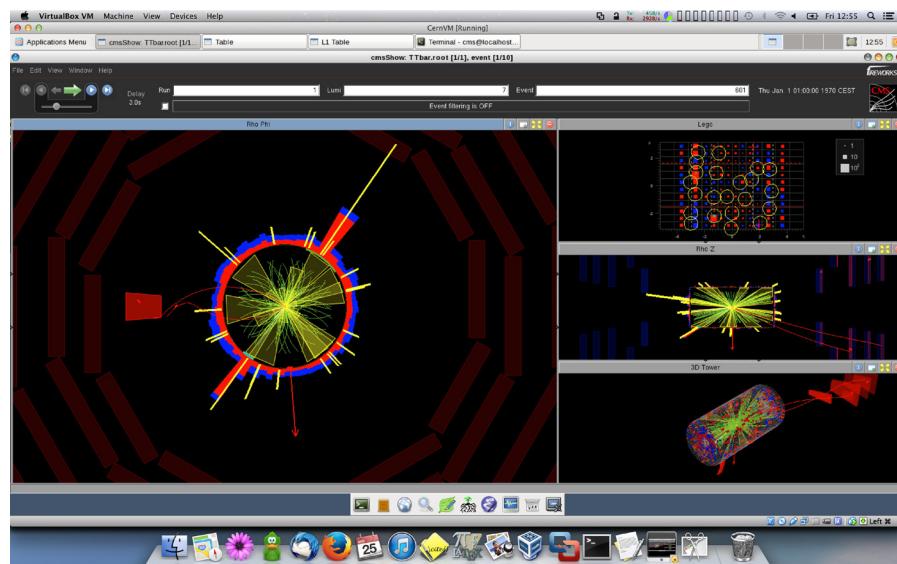


## THE MACHINE WITHIN THE MACHINE

Although Virtual Machines are widespread across CERN, you probably won't have heard of them unless you work for an experiment. Virtual machines - known as VMs - allow you to create a separate machine within your own, allowing you to run Linux on your Mac, or Windows on your Linux - whatever combination you need.



Using a CERN Virtual Machine, a Linux analysis software runs on a Macbook.

When it comes to LHC data, one of the primary issues collaborations face is the diversity of computing environments among collaborators spread across the world. What if an institute cannot run the analysis software because they use different operating systems?

"That's where the CernVM project comes in," says Gerardo Ganis, PH-SFT staff member and leader of the CernVM project. "We were able to respond to experimentalists' concerns by providing a virtual machine package that could be used to run experiment software. This way, no matter what hardware they have to hand, they're still able to do their job."

Seems like a simple solution, right? Not quite. "Although virtualisation has been around many years, there had always been too many

performance issues," explains Jakob Blomer, PH-SFT fellow, author and main developer of the CernVM file system. "But with the recent advances in virtualisation technology on personal computing systems, using a virtual machine can be easily done."

The CernVM team also stumbled upon a whole new way to help experiments with their IT needs: as well as providing a single platform for experimentalists, they could deliver the latest experimental software through a file system online.

With new experimental analysis software being released every other day, it can be tough for users to keep up. "We created the CernVM file system, which keeps up with the latest software so users don't have to,"



## EDUCATION, EDUCATION, EDUCATION

Education is a recurring theme of our 60th anniversary year, as I was reminded last week when we had a visit from the winners of the Spanish schools competition launched with the Prince of Asturias Award prize money.

(Continued on page 2)

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# A word from the DG

## EDUCATION, EDUCATION, EDUCATION

Young people are always remarkable in their curiosity and inventiveness, and this was very clear in all the submissions for the competition. I was most impressed with the six winners, but have to give a special mention to the youngest, Sofía Isabella Villamizar Villegas, who at just seven years of age made a lovely video explaining the Higgs mechanism by analogy to moving a balloon with and without static charge through a field of suspended strips of paper. It was not only charming, but also very effective as analogies go.

The Spanish visit came in the middle of judging to find a winner of the Beamlime for Schools competition, which closed at the end of March having received almost 300 proposals for experiments from

schools all over the world. These vary from fundamental physics, with students wanting to study the weak interaction, to radiation hardness for space applications, and include a wide range of medically oriented proposals as well. From what I have seen, the quality is high: I do not envy the judges who have to choose a winner from a very strong selection.

Completing the range of new educational initiatives to be launched this year is S'cool lab, a new lab designed for school students and teachers visiting CERN that's being installed in the Microcosm building to add a new dimension to high school visits to CERN. At the S'cool lab, students can use facilities that are not commonly available in schools, and will be able to repeat

(Continued from page 1)

**fundamental experiments in modern physics such as electron diffraction and the Rutherford experiment. They'll be able to study the properties of electrons and photons, explore superconductivity, trap particles and learn about particle detection techniques. S'cool lab will open to its first young experimenters in July 2014.**

S'cool is perhaps a good place to draw this message to a close, because it is a fact that basic science is now perceived as relevant, exciting and cool, and that's something we need to build on. All our futures depend on science, and if we want to ensure a bright future for young Sofía Isabella and her generation, scientific education is the key.

Rolf Heuer

## THE MACHINE WITHIN THE MACHINE

(Continued from page 1)

says Blomer. "This system provides new experimental software for download. It's a win-win: we only have to send out a small, easy-to-distribute virtual machine, and users will receive automatic updates of their software from CERN." Not only does this system ensure that all LHC experiments are running their software on the right systems,

it also gives developers the freedom to focus their developments on one virtual machine platform.

With CERN's experiments having already embraced virtualisation, the best is yet to come with last year seeing the "virtualising" of the entire CERN infrastructure. Expect to hear

more about the potential of virtualisation, starting with an upcoming Bulletin article exploring how VMs are being used to save endangered data and software environments.

Katarina Anthony

## LS1 REPORT: SHORT-CIRCUIT TESTS

As the LS1 draws to an end, teams move from installation projects to a phase of intense testing. Among these are the so-called 'short-circuit tests'. Currently under way at Point 7, these tests verify the cables, the interlocks, the energy extraction systems, the power converters that provide current to the superconducting magnets and the cooling system.

Before putting beam into the LHC, all of the machine's hardware components need to be put to the test. Out of these, the most complicated are the superconducting circuits, which have a myriad of different failure modes with interlock and control systems. While these will be tested at cold - during powering tests to be done in August - work can still be done beforehand.

"While the circuits in the magnets themselves

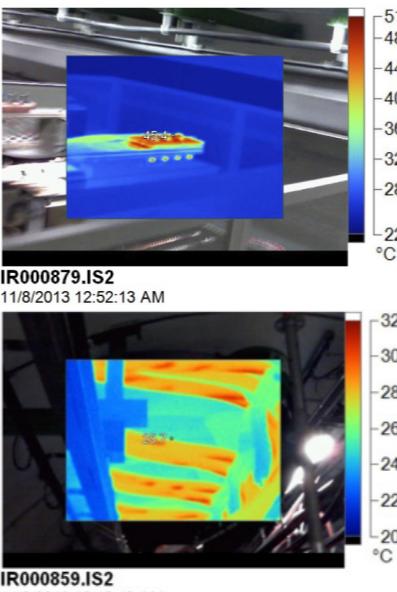
cannot be tested at warm, what we can do is verify the power converter and the circuits right up to the place the cables go into the magnets," says Matteo Solfaroli, co-coordinator of the short-circuit tests. "By placing a copper block before the cables make the transition to cold, it is short-circuited and tests can be carried out at warm."

The motivation behind these tests is two-fold: not only does testing these circuits now give

us additional time to react in the event of a problem, it is also safer for the engineers. When the powering tests are done at cold, access is restricted as there is a risk of helium release. By testing at warm, the time spent in the tunnel at cold is dramatically reduced.

During LS1, numerous interventions were made to the circuit's energy extraction system and water-cooled cables. Some were fixed and others were completely replaced.

(Continued from page 1)



Thermal camera images taken during tests at point 4 (IP4).

"In order to verify that the replacements can handle the long run of the machine, we bring the circuits to the ultimate current," says Mirko Pojer, co-coordinator of the short-circuit tests. "This is the highest current the power

converters can achieve, and is actually higher than the nominal current in the machine. We run it through the local circuit system for a testing period that varies between a few hours and 24 hours, depending on the nature of the intervention carried out and the type of system."

Of course, where you have currents that can reach as high as 13,000 A, things are bound to get hot! Although expected, the team needs to verify if the warm-up stabilises to a manageable temperature that does not affect the behaviour of the cables. To do this, they use infrared cameras (see photo) to periodically check the temperature rise of the different parts of the circuit.

Thanks to the seamless collaboration between the Electrical Power Converter Group (TE-EPC), the Machine Protection and Electrical Integrity Group (MPE) and EN-EL, who are in charge of the cables, the short-circuit tests have progressed well. Tests should be completed by the end of July, in preparation for the powering tests in August. Points 4R and 6 have already been completed, with tests at Point 7 currently ongoing.

## Meanwhile, elsewhere

In the LHC, all activities continue to progress well. Preparation is under way for the cool-down of the first sector of the machine, which will start on 7 May.

Over in the injectors, hardware commissioning across the PS complex (including the PS Booster) has progressed with no major issue. In the PS Booster, a wire scanner (BI.SMH) needs to be replaced. This will be done at the beginning of May and will unfortunately delay the start of cold checks. Happily, this will only be a short three-day delay, thanks to the excellent collaboration between teams.

The LS1 coordination team would like to take this opportunity to thank all the voluntary guides who have given "visits for CERNnois" of the LHC tunnel. Thanks to your efforts, around 500 of your colleagues have had the pleasure of exploring the machine.

Katarina Anthony

## PHYSICS AT 13 TeV: ATLAS - EXTRACTING THE MOST FROM NEW LHC DATA

The unprecedented collision energy of LHC run 2 will bring physicists a step further into an as-yet unexplored world, where new particles should eventually leave their signature in the powerful detectors. This may well happen in the form of "missing transverse momentum" – that is, energy that is not detected directly but can be deduced by measuring the imbalance of the observed particles. Often called "missing energy" for simplicity, scientists predict that it could be the signature of many new physics processes.



"In ATLAS, we have performed many analyses, searches and measurements using the missing transverse momentum signature with the run 1 data. Reconstruction of the missing transverse momentum in ATLAS is based on calibrated jets and leptons, plus other calorimeter energy deposits," explains David Charlton, ATLAS Spokesperson.

Not all the new processes that ATLAS plans to investigate will be studied using a missing energy signature. An example is the Brout-Englert-Higgs mechanism, which accounts for the mass difference of elementary particles and whose simplest manifestation is the Standard Model Higgs boson discovered by the LHC experiments in 2012. "Supersymmetry and string theory, which try to explain features beyond the Standard Model like dark matter and quantum

gravity, suggest not one Higgs boson but five or more," says Bill Murray, ATLAS Physics Coordinator. "We will search for evidence of these new bosons in the changed predictions they make for the behaviour of the Standard Model Higgs boson we have found. Recently, ATLAS showed that the measured properties of the Higgs boson already strongly suggest that supersymmetric Higgs bosons should

weigh at least three times as much as the one found already. Precise measurements in run 2 could point to their existence. The Higgs boson could also show us dark matter by decaying into dark matter particles. We started these searches during the first run but in the next one we will have much more precise tests for such possibilities."

Tagging the missing transverse momentum becomes increasingly difficult as the number

of pile-up interactions in each bunch crossing rises. According to the current plan, run 2 will use a bunch spacing of 25 nanoseconds, which should result in a pile-up not very much higher than that of run 1. However, tougher experimental conditions with a bunch spacing of 50 ns and a higher number of protons in the bunches, which could challenge the detectors, are not completely excluded. "The information coming from the calorimeter together with very good tracking capabilities will allow us to reduce the effects of pile-up," confirms Murray.

"However, 50 ns bunch spacing would indeed be a big challenge for our detector."

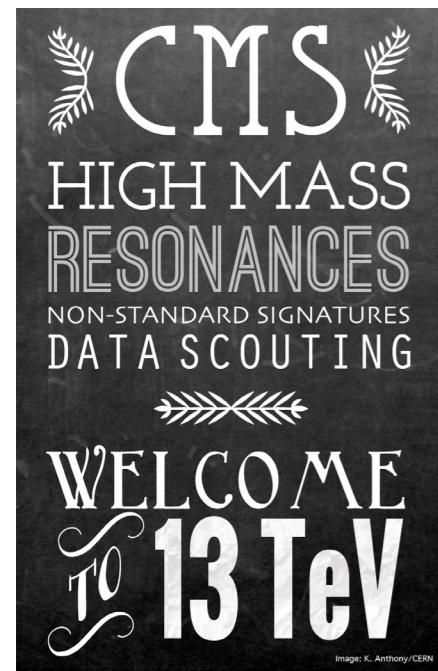
During the long shutdown of the LHC, the ATLAS collaboration has been working on improving the trigger software and performance, and introducing some new hardware trigger components. The wish to keep low trigger thresholds in run 2 results in an immense data-handling challenge, putting heavy pressure on the disks and tapes available to ATLAS through the Worldwide LHC Computing Grid. "We have been running

a big programme to optimise the use of our computing resources, shrinking the size of events by dropping and condensing information, reducing the number of copies of events which need to be kept, and improving simulation flexibility and reconstruction speeds. This has taken the work of many dedicated people to implement. However, the benefits are substantial and the physics goals are large: further steps into unexplored territory," concludes Charlton.

*Antonella Del Rosso*

## PHYSICS AT 13 TEV: CMS - SCANNING THE UNKNOWN

CMS is getting ready to use its accurate detector to scan the many ripples of the unknown physics that may lie beyond the Standard Model. Foremost in everyone's mind is the search for signs of the production of dark matter at a man-made machine.



Interestingly, the observation of dark matter or new weakly interacting particles implies detecting that some energy has escaped, i.e. it's missing from the upcoming proton collisions at the LHC. This is why measuring and understanding "missing energy" will be a very important step in that direction. "A large amount of missing energy is the signature for many processes of physics beyond the Standard Model. However, it's not the only interesting signature that we will be able to exploit when the new collision energy is available," explains Luca Malgeri, CMS Physics Coordinator.

Among the interesting things not associated with missing energy are high-mass resonances,

which are revealed by peaks in the invariant mass distribution spectra of pairs of leptons or hadronic jets. "The high-mass resonance peaks are strongly linked to the available energy in the collisions," says Malgeri. "The probability of creating high-mass objects in 13 TeV collisions is much higher than during run 1, when the collision energy was 7 or 8 TeV."

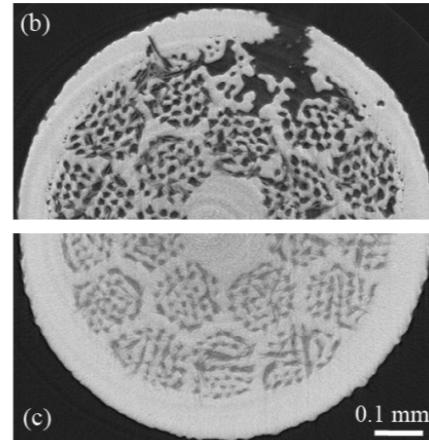
Theoretical studies also confirm that the standard cross-sections – i.e. interaction probabilities – to produce Standard Model particles at 13 TeV will be between 1.5 and 2 times higher than those at 8 TeV. For experiments, this translates into a quicker acquisition rate. "We will use the initial weeks of running at low luminosity to familiarise ourselves once more with our detector and, in particular, with the improvements that we have made during the long shutdown," explains Malgeri. "Subsequently, if everything goes well, a few weeks of data acquisition should be enough for us to be able to observe, if they exist, the first new heavy particles, such as the Z prime, a particle that many theories predict and that should give us clues as to how the forces relate to one another."

While high-mass objects will be within reach of the multi-purpose experiments very soon after startup, other particles could take months or years of accurate analysis before appearing on the physicists' screens. "Some theories predict the existence of particles having signatures – such as long decay chains whose final states are several low-energy leptons or hadronic jets – that are difficult to disentangle from Standard Model signals. This type of information will require a lot of statistics and long studies," Malgeri confirms.

*Antonella Del Rosso*

## HIGH-TEMPERATURE SUPERCONDUCTORS MAKE MAJOR PROGRESS

This month's *Nature Materials* featured an important breakthrough for high-temperature superconductors. A new method has been found for processing Bi-2212 high-temperature superconducting round wire in order to drastically increase its critical current density. The result confirms that this conductor is a serious candidate for future very-high-field magnets.



This image shows the cross-section of two Bi-2212 wires. The bottom wire has less leakage and void porosity due to a heat treatment done at an overpressure of 100 bar – about 100 times the pressure used to produce the top wire (image from *Nature Materials*, Vol. 13 (2014), 10.1038/nmat3887).

The workhorse for building superconducting accelerator magnets has been, so far, the Niobium-Titanium (Nb-Ti) alloy superconductor. But with Nb-Ti having reached its full potential, other conductors must be used to operate in higher magnetic fields beyond those reached with the LHC magnets. Today, the intermetallic

Niobium-Tin ( $\text{Nb}_3\text{Sn}$ ) is the most advanced superconducting material beyond Nb-Ti.  $\text{Nb}_3\text{Sn}$  conductors are now ready for use at CERN in high-field accelerator magnets, like the 11 Tesla magnets, and large aperture quadrupole magnets, like those being developed for the LHC High-Luminosity upgrade. However, high-temperature superconductors are needed to reach the 20 Tesla domain.

"Recent spectacular performance improvements of Bi-2212 wire at the National High Magnetic Field Laboratory (NHMFL) have made this high-temperature superconductor a real candidate for future magnets that can produce magnetic fields beyond the reach of any Nb-based superconductor," says Christian Scheuerlein, materials engineer in the Superconductors and Superconducting Devices section within the Magnet, Superconductors and Cryostats group of the Technology Department.

In the framework of the EuCARD-2 Future Magnets development programme, CERN is collaborating with NHMFL and industrial partners Nexans (who produce the state-of-the-art Bi-2212 precursor)

and Oxford Superconducting Technology (the Bi-2212 wire manufacturer). Their goal is to develop Bi-2212 wire for use in accelerator magnets that can reach 20 Tesla.

A drawback of Bi-2212 is that the precursor material needs to be melted and re-solidified when the conductor is its final size and shape. This requires heating the entire magnet coil up to a maximum temperature of about 900 °C, controlling a homogeneously distributed temperature with high accuracy. In order to reach the full potential of the Bi-2212 conductor, the heat treatment must be done at overpressures, possibly as high as 100 bar. "In collaboration with researchers at the European Synchrotron Radiation Facility (ESRF), we are studying how to simplify this delicate process to make the use of Bi-2212 in accelerator magnets even more attractive," says Scheuerlein, and he concludes: "Three decades after its discovery, Bi-2212 high-temperature superconductor is becoming a real candidate for application in very-high-field magnets!"

*CERN Bulletin*

## CERN IS CELEBRATING ITS ANNIVERSARY - INVITE YOUR NEIGHBOURS!

On 24 and 25 May 2014, CERN will be organising a weekend of discovery to celebrate its 60th anniversary with its (our) neighbours. Come and help us to welcome them as a volunteer!

CERN is celebrating 60 years since its establishment – 60 years during which the region and the Laboratory have developed strong links. To celebrate this collaboration, two days of visits and activities for everyone living in the region are being organised.

Underground visits to the CMS detector in Cessy, the LHCb detector in Ferney-Voltaire and the LHC machine in Échenevex will be held throughout the weekend. Some 6,000

visitors are expected to make the most of one of the last chances to visit the underground installations before the LHC is restarted next year. These visits are open only to people aged 12 years and over and are by reservation only.

Members of the public are also invited to take part in fun activities at the site of the CMS experiment in Cessy. The programme includes demonstrations and experiments involving superconductivity, cryogenics, precision

measurements and even robotics. Younger visitors will have the chance to build machines out of Kapla blocks or Lego. These activities are open to everyone, are free of charge and do not need to be booked in advance.

If you want to introduce your friends and neighbours to CERN, invite them to come and enjoy this weekend. As the underground visits are aimed primarily at residents of the local region, they can be booked only at the

CERN Reception and at the tourist offices and town halls listed on the event's website: [www.cern.ch/voisins](http://www.cern.ch/voisins).

#### We need your help!

CERN is looking for several hundred volunteers to lead guided tours and surface activities and to direct visitors over the two days. All help will be appreciated – tell your colleagues!

If you want to take part, sign up at <http://cern.ch/voisins-volontaires/>

Corinne Pralavorio

**LE CERN FÊTE SES 60 ANS  
AVEC SES VOISINS**

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60 YEARS/ANS CERN

## ATLAS WELCOMES A NEW PALESTINIAN STUDENT

Mahmoud Ibrahim Alstaty, from near Jenin, is starting a PhD studentship at CERN, where he will be working on the new inner layer of the ATLAS pixel detector. He joins a growing number of other Palestinian researchers who are working at CERN.



Mahmoud Ibrahim Alstaty.

Mahmoud Alstaty's PhD scholarship is supported by the Sharing Knowledge Foundation. In 2013, Robert Klapisch, president of the foundation and former Director of Research at CERN, signed a framework agreement with CERN to open the Doctoral Student programme to countries from the Middle East and North Africa (MENA). Mahmoud is the second student to benefit from such an opportunity, following Mohamed Gouighri from Morocco. "Mahmoud will work on the ATLAS experiment on the commissioning and performance of the new inner layer of the pixel detector (IBL) and on the search for new physics, including leptons in the final state, under the supervision of Fares Djama and myself", says Pascal Pralavorio from Centre de Physique des Particules de Marseille (CPPM) and Aix-Marseille University, which will deliver the diploma. "The IBL will strengthen ATLAS's potential for physics discoveries and measurements during run 2.

Mahmoud's work will demonstrate the ability of the IBL to reach this goal," says Fares Djama. Mahmoud joins a number of other Palestinian researchers who have already participated in CERN's student programmes. "The first of these was Muhammad Alhroub, currently a post-doc supported by the International Center for Theoretical Physics (ICTP) in Trieste, who first came to CERN as a summer student in 2007 and subsequently obtained his PhD from Bonn University, also while working on ATLAS," recalls John Ellis, a former CERN theorist who was in charge of relations with non-Member States at that time. Following this first successful experience, CERN welcomed another Palestinian summer student in 2008 - Arwa Bannoura, who is now working towards her PhD at Wuppertal University - and another PhD student working in the ATLAS collaboration - Ahmed Bassalat, a summer student in 2011, from the Laboratoire de l'Accélérateur Linéaire (LAL)

in Orsay. "For the 2014 summer student programme, CERN will offer two students from Birzeit University in Ramallah and the An-Najah National University in Nablus the opportunity to participate in the ATLAS experiment," says Patrick Fassnacht, advisor to the Director-General for the MENA. "It is hoped that these young researchers will

help form the core of a Palestinian team in the ATLAS collaboration, a goal being supported actively by CERN and the ICTP." Motivation is certainly not something Mahmoud is lacking. "I am so excited to be at CERN, and I am sure that the experience I will gain here during my stay will boost my

scientific career and widen my horizons. I hope to honour Palestine at CERN and to contribute to a fruitful cooperation between Palestine and CERN in the future," he concludes.

Antonella Del Rosso

## EDMS 6: MODERN AND INTUITIVE

As announced in *Bulletin No. 14-15/2014*, a new version of the system used to manage technical data and data concerning CERN equipment (EDMS, Engineering and Equipment Data Management Service) is now available.



A unique interface for all data linked to CERN's engineering work, EDMS currently stores more than 1.2 million documents containing almost 2 million files, guaranteeing the transfer of protected information and knowledge to future generations of engineers and scientists at CERN, be it the design data and documentation for a specific object

(technical specifications, test procedures, non-conformities, drawings, etc.) or technical information about the Laboratory's infrastructure and scientific equipment.

In a few months, the new EDMS 6 system will replace the current system definitively, offering its 13,000 users a more modern and intuitive interface that meets their expectations. "We've been working in close collaboration with some of the system's most frequent users to develop this new version of EDMS," explains Aleksandra Wardzinska, EDMS 6 Project Leader. "We carried out the first tests in January 2013 with a panel of key users, thanks to whom we were able to improve the system and integrate some new functions that they really wanted."

These new functions include a simple drag-and-drop method for downloading EDMS files, an improved tree structure and easy right-click access to certain options, to name

just a few. "We wanted to make this interface more interactive and user-friendly for everyone," underlines Rachel Bray, Product Lifecycle Management and Document Management Specialist. "It will make life much easier for new arrivals and members of the personnel who are less familiar with EDMS, as well as for those who use it every day."

The new version of EDMS, which can already be accessed from the interface of the current system, will continue to evolve over the next few months (keep an eye on the News panel of the new EDMS 6 home page for updates on these changes). To continue improving this new management system, its team of developers needs you! So start using EDMS 6 today and send your comments to [edms.support@cern.ch](mailto:edms.support@cern.ch).

Anaïs Schaeffer

## CERNLAND/PRINCE OF ASTURIAS COMPETITION WINNERS TOUR CERN

Last week, the Laboratory rolled out the red carpet for the six young winners of the CERNland/Prince of Asturias competition. From a visit of the CMS detector to dessert with the Director-General, these young talents were given the full VIP treatment. Nothing less would do for our winners!

For the CERNland/Prince of Asturias competition winners, Easter 2014 would be unforgettable. Besides visits to all the main CERN landmarks, they attended an award ceremony in the Main Building in their honour. Among the audience were CERN

Director-General, Rolf Heuer, the Permanent Representative of Spain to the United Nations Office at Geneva, Ana María Menéndez Pérez, and the Director of the Prince of Asturias Foundation, Teresa Sanjurjo González.

The ceremony was also an opportunity for the CERN community to interact with the young winners. "They brought with them such heartfelt enthusiasm," says CERN's Isabel Béjar Alonso, who accompanied them throughout their visit and was one of



The competition's youngest winners study the CMS detector.

the driving forces behind the competition. "Not only was seeing their faces when they visited the CMS experiment a highlight, but also hearing them ask who had made the experiment, who worked together there – it

rekindled my own enthusiasm. We all saw the experiment through the eyes of a child."

The winners of the CERNland/Prince of Asturias competition shared their thoughts with the *Bulletin* during the award ceremony:

"I never imagined something like this could happen. It is... too much! Coming to this place where people are doing such impressive things, where people are so talented... that they went out of their way to read and see all of our works... I can only give my most heartfelt of thanks." - Quillaccori García López (16 years old), IES "Lancia", León.

"What she said! I am so thankful to be here, I really didn't expect it. I love painting and, for my submission to the contest, I drew a family who could travel to space on holiday. The competition was a fantastic opportunity and I am very thankful." - Anna Salut Esteve Domínguez (17 years old), IES Bernat Guinovart, Algemesí, Valencia.

"I can hardly believe I am here. Even on the plane, I could barely believe it. So, yes, I am very excited to be here. It was something I had dreamed about, as I had been interested in seeing what CERN was like. I had imagined it, of course, but it still surprised me." - Pedro García Gómez (15 years

old), Colegio Sagrado Corazón, Zaragoza.

"I am very thankful for this competition... Fin!" - Sofía Isabella Villamizar Villegas (7 years old), Colegio Público Gesta I., Oviedo.

"I am super excited to be a winner of this competition and am super happy! Thanks!" - Rocío Lahuerta Blanco (9 years old), CEIP Puente de Simancas, Simancas, Valladolid.

"The visit to CMS was, of course, what struck me most. Being next to one of the detectors that discovered the Higgs boson would amaze anyone who likes physics. The award ceremony was also very emotional - there were some wonderful speeches. Overall, this competition has been a great adventure." - Ana Villanueva Ruiz de Temiño (15 years old), Colegio Sansueña, Zaragoza.

Katarina Anthony

## THE FIRST CERN SPRING CAMPUS

From 14 to 16 April, the first edition of the CERN Spring Campus took place in Spain. Taking place over three intensive days, this event brought experts from CERN together at the University of Oviedo, where they met the engineers and scientists of the future in a programme of scientific and technological dissemination and cultural exchange.



The young participants of the first CERN Spring Campus and their instructors show their enthusiasm after the intensive three-day course.

"This three-day school focuses on preparing young engineers for the job market, with a particular emphasis on computing," explains Derek Mathieson, Advanced Information

job interviews and CV writing. It was also an important opportunity for the participants to meet CERN computing engineers to find out what it is like to work in IT at the moment."

"It has been a great experience," says Miquel Llobet, a participant from the *Universitat Politècnica de Catalunya*. "I was exposed to many new technologies and methodologies that I had never heard about. The instructors from CERN were fantastic and the experiences they shared were very valuable. I can't wait to put what I've learned into practice!"

"I think the concept of the Campus is very nice, but I would make it longer," adds Victor Rodríguez Bouza, from the University of Oviedo. Strong encouragement for future initiatives no doubt!

*CERN Bulletin*

## Behind the scenes of GS

### PRECIOUS STONES

Since the laying of the foundation stone for the Synchrocyclotron in June 1954, CERN has been expanding constantly to reach a current constructed surface area of 580,000 m<sup>2</sup> covered by some 650 buildings (just 125 of which account for 70% of this area).

This year, while CERN's 60th anniversary is an important milestone in the Laboratory's history, it also highlights another reality: CERN is a collection of ageing buildings, no less than 60% of which are more than 40 years old. "Of the 580,000 m<sup>2</sup> of buildings, around 52,000 m<sup>2</sup> are nearing the end of their useful life and 140,000 m<sup>2</sup> are in need of extensive renovations," says Natacha Lopez, GS-SE-PO Section Leader. "Of course, we've already started several renovation projects, but it's a huge challenge as we have to renovate buildings constructed in the 1960s and 70s while complying with modern standards, which are very different from those that were in force when they were built! As a result, we have to keep finding new ways to adapt our rules and modern techniques to suit our older infrastructure. That's without even taking into account the differences in the requirements

between Switzerland and France, which mean that the buildings on one side of the CERN site are different from those on the other side!"

Alongside its renovation, upkeep and maintenance activities, the GS-SE Group dedicates a large proportion of its resources to the construction of new buildings, including the eco-friendly Building 774, Building 107 and the ELENA building, which has just been inaugurated. "We're always receiving new building and extension requests," explains Michael Poehler, GS-SE-DOP Section Leader. "They concern buildings that house accelerators, experiments and workshops as well as office buildings. That said, we are facing a growing problem because of a shortage of land suitable for building on, in particular on the Meyrin site."

"We really expected the number of building requests to go down once the LHC had started running," recalls Luigi Scibile, Group Leader of GS-SE, which is responsible for civil engineering at CERN, "but our activity has remained constant. This is largely down to the growing number of Users. The Organization is a living organism and its members are very active! This leads to new experiments being created, each of which needs a home."

To sustain the fast pace of upkeep and maintenance work, renovations and numerous construction projects, the GS-SE Group relies on the expertise of 42 members of CERN personnel and almost 1,400 externally contracted professionals who work on the CERN worksites every day.

Anaïs Schaeffer

## Computer Security

### "HEARTBLEED" - A DISASTER FOR PRIVACY

"On a scale of 1 to 10, this is an 11," claimed the famous security expert Bruce Schneier. Indeed, the serious vulnerability dubbed "Heartbleed" affects everyone who relies on secure and private Internet communication. You cannot avoid it, so let's see how it affects you.

"Heartbleed" is the name that's been given to a vulnerability for OpenSSL (CVE-2014-0160). This software implements the Secure Socket Layer (SSL v2/v3) and Transport Layer Security (TLS) protocols as well as a full-strength general purpose cryptography library. SSL and TLS protocols are used to encrypt any communication between a client and a server, and to ensure that your communication is safe from eavesdropping or spying - that is, until 2012, when this bug was introduced. It allows the extraction of the first 64 kB from the memory of a server or client using OpenSSL (not necessarily web servers), and can potentially be used to reveal not only the content of a secured message, such as passwords over HTTPS, but the SSL keys themselves.

This has become a catastrophe as OpenSSL is widely used in many different applications, including Linux distributions, Netapp storage systems, Cisco or Juniper VPN appliances, HP management software... It comes as

no surprise that Facebook, Yahoo and even Google were concerned. CERN is no exception and, as CERN takes security very seriously, it is taking all the necessary measures to prevent potential exploitations of the "Heartbleed" vulnerability. Fortunately, LXPLUS, CERN Eduroam, the CERN mail service, the CERN Single Sign-On portal, most of the centrally managed web servers and all major CERN web applications (e.g. EDMS, EDH) were not affected. Similarly, EGI and OSG have launched their own emergency response procedures to ensure that the Grid infrastructure is kept safe.

So what can you do?

- Thanks to many of our colleagues at CERN - in the IT Department, in technical departments and in the LHC experiments - our server infrastructure is fine;
- As a preventive measure, you will have been asked to change the password of all your CERN accounts (you can do this

at <https://cern.ch/account>);

- If you run your own web/file/etc. server using a Linux operating system like CERN Scientific Linux 6, make sure you apply all pending patches as soon as possible (e.g. through "yum update"; SLC5 and Windows Server are OK);
- If you run Microsoft Windows, Apple Mac OS X/iOS or Linux on your office PC/laptop/tablet, and use a web browser like Chrome, Firefox or Internet Explorer, you should be fine on the client side. This also holds for your computers at home;
- If you are customer of external web services like Facebook, Google, Yahoo or others, check for their messages and consider changing your password with them. They all should have fixed any potential vulnerability by now.

Computer Security Team

## Ombuds' Corner

### LETTER FROM OMBUDSLAND

Early this month, over 400 Ombuds met in Denver for their annual conference and networking event. It was an excellent opportunity to meet colleagues from all over the world and to share best practices and benefit from an ongoing exchange of professional experience.

Twenty-seven countries were represented at the 2014 annual conference of the International Ombudsman Association. Participants came from the private sector as well as from various universities and organisations. Networking and exchanging experience with all the different colleagues was extremely interesting, in particular as there was also an opportunity to meet a few people who were amongst the pioneers in the field and had contributed significantly to developing the Ombuds' role and practices into the established professional body it is today.

The main focus of the conference was to review and underline the Ombuds' code of ethics and the common standards of practice, which are based on four basic principles, namely: confidentiality – everything that is discussed in the Ombuds' office remains confidential and is shared only with the express agreement of the persons concerned; informality – people should feel comfortable to come and speak about whatever concerns they may have because there are no rules about what can or cannot be discussed in the Ombuds' office and no records are kept; impartiality and neutrality – the Ombuds does not take sides or judge the concerns that are raised; and independence – the Ombuds does not belong to any specific department and reports directly to the Director-General, never sharing individual concerns but anonymously raising topics that appear to indicate symptoms or patterns that emerge so as to allow for appropriate action to be taken. These four principles were a constant

leitmotif throughout - underlying all the presentations during the conference and equally emphasised in informal discussions between talks and during the evening networking sessions.

Although the types of situations faced by other Ombuds and the ways they deal with them are very similar to our experience at CERN, there were clearly also some aspects that were specific to our Organization, in particular with regard to our multicultural context, together with our culture of informality. These combined aspects mean that, for example, interactions between colleagues at CERN tend to be less regulated or 'codified', and rather more free and spontaneous in nature. While this is of course to be preserved as a very enriching part of our diverse work environment, it is also often a source of the communication difficulties brought to the Ombuds that may otherwise have been swept under the carpet of codified behaviour in more formal and established social structures.

Another specificity of the role of the CERN Ombuds that emerged from the discussions was the fact that here we provide an informal conflict resolution resource for issues that arise from both the corporate and the academic work environments. This brings an enriching sort of variety to the role, which is quite distinct from that practised by the majority of participants at the conference.

Other sessions at the conference focussed on the many ways to manage different types of

situations and a practical 'toolbox' offering a variety of problem-solving approaches in order to help people to analyse their own situations and identify options for addressing them.

Throughout the conference, it was clear that Ombuds all over the world share the same code of ethics and standards of practice regardless of the country in which they operate or whether they work in a governmental, corporate or academic environment. Indeed, it was very interesting to spend these few days in Ombudsland and to discover a very active community that operates on shared principles and to note that CERN is recognised as an established member of this growing professional body.

**"Ombudsman offices exist for many reasons. Sometimes managers and employees do not know exactly why they feel concerned, but they need a safe place to go, to talk. Sometimes a person is concerned on someone else's behalf, and needs to have options in a delicate situation. Sometimes one sees a really good thing happening at work and would like to know how to commend it."**

Mary P. Rowe, ombudsperson, MIT, USA,  
pioneer in the field.

Sudeshna Datta-Cockerill

## Official news

### TAX DECLARATION: FOR THE ATTENTION OF MEMBERS OF THE PERSONNEL AND PENSIONERS LIVING IN FRANCE

For 2013, the average annual exchange rate is EUR 0.82 for CHF 1.

Human Resources Department

## Take note

### THE NEW GLOBE CAR PARK: FOR VISITORS AND THE CERN COMMUNITY

With twice as many parking spaces as the existing car park by the flagpoles and the same conditions of use, the new Globe car park will be open for use from Monday 5 May.

The new car park, which will be inaugurated on Monday 28 April by CERN's Director-General in the presence of officials representing the Canton of Geneva and the sub-prefecture of the Ain, will better cater to the needs of CERN's many visitors. The large number of spaces (around 100) reserved for P+R users will encourage the use of public transport, which will be particularly important at peak times.

From autumn 2014, the Globe car park will completely replace the flagpole car park, where the new *Esplanade des Particules* will be built.



The new Globe car park: the blue spaces are reserved for P+R pass holders.

## Seminars

### TUESDAY MAY 06, 2014

- 09:00 TH institutes **Questioning Fundamental Physical Principles**
- 11:00 EP Seminar **One Second After the Big Bang** Main Auditorium

### WEDNESDAY MAY 07, 2014

- 08:00 CERN Accelerator School **Power Converters 2014**
- 11:00 ISOLDE Seminar **Radiochemical separation of exotic radionuclides from accelerator waste for nuclear astrophysics experiments** 26-1-022
- 14:00 TH Theoretical Seminar **The Null Energy Condition, its violation and creation of a universe in the laboratory.** TH Conference Room

### THURSDAY MAY 08, 2014

- 11:00 Academic Training Lecture Regular Programme **Game Theory (1/2)** Main Auditorium
- 14:00 TH Exceptional Seminar **Quantisation and Infrared Regularisation of Nonabelian Gauge Fields beyond Perturbation Theory** TH Conference Room

### FRIDAY MAY 09, 2014

- 11:00 Academic Training Lecture Regular Programme **Game Theory (2/2)** Main Auditorium
- 15:00 Particle and Astro-Particle Physics Seminars **Fake hair for black holes** TH Conference Room

### TUESDAY MAY 13, 2014

- 14:00 TH String Theory Seminar **TBA**
- 14:00 Computing Seminar **The Cloud Legal Project** IT Amphitheatre

# Training

## SAFETY TRAINING : PLACES AVAILABLE IN MAY

There are places available in the forthcoming Safety courses. For updates and registrations, please refer to the Safety Training Catalogue.

*Safety Training, HSE Unit*

Title of the course EN	Title of the course FR	Date	Hours	Language
<b>Cryogenic Safety</b>				
Cryogenic Safety - Level 1	Sécurité Cryogénie - Niveau 1	08-May-14	10:00 - 12:00	English
Cryogenic Safety - Level 2	Sécurité Cryogénie - Niveau 2			
<b>Electrical Safety</b>				
Habilitation Electrique - Electrician Low and High Voltage - Refresher	Habilitation électrique - Électricien basse et haute tension - Recyclage	15-May-14 to 16-May-14	09:00 - 17:30	English
Habilitation Electrique - Non-Electrician - Initial	Habilitation électrique - Non-Electricien - Initial	12-May-14 to 13-May-14 15-May-14 to 16-May-14 22-May-14 to 23-May-14	09:00 - 17:30 09:00 - 17:30 09:00 - 17:30	English French English
Habilitation Electrique - Non-Electrician - Refresher	Habilitation électrique - Non-Electricien - Recyclage	14-May-14	09:00 - 17:30	English
Habilitation Electrique - Person making Tests in Labs or on Test-Stands - Initial	Habilitation électrique - Personnel réalisant des essais en laboratoire ou en plate-forme d'essai - Initial	19-May-14 to 21-May-14	09:00 - 17:30	English
<b>Fire</b>				
		06-May-14 07-May-14 14-May-14 14-May-14 21-May-14 23-May-14 28-May-14	08:30 - 10:00 10:30 - 12:00 10:30 - 12:00 14:30 - 16:00 14:00 - 15:30 08:30 - 10:00 14:00 - 15:30	French French French English English English English
Fire Extinguisher	Extincteur d'incendie			
<b>Lifting and Heights</b>				
Mobile Elevated Working Platform - Driving - Initial	Plate-forme élévatrice mobile de personnel - Conduite - Initial	12-May-14 to 13-May-14	08:30 - 17:30	French
Mobile Elevated Working Platform - Driving - Refresher	Plate-forme élévatrice mobile de personnel - Conduite - Recyclage	14-May-14	08:30 - 17:30	French
Overhead Crane - Operator and Slinger - Initial	Pontier-élingueur - Initial	19-May-14 to 20-May-14	08:30 - 17:30	French
<b>Non-ionizing Radiation</b>				
Laser - User	Laser - Utilisateur	09-May-14	08:30 - 12:30	English
<b>Oxygen Deficiency Hazard (ODH)</b>				
		05-May-14 06-May-14 12-May-14 13-May-14 19-May-14 20-May-14 26-May-14 27-May-14	14:00 - 15:30 10:30 - 12:00 14:00 - 15:30 10:30 - 12:00 14:00 - 15:30 10:30 - 12:00 14:00 - 15:30 10:30 - 12:00	English French English French English French English French
Self-Rescue Mask - Initial	Masque auto-sauveteur - Initial			
		01-May-14 06-May-14 08-May-14 13-May-14 15-May-14 20-May-14 22-May-14 27-May-14 29-May-14	10:30 - 12:00 10:30 - 12:00	English French English French English French English French English
Self-Rescue Mask - Refresher	Masque auto-sauveteur - Recyclage			
<b>Radiation Protection</b>				
Radiation Protection - Controlled Area - CERN Employees and Associates	Radioprotection - Zone contrôlée - Employés et associés CERN	06-May-14 14-May-14 26-May-14 27-May-14	09:00 - 17:00 09:00 - 17:00 09:00 - 17:00 09:00 - 17:00	English English French English
<b>Safety Representative</b>				
Safety in Projects	Sécurité dans les Projets	08-May-14	14:00 - 17:00	French
Territorial Safety Officer (TSO) - Initial	Délégué à la sécurité territoriale (TSO) - Initial	20-May-14 to 22-May-14	08:30 - 17:30	French

## TECHNICAL TRAINING: PLACES AVAILABLE

If you would like more information on a course, or have any other inquiry/suggestions, please contact **Technical. Training@cern.ch**.

*Eva Stern and Elise Romero,  
Technical Training Administration  
(Tel: 74924)*

	Language	Next Session	Duration	Availability
<b>Controls and data acquisition</b>				
LabVIEW Structures	English	22-Apr-14 to 23-Apr-14	2 days	2 places available
JCOP - Finite State Machines in the JCOP Framework	English	07-May-14 to 09-May-14	3 days	One more place available
FESA: New Features & Migration	English	09-mai-14	1 day	3 places available
LabVIEW for Experts	English	12-May-14 to 16-May-14	5 days	4 places available
FESA: Introduction	English	21-May-14 to 22-May-14	2 days	4 places available
LabVIEW for beginners	English	11-Jun-14 to 13-Jun-14	3 days	6 places available
<b>Electronic engineering</b>				
Introduction to VHDL	English	06-May-14 to 08-May-14	3 days	One more place available
Comprehensive VHDL for FPGA Design	English	23-Jun-14 to 27-Jun-14	5 days	9 places available
<b>Information technologies</b>				
JavaScript/jQuery/AJAX course	English	28-Apr-14 to 30-Apr-14	3 days	One more place available
CERN openlab Workshop on Numerical Computing	English	05-May-14 to 06-May-14	16 hours	27 places available
Agile Project Management with Scrum	English	06-May-14 to 07-May-14	2 days	No more places available
Introduction to Drools	English	07-May-14 to 09-May-14	3 days	10 places available
CERN openlab / Intel Parallelism, Compiler and Performance Workshop	English	12-May-14 to 14-May-14	3 days	11 places available
Drupal in a Day	English	19-mai-14	8 hours	5 places available
Core Spring	English	19-May-14 to 22-May-14	4 days	3 places available
JAVA - Level 1	English	02-Jun-14 to 04-Jun-14	24 hours	5 places available
ITIL Foundations (version 3)	English	04-Jun-14 to 06-Jun-14	3 days	8 places available
Agile Infrastructure & Puppet for Service Managers: getting started	English	11-juin-14	1 day	One more place available
Python: Advanced Hands-On	English	16-Jun-14 to 19-Jun-14	4 days	2 places available
Developing secure software	English	23-juin-14	3.5 hours	27 places available
Python - Hands-on Introduction	English	23-Jun-14 to 26-Jun-14	4 days	2 places available
Oracle Certified Professional	English	30-Jun-14 to 04-Jul-14	5 days	11 places available
<b>Mechanical engineering</b>				
ANSYS Workbench advanced	English	13-May-14 to 16-May-14	4 days	4 places available
CATIA-Smartteam Basics	French	19-May-14 to 20-Jun-14	10 days	5 places available
CATIA V5 – Surface	French	26-May-14 to 27-May-14	2 days	6 places available
SmarTeam - CATIA data manager at CERN	French	04-Jun-14 to 06-Jun-14	3 days	8 places available
ANSYS CFX	English	10-Jun-14 to 13-Jun-14	4 days	2 places available
Sécurité Fonctionnelle	French	12-Jun-14 to 13-Jun-14	16 hours	5 places available
Geometrical Dimensioning and Tolerancing according to ISO standards at CERN	French	24-Jun-14 to 26-Jun-14	3 days	4 places available
<b>Physics</b>				
Demonstrating Reliability with Accelerated Testing	English	13-May-14 to 14-May-14	2 days	14 places available
CST PARTICLE STUDIO	English	27-May-14 to 28-May-14	2 days	4 places available
<b>Software packages</b>				
Lync – click to call and collaborate with others	English	29-avr-14	1 hour	55 places available
EXCEL 2010 - Level 2: ECDL	French	12-May-14 to 13-May-14	2 days	2 places available
Powerpoint 2010 - Level 2 - ECDL	French	15-May-14 to 16-May-14	2 days	6 places available
Drupal Site Editing: Beginners	French	19-May-14 to 20-May-14	2 days	No more places available
Word: Perfectionnement et charte graphique CERN	French	23-mai-14	1 day	7 places available
Vidyo - Hands on Overview	English	10-juin-14	3 hours	4 places available
Drupal Site Editing: Advanced	French	10-Jun-14 to 11-Jun-14	2 days	6 places available
PowerPoint 2010 - Level 1: ECDL	French	12-Jun-14 to 13-Jun-14	2 days	6 places available
EXCEL 2010 - level 1 : ECDL	French	16-Jun-14 to 17-Jun-14	2 days	7 places available
Sharepoint Collaboration Workspace - Level 1	French	19-Jun-14 to 20-Jun-14	2 days	3 places available