

In addition to her day-to-day work, she led a number of fundamental projects to successful conclusions. In particular, she coordinated one of the Library's first large-scale digitalisation projects: that of theTheory department's collection of preprints, which is one of CERN's most prolific collections.

Jocelyne also trained numerous students, apprentices and even staff members, demonstrating patience and a talent for teaching. She knew how to transmit her knowledge, always with the aim of doing the job as well as possible. As well as being a consummate professional, she also displayed admirable personal qualities: her colleagues felt that they could rely on her and enjoyed working with her.

"Joce" was always calm and smiling, always ready to help. A local of the region, she loved nature and enjoyed walking in the Jura mountains.

We have lost a pillar of the Scientific Information Service and a dear friend, and we share her family's grief at this difficult time.

Her colleagues and friends

We deeply regret to announce the death of Jocelyne Jerdelet on 11 May 2017.

Jocelyne Jerdelet, who was born on 28 January 1959, worked in the SIS group, RC sector, and had been at CERN since 1 November 1983.

The Director-General has sent a message of condolence to her family on behalf of the CERN personnel.

Social Affairs
Human Resources Department

CERN's flags were flown at half-mast on Wednesday 17 May 2017, the day of the funeral, in accordance with the procedure for the death of an employed member of the personnel.