CERN Bulletin

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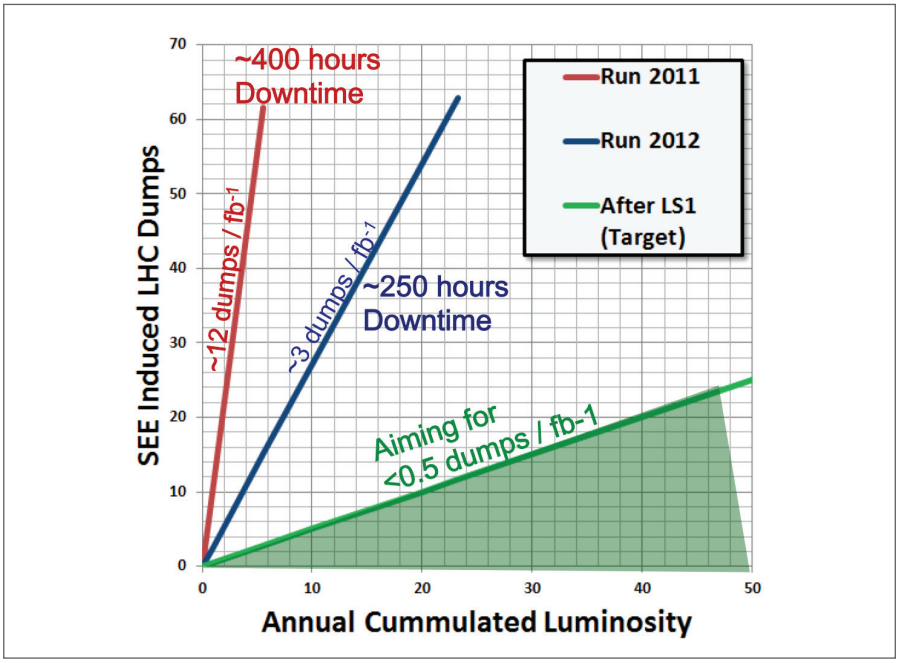
R2E – identifying problems, mitigating risks



The graph plots the rate of LHC beam dumps due to single-event effects against beam luminosity. An indication of the challenge that faces the R2E project teams during LS1!

During LS1, the R2E project team will be working on a task as painstaking as it is crucial: to achieve a sixfold reduction in the number of electronic malfunctions caused by radiation. On their success depends the ability of the accelerator to function correctly at nominal energy. No mean challenge, considering it comes on top of the tenfold reduction already achieved since 2009.

The origins of the project known as R2E (Radiation to Electronics) go back to 2007, when the CNGS (CERN Neutrinos to Gran Sasso) experiment was being commissioned. "Right from the outset, some CNGS control systems were causing problems. They would regularly break down in operations with beam," recalls Markus Brugger, head of the R2E project. "Even though the beam intensity was very low, we began to suspect that radiation was behind the problem." Their suspicion was soon borne out: the electronics turned out to be vulnerable to disruption caused by the impact of individual energetic particles, which can cause logic errors and other single-event effects*. For CNGS the problem was solved by installing thick radiation shields in situ and moving all of the control systems into a protected area; but it highlighted a potential issue for the

(Continued on page 2)

Multiplying dimensions

A few weeks ago, I had a vague notion of what TED was, and how it worked, but now I'm a confirmed fan. It was my privilege to host CERN's first TEDx event last Friday, and I can honestly say that I can't remember a time when I was exposed to so much brilliance in such a short time.

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In this issue

News

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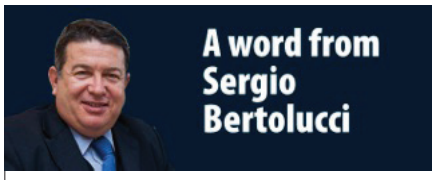


(Continued from page 1)

Multiplying dimensions

TEDxCERN was designed to give a platform to science. That's why we called it Multiplying Dimensions – a nod towards the work we do here, while pointing to the broader importance of science in society. We had talks ranging from the most subtle pondering on the nature of consciousness to an eighteen year old researcher urging us to be patient, and to learn from our mistakes. We had musical interludes that included encounters between the choirs of local schools and will.i.am, between an Israeli pianist and an Iranian percussionist, and between Grand Opera and high humour. And although I opened the event by announcing it as a day off from physics, we had a quite brilliant talk from our own Gian Giudice on what can be learned from a single number, and a series of animations on physics-related themes prepared in collaboration with TED Ed.

TEDxCERN was a brilliant event, and its impact will go far beyond last Friday. Over the coming weeks, videos of all the talks will be posted on our website, and, we hope, some may make it to the main TED website, which recently celebrated its billionth video viewing.

Another thing that impressed me about TEDxCERN was the quality of the event, which I know was run by a core team and a lot of volunteers. You did a fantastic job. You can be very proud of yourselves, and I'd like to thank you for helping us multiply the dimensions through which CERN connects science to society. I, for one, am already looking forward to the next TEDxCERN!

Sergio Bertolucci, CERN's Director for Research and Computing

R2E – identifying problems, mitigating risks

(Continued from page 1)

LHC, scheduled to enter operation one year later.

"Most of the equipment installed in the LHC tunnel was designed with sufficient radiation hardness built in, so theoretically they should not have been affected," notes Markus Brugger. "But the same was not true for off-the-shelf equipment installed in the shielded areas located near the tunnel; it remained vulnerable, despite the shielding." But how was the vulnerable equipment to be identified? A detailed inventory was drawn up in 2008 and 2009. At the same time, testing began of the instrumentation that was at risk. This was done in a test area set up next to the CNGS experiment, which had an environment similar to that of the LHC, and at the Paul Scherrer Institute (PSI). In 2010, for practical reasons, a dedicated test area called H4irrad was finally set up on the H4 beam line in the North Area. It in turn will soon be replaced by a bigger facility, currently under construction on the site of the old DIRAC experiment. It should come into operation in mid-2014.

The purpose of the equipment testing is to identify critical components so that they can be replaced, improving the radiation hardness of the hardware and ensuring that all of the electronics installed in the accelerator chain and exposed to radiation will operate correctly. The R2E project team has been working on this for more than three years, in close collaboration with all of the groups responsible for LHC equipment and with the invaluable assistance of the service groups.

So what can be done when an item is at risk but there is no way of improving its characteristics? "In that case, you have three possibilities," explains Markus Brugger. "You can build new, more heavily shielded caverns, but you don't always have the time or the resources to do this. You can provide additional shielding in the existing protected areas. Or you can move the equipment further away." In the time since LHC start-up, several relocation and shielding campaigns have already been conducted. In parallel, the Radiation Working Group performs post-mortems on all failures with beam loss, in order to determine which ones are due to radiation. "The major relocation and shielding work that was done in the framework of the R2E project was only possible thanks to the energetic assistance of the groups in charge of the LHC machinery and the EN/EL, EN/CV, EN/HE and EN/MEF groups, among others," says Anne-Laure Perrot, in charge of integration of the R2E mitigation measures in the underground installation of the LHC. "I want to thank them all for the excellent work done."

Anaïs Schaeffer

**The phenomenon of single-event effects is a stochastic one, affecting electronics in a random way.*

The R2E project in numbers

During LS1, 15 equipment and service groups will be working at Points 1, 5, 7 and 8, where more than 100 control and power racks will have to be moved. In addition, the shielding in the RR service caverns at Points 1 and 5 will be reinforced. In the LHC tunnel, the electronics that are most vulnerable to single-event effects are those used in power converters, cryogenics and the QPS (Quench Protection System). To make the QPS more robust, more than 1000 circuit cards will be replaced during LS1. The R2E work is expected to take slightly more than 60 weeks.

Please use the emergency exit

In order to minimise the consequences of an incident like the one that occurred in 2008, the LHC has been fitted with safety valves. A total of 1,344 of these valves, whose function is to release the helium in the event of over-pressure, will be in place by the end of LS1.

Let's go back five years. It's 2008 and an electrical incident has just caused a helium leak in LHC Sector 3-4. 30-tonne magnets moved half a metre as a result of the over-pressure. What did the ensuing investigation find? A defective electrical connection between two magnets caused a short-circuit, provoking an electrical arc, which in turn led to a leakage of liquid helium into the insulation vacuum of the cryostats containing the magnet cold masses. While helium is liquid at a temperature of 1.9 K (inside the magnets), it becomes gaseous as soon as the temperature exceeds 4.2 K (outside the magnets), which means that its volume increases by a factor of more than 700 inside the cryostats, which, without a valve, are as airtight as a pressure cooker.

That's where the new valves, the DN200s, come into play. In the event of a helium leak into the insulation vacuum, the gas will be able to escape through these "emergency exits," thereby reducing the over-pressure. "With one safety valve for each dipole, the LHC will eventually be equipped with 1,344 valves," explains Anna Chrul, deputy leader of the Alfa & Omega team. "More than half of them were installed after the incident in 2008, and from 21 May this year, we will go on to install the remaining 612. To do this, we are working in collaboration with seven technicians from the JINR Institute in Dubna (Russia) who have come to lend us a hand."

Vacuum leak tests are performed on the magnets before the LHC is brought up to ambient temperature.

The teams begin the valve installation by opening the W sleeve – the external bellows that enclose the interconnections. The thermal shield just beneath the sleeve remains in place during this operation, thus protecting the electrical connections and the internal bellows. "Once the external sleeve is open, we insert a flame-retardant covering between the cryostat – in which we must bore a hole – and the layers underneath, which could ignite during the welding process," adds Andrea Musso, Alfa & Omega team leader. "Then we slide a magnetic plate under the area to be drilled. This is to catch the metal swarf and dust produced during boring, ensuring that it doesn't get into the machine." Using a circular cutting machine specially designed at CERN, the technicians, who are trained and supervised by DN200 activity leader Manuel Gomes De Faria, then cut out a hole 20 cm in diameter, to a precision of one tenth of a millimetre. The valve, a stainless steel flange with a lid, is then welded in place. With 30 valves to install per week, Musso's team is going to have a heavy workload.

After the flange is in place, the welding points are cleaned with a stainless steel brush.

Anaïs Schaeffer

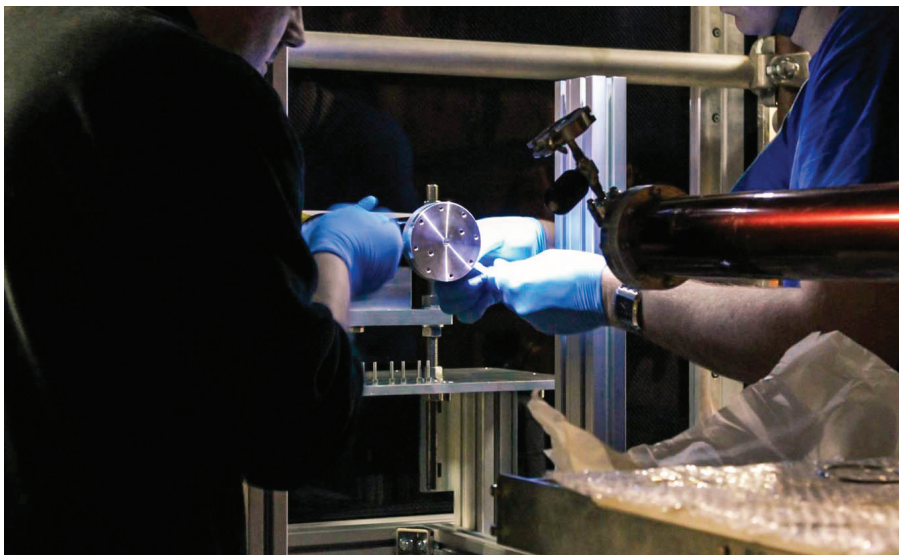
Filling the vacuum at LHCb

Last month, the Vacuum, Surfaces and Coatings (VSC) group was tasked with an unusually delicate operation in the LHCb experiment cavern: removing the LHC beam pipe while keeping the sensitive Vertex Locator vacuum vessel (VELO) completely isolated from the action.

LHCb's VELO detector is one of the crown jewels of the experiment. With detector elements surrounded by a vacuum, it gets as close as 5 cm from the beam. Fantastic for physics, but difficult for all-important access. "Because of the sensitivity of the VELO detector and its proximity to the beam, the collaboration decided not to bake (see box) its portion of the beam pipe," says Giulia Lanza (TE-VSC-LBV), the expert in charge of the beam vacuum operation. "Our group was therefore asked to remove the rest of the LHC beam pipe while keeping the VELO portion of the pipe completely isolated. This work was carried out by members of VSC-LBV and VSC-EIV, under the supervision of Cedric Garion." By removing the beam pipe, LHCb engineers have more space to work on LS1 activities. It also gave the VSC group an opportunity to replace one of the vacuum chambers – which, although leak tight, does not conform to design specifications – and to replace the supports of the vacuum chambers.

To remove the beam pipe, the VSC team used a special procedure in which neon is flushed into the beam pipe. The gas allows the team to divide the beam pipe into two parts, minimising air exposure. Also, as neon is a noble gas, it can be left in the pipe without affecting its special coating (see box). Once pressurised with neon gas, the VELO is simply sealed off with a flange.

But with the beam pipe separated from the VELO detectors by just a simple sheet of thin aluminium foil, even the slightest change in pressure can cause serious damage. "If there is a pressure imbalance between the beam pipe and the VELO detector vacuum, the thin foil can break," says Giulia. "To avoid this, we kept the pressure difference as low as 4 mbar and flushed neon into both the beam pipe and the vacuum chamber of the VELO detectors, maintaining the balance of pressure on both sides." Because of the VELO's unique construction, the VSC team had a VELO expert, Eddy Jans from NIKHEF, on hand to ensure the process went smoothly.



The VSC group seal off the VELO beam pipe with a flange. Image: Gloria Corti.

The neon-filled VELO will remain in place for the rest of the long shutdown. "We will keep it at atmospheric pressure while work continues nearby," concludes Giulia. "However, we will bring it back under vacuum as soon as we can, as this will be better for the integrity of the beam pipe once the machine is back in operation."

Katarina Anthony

Baking the NEG

The LHC beam pipe is lined with a non-evaporable getter coating (NEG) which acts as a distributed vacuum pump, allowing the LHC to reach that ultra-high vacuum level. To activate the NEG, the beam pipe is heated to 250°C in a process known as "baking". The sections of the LHC beam pipe removed in this latest operation will be baked before they are re-installed at the end of LS1.

Collider – the LHC in London

In November the London Science Museum will open a major new exhibition about the LHC. The project marks an ambitious new approach for the museum who will work with an eclectic design team that includes a video artist and a playwright. Both Olivier Award winners, they are more renowned for their work on stage and screen than inside museums.

The Science Museum team came to Geneva expecting to be blown away by the extraordinary physics and engineering at CERN and they weren't disappointed. But what impressed them most was the people who made it all happen. Physicists of all kinds, restaurant staff, engineers, administrators, those working in transport and logistics, all had in common a passion for CERN and an enthusiasm for communicating their work. "What really struck us was how every single person mentioned the spirit of international collaboration and the importance of curiosity," Alison Boyle told the Bulletin. Curator of Modern Physics and Astronomy, Alison leads the team creating the new exhibition.

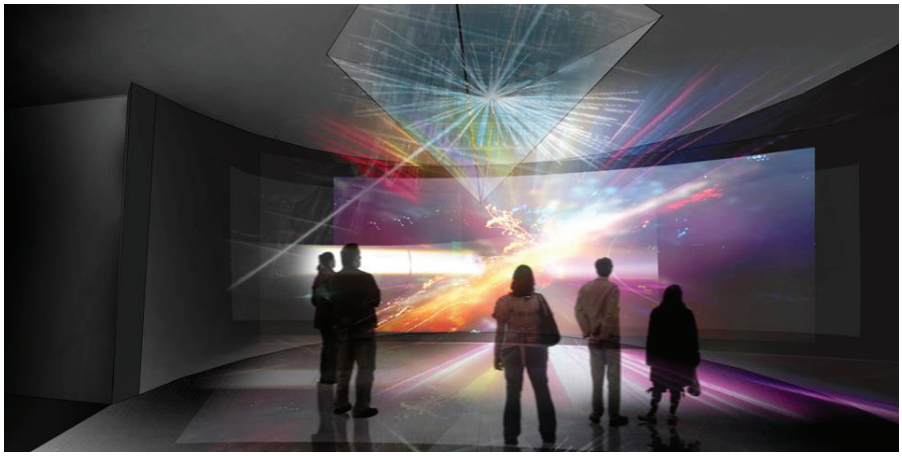


Image courtesy of Science Museum / Nissen Richards Studio.

The museum's first visit to CERN was a fantastic surprise. But how to convey this sense of excitement of being part of the adventure? The museum's answer was to choose a design team that focused strongly on drama so that they could re-create the experience of a visit to CERN. Indeed, key elements of the new exhibition will be based on scripted dramas written by the playwright Michael Wynne taking place in recreations of CERN locations by the video artist Finn Ross. Exhibition locations will include the CCC, the Main Auditorium, the LHC tunnel and one of the LHC experiments - immersive spaces for the visitor to explore and discover personal accounts from the people who work there.

"The Collider exhibition is a really important part of the Museum's ambitions to put cutting-edge science on the cultural agenda," says Alison. "Particle physics is a tough subject for museums - the scientific concepts are way beyond most visitors' prior knowledge, and the technology is unfamiliar and often baffling at first glance. The LHC's extremes of scale - from the enormous machinery to the subatomic world - are not very suited to being displayed in glass showcases!" There will of course be objects, both from the Museum's collections and also from CERN and experiments. From the inevitable LHC magnets to the more personal, such as Roberto Saban's bicycle that has many a story attached to its travels in the LHC tunnel.

Harry Cliff, a Cambridge LHCb physicist who has been specially appointed as the Museum's Fellow of Modern Physics to lead the exhibition content, has enjoyed the experience. "It's been a thoroughly rewarding process and I'm constantly reminded just how exciting the work being done at CERN really is by the enthusiasm that the exhibition team of non-physicists has for the subject, which can be easy to forget when you've just spent two days debugging some piece of ROOT code," he says. "It's probably fair to say that I've learnt as much about CERN and the LHC as I have about museums. I've been really fortunate to meet people from across the lab who I would never normally have encountered by working on LHCb. In fact, the project would never have got off the ground without the help of the many physicists, engineers and other CERN staff who have been so generous with their time in helping us bring the LHC to the Science Museum." This sentiment is echoed by Alison: "everyone at CERN has been incredibly enthusiastic and helpful - from finding us objects and digital data, to helping to transport the objects to London, giving up time for interviews and filming, explaining how everything works and, most importantly, sharing the behind-the-scenes stories that will bring the LHC to life for our visitors."

This investment will benefit CERN's own exhibition projects, with the renovation of Microcosm on the cards for 2014. All new film footage taken for the exhibition will be available for use at CERN, as will any content developed by the museum.

Collider will open on 13 November 2013 at the Science Museum in London. The exhibition will run for six months before travelling to other venues around the world. There will be free entry for all CERN badge holders.

Emma Sanders

The success of the 11-Tesla project and its potential beyond particle physics

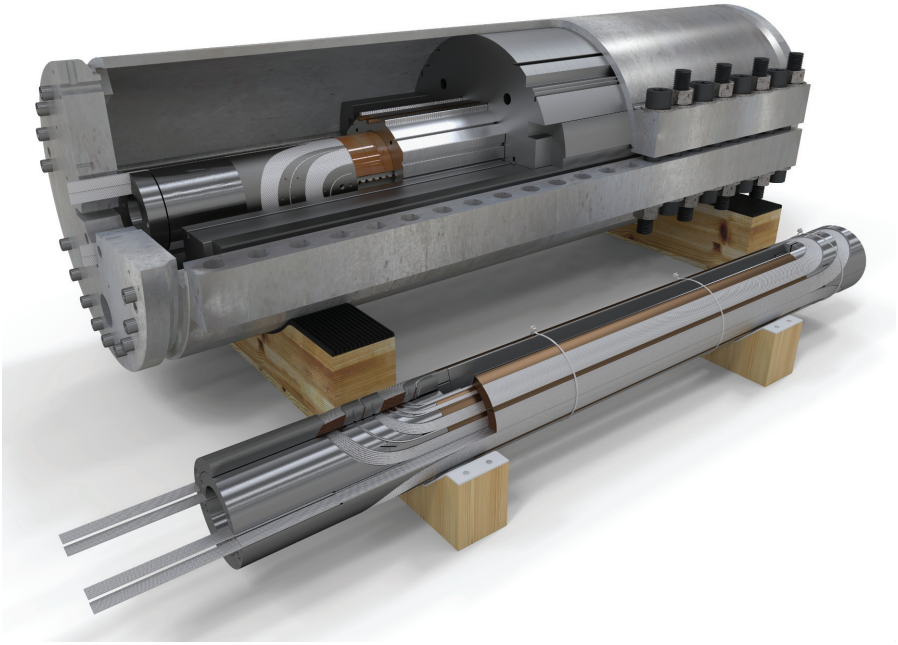
On 7 March, the 1-metre-long single-aperture dipole model magnet under testing at Fermilab reached a current of 12.54 kA corresponding to a bore field of 11.5 Tesla, thus surpassing the goal set for the 11 T dipole project.

The 11-Tesla dipole project originated from a proposal made by High Luminosity LHC project coordinator, Lucio Rossi, in September 2010. To cope with the increasing amount of debris hitting the magnets when increasing the number of collisions produced by the LHC, he suggested replacing a few 8-Tesla dipole magnets in the LHC tunnel with shorter, stronger 11-Tesla magnets in order to create enough space to install additional collimators. The only way to achieve this goal is to use advanced niobium-tin technology.

Rossi's proposal aligned well with the goals of Fermilab's High-Field Magnet R&D programme, which aims to develop collared magnets with fields in excess of 10 Tesla for use in future machines such as the Muon Collider or the Very Large Hadron Collider. The two laboratories quickly established a collaborative effort under the umbrella of the High Luminosity LHC project and jointly designed and developed the magnet concept based on collared cos-theta coils. The goal of the on-going first phase of the 11 T dipole model programme is to demonstrate the quench performance with short (1-2 m) single-aperture magnets. The second phase will address the "accelerator-quality" design in twin-aperture configuration, first with 1-2 m model magnets then with a full 5.5-m-long prototype dipole compatible with the LHC's main systems.

The magnet is the second single-aperture model magnet constructed at Fermilab. An important issue concerning long-term stability needs to be addressed by a third prototype, which is under construction by the Fermilab team. However, this recent test shows accelerator quality potential: for example this was the first accelerator magnet with a cored cable (core drastically reduces eddy current during ramping, thus reducing ramp dependence) and a relatively small filament size (36 mm).

The design and manufacturing of the first 2-m-long model magnet is also progressing well at CERN. While relying on the coil technology developed at Fermilab, the CERN team is striving to accommodate interesting alternative design features: cable insulation made by braiding S2-glass on mica-glass tape, inter-layer quench heaters, and a new collaring concept for pre-loading the brittle niobium-tin coils. "We are currently in the final stage of commissioning the coil production tooling and, provided the results of the first practice coils are satisfactory, we expect to test our first single-aperture magnet around September this year," says Mikko Karppinen, 11 T project leader at CERN.



Computer generated model of the FNAL 1 metre 11 T dipole model magnet and a pair of CERN coils. Image: courtesy of Don Mitchell, FNAL.

Exceeding the 10-Tesla barrier with the relatively new niobium-tin technology can allow scientists to plan hadron colliders that could reach 100 TeV centre-of-mass energies, about seven times more than the design energy of the LHC.

Another advantage is that the niobium-tin technology will have applications beyond particle physics as well. As Giorgio Apollinari, head of Femilab's Technical Division says, "Hospitals will rely on niobium-tin-equipped MRI systems, which will provide more detailed images due to the higher magnetic fields achieved by these magnets, leading to improved medical diagnoses."

CERN Bulletin

Ombuds' Corner
Le coin de l'Ombuds

Ethics - first speak to yourself

Good ethics start with you. It is similar to the CERN Code of Conduct: such a code is not designed to remind us to be in agreement with its values, but rather it is intended to remind us that we should first apply it to ourselves. Why is this in our interest?

Let us contemplate, for example, someone who does not demonstrate fairness, does not respect differences or offends others. How can such a person sincerely live with oneself? For every one of us it is very important, would that only be for ourselves alone, to create in our mind an environment in which we can live with ourselves according to the highest human values. Certainly integrity, sincerity, openness, empathy and respect are among such values. Let us then try to be crystal clear with ourselves. That way we will behave the same way with others, and respect them as much as we respect ourselves.

As Lao Tzu once said, "When you are content to be simply yourself and do not compare or compete, everyone will respect you."

For a change, and for fun, let me share with you a Zen tale:

Once upon a time, a shepherd took his flock to the river in order for them to drink some fresh and clean water. When he approached the river, he noticed upstream a man washing up his ears in the flow. "What are you doing?" yelled the shepherd. The man answered: "I just heard some unfair and malicious words which messed my mind up. So I am washing my ears to get rid of them. I do not want to keep them." "Oh! Thank you for letting me know," answered the shepherd. "In such conditions I will bring my sheep somewhere else to quench their thirst, as I really do not want them to drink such dirty water." And he went away.

Clear, is it not? If we want everyone to work in a respectful workplace, we should start by applying elevated ethics to ourselves and act accordingly. As it is quite improbable that we can change the behaviour of other people, the best strategy is for everyone to make a U-turn and take a look at themselves first.

Conclusion:

As much as everyone does their best in order to guarantee the success of the Organization - be it scientific, engineering, financial, environmental, safety, human resources, etc. - we should also guarantee mutual respect and good ethics in this Organization by looking first at ourselves, and not waiting for the others to do the same.

Vincent Vuillemin

Computer Security
Sécurité informatique

Bad (Re)Presentations

This time, we would like to address copyright violations (again) - but with a twist. While previous articles focussed on "Music, videos and the risk for CERN" or on software licences, the focus is now on using photos, music and images "found" on the Web for presentations, publications and web pages…

Just recently, a video produced for CERN and published on YouTube and Facebook used background music from a contemporary popular artist. However, the people responsible failed to obtain the appropriate permission to actually use that music. They thought that having bought it on iTunes was sufficient. But it was not: "buying" means you have the right to listen, but not the right for further distribution or re-publication. As a result, the videos were pulled from YouTube and Facebook.

Similarly, how many of us integrate graphics and images "found" on the Web into our presentations? How many of us enhance our web pages with photos by third parties or use third party fonts? Should we? Graphics, images, photos and music files published on the Web still have an owner who can claim copyright fees when his or her work is re-used. That this material is accessible to you does not mean you have the right to copy and reuse it. This is the case for the aforementioned background music and for "shareware", which can be used on trial but must eventually be paid for. Only "freeware" is really free. It can be quite embarrassing for you, and for the Organization, to be caught violating copyright. Not to mention the legal consequences which might follow.

In order to be sure, check if you do have the proper rights to use the material. If you do not, there are plenty of photo repositories (such as BigStockPhoto.com or iStockPhoto.com) where you can buy images, graphics and photos. It is just an investment of a few francs to be on the safe side. If you are really keen on using a particular photo, image or graphic, contact its author/owner for permission. At the very least, refer to the URL as the image source and for kudos. Reusing music, however, in web pages or publications is more difficult. We usually suggest avoiding this unless you are sure that the music is in the public domain and can be freely used.

In addition, you are reminded that violating copyrights can put the reputation of the Organization at risk and thus constitutes a violation of the CERN Computing Rules. Please refrain from sharing music or videos purchased for your personal use. You do not usually have the right for further distribution. Respect licence conditions and copyrights of software packages, in particular those of software provided for professional use at CERN. And finally, take care when re-using photos and images "found" on the Web in presentations or on Web pages. There might be a usage fee attached to them.

For further information, please check our website or contact us at **Computer.Security@cern.ch**.

Computer Security Team

Gate E to the Meyrin site - Reminder

International agreements have been concluded between CERN, Switzerland and France concerning Gate E («Charles de Gaulle Gate») aimed at reducing congestion at the Prévessin–RN84 and Route de Meyrin customs posts.

On the basis of these agreements, the Director-General has issued Rules for the use of Gate E (see this document, available on the Relations with the Host States website), which includes the following provisions:

a) Gate E is open from Monday to Friday, except on official CERN holidays, from 7.00 a.m. to 9.30 a.m. for access to the site, and from 4.30 p.m. to 7.00 p.m. for departure from the site.

b) The following persons are authorised to use Gate E:

– members of the CERN personnel (who may be accompanied by any of their children attending the CERN nursery school),
– members of contractors' personnel working on the CERN site.
These persons must be in possession of the following three documents:

- their CERN access card of the Blue "C" type or Red "E" type proving that they are authorised to use Gate E,
- their national identity card, if accepted by French and Swiss regulations, or their passport (with visa if required by the French and/or Swiss regulations),
- their French residence permit if they live on French territory and are not nationals of Switzerland or a Member State of the European Union (e.g. a special French AT, FI or CD card issued by the French Ministry of Foreign and European Affairs).

c) All persons using Gate E must present their CERN access card to the Guard on duty without being prompted, and wait until he specifically authorises them to pass.

d) Only personal effects that are not subject to a customs declaration may be transported (cf. websites of the Swiss and French customs, e.g. here).

e) Persons are authorised to use Gate E exclusively for the purposes of travelling to work on the Meyrin Site from French territory and vice versa (it is strictly forbidden to use Gate E in order to gain access to the territories of the Host States outside the boundaries of the CERN site).

Relations with the Host States Service
http://www.cern.ch/relations/
relations.secretariat@cern.ch
Tel.: 72848

Taxation in France | Memorandum concerning the annual internal taxation certificate and the declaration of income for 2012

You are reminded that the Organization levies an internal tax on the financial and family benefits it pays to the members of the personnel (see Chapter V, Section 2 of the Staff Rules and Regulations) and that the members of the personnel are exempt from external taxation on salaries and emoluments paid by CERN.

I - Annual internal taxation certificate for 2012

The annual certificate of internal taxation for 2012, issued by the Finance, Procurement and Knowledge Transfer Department, is available since 15 February 2013. **It is intended exclusively for the tax authorities**.

1. If you are currently a member of the CERN personnel you received an e-mail containing a link to your annual certificate, which you can print out if necessary.

2. If you are no longer a member of the CERN personnel or are unable to access your annual certificate as indicated above, you will find information explaining how to obtain one at this link.

In case of difficulty in obtaining your annual certificate, send an e-mail explaining the problem to helpdesk@cern.ch.

II - 2012 income tax declaration form in France

The 2012 income tax declaration form must be completed in accordance with the indications available at the following address: **https://cern.ch/admin-eguide/Impots/proc_impot_decl-fr.asp.**

IF YOU HAVE ANY SPECIFIC QUESTIONS, PLEASE CONTACT YOUR TAX OFFICE DIRECTLY

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

HR Department
Contact: 73903

Tax declaration: for the attention of members of the personnel and pensioners living in France

Exchange rate for 2012
For 2012, the average annual exchange rate is EUR 0.83 for CHF 1.

Human Resources Department

Take note

Globe Event | Lecture by Hervé Dessimoz and Thomas Büchi | 14 May

At the summit of Sustainable Development, by Hervé Dessimoz and Thomas Büchi.

Globe de la science et de l'innovation
Route de Meyrin, 1211 Genève
Tuesday 14 May 2013 at 8:30 p.m.
The lecture will be in French

Hervé Dessimoz and Thomas Büchi have been committed to sustainable development since the 2000s. They created the Palais de l'Équilibre at Expo.02.

They designed an exhibition in conjunction with the Cité de la Science et de l'Industrie (Paris) to educate visitors about sustainable development.

The pavilion was donated to CERN by the Swiss Confederation and rebuilt on the CERN site in 2004. It is now known as the Globe of Science and Innovation.

The Refuge du Goûter, on the slopes of Mont Blanc, is the culmination of their research into sustainable development, with the aim of demonstrating that if we can construct a building at 3835 m which is autonomous in terms of its operating energy requirements, there are no longer any excuses for not doing so at lower altitudes.

The *Fédération française des clubs alpins de montagne* has contracted the project.

Hervé Dessimoz: EPFL SIA architect, CEO of Groupe H.
Thomas Büchi: Wood engineer, CEO of Charpente Concept.

» Suitable for all audiences - Entrance free
» Seating is limited - Booking is essential
» Booking: +41 22 767 76 76 or cern.reception@cern.ch

Globe Info

Université de Genève | Séminaire de physique corpusculaire | 15 May

Thorium or Uranium fuel cycle for advanced nuclear reactors ? Fuel recycling, multi-recycling, breeding and burning, Dr Jiri Krepel, Paul Scherrer Institut (PSI).

Wednesday 15 May, 11:15 a.m.
Science III, Auditoire 1S081
30, quai Ernest-Ansermet, 1211 Genève 4

Abstract: The Thorium fuel cycle provides several advantages, which make it very attractive; e.g. lower waste production and possibly improved reactor safety. However, there are also some drawbacks if compared with the Uranium cycle. The seminar will provide an overview of the basic physical features of both the Thorium and the Uranium fuel cycles and comparison of their performance (criticality, breeding gain) and safety-related parameters (Doppler effect, coolant density effect), with respect to fuel recycling, multi-recycling, breeding and burning.

Organised by Prof. Teresa.Montaruli@unige.ch and Prof. Giuseppe.Iacobucci@unige.ch.

Globe Event | Lecture by Cédric Villani | 21 May

La naissance des idées - réflexions sur la nature et l'histoire de la mathématique et de la physique, by Cédric Villani.

Globe de la science et de l'innovation
Route de Meyrin, 1211 Genève
Tuesday 21 May 2013 at 6:00 p.m.
The lecture will be in French - Interpreting available in English

In this lecture, Cédric Villani will explain what he considers to be the necessary "ingredients" for the birth of new ideas. Clearly a good brain is an essential factor, but that alone is not enough. The researcher must also have access to a wealth of literature, which is now greatly facilitated by the Internet. Motivation is another key component, although we do not really understand what incites it. Intellectual environment and constraints also drive creativity, as do perseverance and chance. An interesting idea has little chance of making a breakthrough without a combination of intuition and hard work and without many false starts.

In this connection, he quotes Henri Poincaré's view that "thought is only a flash in the middle of a long night, but this flash is everything."

To illustrate his ideas, Villani will reflect on the nature and history of mathematics and physics during his lecture.

Cédric Villani is a world-renowned mathematician, a pre-eminent specialist in equations in the kinetic theory of gases and plasmas and in optimal transportation. In 2010, he received the Fields Medal, which is the most prestigious award in mathematics. Between 2000 and 2009, he held professorial posts at Atlanta, Berkeley, Princeton and the École normale supérieure de Lyon and is currently a professor at the Université de Lyon and the director of the Institut Henri Poincaré in Paris. In 2012, he published a book entitled "Théorème vivant". As a populariser of science, Villani draws on his enthusiasm and humour to convey his passion for his subject.

This evening is organised by the Groupement des français du CERN (GFC) and forms part of the year's programme of events for the general public that CERN makes available in the Globe.

» No specialist knowledge required
» Suitable for all audiences - Entrance free
» Limited number of seats - registration is essential
» Reservation: +41 22 767 76 76 ou cern.reception@cern.ch

Globe Info

Official CERN holidays | Restaurant opening hours

Please note that the CERN Restaurants will have the following opening hours during the upcoming holidays:

- Restaurant #1 will be open from 7 a.m. to 11 p.m. on Wednesday 1 May, Thursday 9 May (Ascension Thursday) and Monday 20 May (Pentecost) - on Friday 10 May the restaurant will be open at the usual times.
- Restaurant #2 will be closed over the 3 official CERN holidays, but will be open on Friday 10 May at the usual times (brasserie will be closed).
- Restaurant #3 will be closed over the 3 official CERN holidays, as well as Friday 10 May.

Take note

Conference | From Newton to Hawking and beyond | 28 May

From Newton to Hawking and beyond: Why disability equality is relevant to the world of particle physics, Dr Tom Shakespeare.

Tuesday, 28 May 2013 - 11.30 am - 1 pm
Main Auditorium – Room 500-1-001

Conference organised by the CERN Diversity Programme
English with French interpretation

According to the recent world report on disability, 15% of the world's population is disabled. Among that group could be numbered famous physicists such as Isaac Newton and Paul Dirac, neither of whom could be classed as "neuro-typical", and Stephen Hawking. This presentation will provide some basic data about global disability, and the socially imposed barriers which disabled people face. It will also include some stories about high achieving people with disabilities. Finally, some practical suggestions will be offered on how to respect and include people with disabilities in the workplace.

Tom Shakespeare is a social scientist and ethicist with 25 years' experience with the disability movement, including time working in disability arts and delivering disability equality training. He has published and broadcast widely, and authors a popular blog on disability history at disabledlives.blogspot.com, as well as the monthly column Die Andere Sicht in NZZ Folio magazine. Between 2008 and 2013, Tom worked in the Disability and Rehabilitation team at the World Health Organization, Geneva. He currently teaches medical sociology at the University of East Anglia Medical School in Norwich, UK.

Training & Development

Safety Training: places available in April 2013

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

Self Rescue Mask Training
14-MAY-13, 8.30 – 10.00, in French
14-MAY-13, 10.30 – 12.00, in French
16-MAY-13, 8.30 – 10.00, in English
16-MAY-13, 10.30 – 12.00, in English
21-MAY-13, 8.30 – 10.00, in French
21-MAY-13, 10.30 – 12.00, in French
23-MAY-13, 8.30 – 10.00, in English
23-MAY-13, 10.30 – 12.00, in English
28-MAY-13, 8.30 – 10.00, in French
28-MAY-13, 10.30 – 12.00, in French
30-MAY-13, 8.30 – 10.00, in English
30-MAY-13, 10.30 – 12.00, en anglais

Habilitation électrique personnel non électricien (electrical safety for non electrician personnel)
16-MAY-13 to 17-MAY-13, 9.00 – 17.30, in French

Use of fire extinguisher – live exercises
08-MAY-13, 10.30 – 12.30, in French
10-MAY-13, 10.30 – 12.30, in French
15-MAY-13, 8.30 – 10.30, in French
15-MAY-13, 10.30 – 12.30, in French
17-MAY-13, 8.30 – 10.30, in French
17-MAY-13, 10.30 – 12.30, in French
22-MAY-13, 8.30 – 10.30, in French
22-MAY-13, 10.30 – 12.30, in French
24-MAY-13, 14.00 – 16.00, in French
24-MAY-13, 16.00 – 18.00, in French
29-MAY-13, 8.30 – 10.30, in French
29-MAY-13, 10.30 – 12.30, in French
31-MAY-13, 8.30 – 10.30, in English
31-MAY-13, 10.30 – 12.30, in English

Refresher course Self-Rescue Mask Training
13-MAY-13, 8.30 – 10.00, in French
13-MAY-13, 10.30 – 12.00, in English
27-MAY-13, 8.30 – 10.00, in French
27-MAY-13, 10.30 – 12.00, in English

Recyclage - Habilitation électrique personnel électricien basse tension (refresher course for electricians in low voltage)
14-MAY-13 to 15-MAY-13, 9.00 – 17.30, in French

First Aiders - Basic Course
16-MAY-13, 8.15 – 17.30, in French
23-MAY-13, 8.15 – 17.30, in English

Radiological Protection - Controlled Radiation Area - Course A for CERN employees and CERN associates
16-MAY-13, 8.30 – 17.00, in English
17-MAY-13, 8.30 – 17.00, in English
21-MAY-13, 8.30 – 17.00, in French
30-MAY-13, 8.30 – 17.00, in English
31-MAY-13, 8.30 – 17.00, in English

Working at heights - Using a harness to prevent falling from a height
14-MAY-13, 9.00 – 17.30, in French
23-MAY-13, 9.00 – 17.30, in English

Isabelle CUSATO, HSE Unit

Self-Rescue Mask Training

Nine new self-rescue mask instructors have been trained since early 2013, which provides CERN with a total of 26 self-rescue mask instructors to date. This will allow us to meet the increasing training needs caused by the Long Shut Down LS1.

The self-rescue mask instructors have trained 1650 persons in 2012 and about 500 persons since the beginning of the year on how to wear the masks properly. We thank all the instructors and all the persons that made this training possible.

Please remember that the self-rescue masks training sessions are scheduled as follows:

- **Basic course**: Tuesday and Thursday mornings (2 sessions – 8.30 AM and 10.30 AM), duration: 1.30 hour, in French and English – registration via CERN online training catalogue – Course code 077Y00.
- **Refresher training**: Monday mornings (2 sessions – 8.30 AM and 10.30 AM), duration: 1.30 hour , in French and English – registration via CERN online training catalogue – Course code 077Y00R.

For any information regarding specific trainings, please contact: **safety.training@cern.ch**.

Seminars

MONDAY 13 MAY

HUPP GROUP - TURKISH STUDENTS MEETINGS

20:00 Next Hupp Meeting

TR

TUESDAY 14 MAY

TH STRING THEORY SEMINAR

14:00 3d & 5d gauge theory partition functions as q-deformed CFT correlators

FILIPPO PASSERINI

CERN (4-3-006 - TH CONFERENCE ROOM)

WEDNESDAY 15 MAY

ACADEMIC TRAINING LECTURE REGULAR PROGRAMME

11:00 Progress in Flavor Physics (1/3)

GINO ISIDORI (INFN, ITALY)

CERN (222-R-001 - FILTRATION PLANT)

TH THEORETICAL SEMINAR

14:00 125 GeV: what is the message?

LUCIANO MAIANI (NATIONAL RESEARCH COUNCIL (IT))

CERN (4-3-006 - TH CONFERENCE ROOM)

THURSDAY 16 MAY

ACADEMIC TRAINING LECTURE REGULAR PROGRAMME

11:00 Progress in Flavor Physics (2/3)

BY GINO ISIDORI (INFN, ITALY)

AT CERN (222-R-001 - FILTRATION PLANT)

CERN COLLOQUIUM

16:30 First Planck results and cosmological implications

JULIEN LESGOURGUES (EPFL, CERN, LAPTH)

AT CERN (503-1-001 - COUNCIL CHAMBER)

FRIDAY 17 MAY

ACADEMIC TRAINING LECTURE REGULAR PROGRAMME

11:00 Progress in Flavor Physics (3/3)

BY GINO ISIDORI (INFN, ITALY)

AT CERN (222-R-001 - FILTRATION PLANT)

PARTICLE AND ASTRO-PARTICLE PHYSICS SEMINARS

TBA

11:00 BY STEFANO FORTE (UNIVERSITÀ DEGLI STUDI E INFN MILANO (IT))

AT CERN (4-3-006 - TH CONFERENCE ROOM)

MONDAY 20 MAY

HUPP Group - Turkish students meetings

21:00 Next Hupp Meeting

at TR

TUESDAY 21 MAY

CONFORMAL FIELD THEORIES IN HIGHER DIMENSIONS (BACK TO THE BOOTSTRAP 3)

09:00

BY JOÃO PENEDONES (PORTO), DAVID POLAND (YALE), LEONARDO RASTELLI (STONY BROOK), SLAVA RYCHKOV (CERN), PEDRO VIEIRA (PERIMETER)

AT CERN (TH CONFERENCE ROOM)

TH STRING THEORY SEMINAR

TH-institute on conformal boostrap

14:00

at CERN

WEDNESDAY 22 MAY

ACADEMIC TRAINING LECTURE REGULAR PROGRAMME

11:00 Perturbative QCD (1/3)

BY AUDE GEHRMANN-DE RIDDER (ETH ZURICH)

AT CERN (500-1-001 - MAIN AUDITORIUM)

TH THEORETICAL SEMINAR

14:00 Entanglement in Quantum Field Theory

BY PROF. JOHN CARDY (UNIVERSITY OF OXFORD)

AT CERN (4-3-006 - TH CONFERENCE ROOM)

Technical training

Electronics design

	Next Session	Duration	Language	Availability
Altium Designer: Essentials	04-Jun-13 to 07-Jun-13	4 days	English	10 places available
Altium Designer: Front End Specialist (Advanced)	23-Sep-13 to 24-Sep-13	2 days	English	10 places available
Altium Designer: PCB Specialist (Advanced)	25-Sep-13 to 27-Sep-13	3 days	English	6 places available
CAO = Allegro Design Entry HDL Front-to-Back Flow v16.6	04-Jun-13 to 06-Jun-13	3 days	English	5 places available
Effets des Radiations sur les composants et systèmes électroniques	20-Mar-13 to 21-Mar-13	1 day 4 hours	French	8 places available
LabVIEW: High-Throughput FPGA and FlexRIO	22-Apr-13 to 24-Apr-13	3 days	French	9 places available
Siemens - STEP7 : level 2	10-Jun-13 to 14-Jun-13	5 days	French	4 places available

Mechanical design

	Next Session	Duration	Language	Availability
AutoCAD - level 1	02-May-13 to 08-May-13	4 days	French	2 places available
AutoCAD Electrical	14-Oct-13 to 18-Oct-13	5 days	French	5 places available
CATIA V5 Kinematics and DMU Fitting	06-May-13 to 07-May-13	2 days	French	6 places available
CATIA-Smarteam Basics	22-Apr-13 to 17-May-13	10 days	French	4 places available
SmarTeam - CATIA data manager at CERN	22-May-13 to 24-May-13	3 days	French	6 places available
SmarTeam - Refresher	21- Mai-13	8 hours	French	2 places available

Software and system technologies

	Next Session	Duration	Language	Availability
C++ Part 1 - Hands-On Introduction	13-May-13 to 16-May-13	4 days	English	One more place available
Core Spring	23-Sep-13 to 26-Sep-13	4 days	English	6 places available
ITIL Foundations (version 3) EXAMINATION	12-Juin -13	1 hour	English	12 places available
Introduction to Linux	12-Jun-13 to 14-Jun-13	3 days	English	7 places available
JAVA - Level 2	03-Jun-13 to 06-Jun-13	32 hours	English	4 places available
JavaScript for web development	27-May-13 to 29-May-13	3 days	English	5 places available
Joint PVSS-JCOP Framework	01-Jul-13 to 05-Jul-13	4 days 3 hours	English	7 places available
Oracle Certified Professional	17-Jun-13 to 21-Jun-13	5 days	English	4 places available
Oracle Database SQL Tuning	22-May-13 to 24-May-13	3 days	English	7 places available

Management & Communication training

Management and communication courses – Places available

There are places available in some management and communication courses taking place in the period April to June 2013.
For advice, you can contact Erwin Mosselmans (tel. 74125, **erwin.mosselmans@cern.ch**)
or Nathalie Dumeaux (tel. 78144, **nathalie.dumeaux@cern.ch**)

Course in English (or bilingual)	**Dates**	**Duration**	**Language**	**Availability**
Managing stress	29 and 30 May	2 days	English	3 places
Making Presentations	30, 31 May & 25 June	3 days	English	2 places
Communicating Effectively - Residential course	4 to 6 June	3 days	Bilingual	9 places
Handling difficult conversations (Adapted from Dealing with Conflict)	7 and 14 June and 13 September	3 days	English	6 places
Voice and Nonverbal Behaviour in Speech Communication	17 and 18 June	1 day 4 hours	English	7 places
Managing Teams	18 to 20 June	3 days	English	3 places
Quality Management	08 to 9 July	2 days	English	8 places
Cours en français				
Savoir gérer les discussions difficiles	15 et 22 mai et 26 juin	3 jours	Français	9 places
Les enjeux de la voix et du comportement non verbal dans la communication orale	21 au 22 mai	1 jour 4 heures	Français	5 places
Communiquer pour convaincre	28, 29 mai	2 jours	Français	7 places
Gestion du stress	5 et 6 juin	2 jours	Français	2 places