CERN Bulletin

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"SHAPE MEMORY" MATERIAL PROVIDES A SOLUTION FOR THE HL-LHC

A collaboration between CERN and the University of Calabria is developing a new connection device for vacuum chambers based on Shape Memory Alloy (SMA) rings, for future use in the High-Luminosity LHC (HL-LHC). The unique characteristics of these materials, able to memorise different shapes at high and low temperatures, are being exploited to create a high-tech solution for sealing the vacuum chambers of the upgraded accelerator.

Proof of concept of a SMA connector for Ultra High Vacuum (UHV) chambers. (Picture: Fabrizio Niccoli)

In particle accelerators, beams circulate inside vacuum chambers connected by flanges - complex engineering components which ensure the integrity of the vacuum system. Currently, there are two types of flanges used in the LHC: standard "ConFlat" flanges, which are bolted together; and the quick conical connection flanges used on radioactive components (for example collimators), which need large and heavy chain clamps. Clamping or unclamping a flange is time-consuming and can result in a larger radiation dose to personnel in a radioactive environments. "A light compact flange that is easier to install and remove, possibly remotely, and that minimises the time of any intervention was what we were really looking for," explains Paolo Chiggiato, Head of the Vacuum, Surfaces and Coatings (VSC) group. And the answer was SMAs.

"The shape memory effect is the ability of an SMA to 'remember' its original shape upon heating," says Cédric Garion, a member of the VSC group. "This is possible under certain thermo-mechanical conditions, where particular microscopic crystallographic configurations occur (see box). At CERN, we are particularly interested in NiTi (Nickel-Titanium)-based alloys, which present very promising shape recovery capabilities." Currently under development by CERN in collaboration with the Department of Mechanical, Energy and Management Engineering (DIMEG) of the University of Calabria (Italy), a NiTi-based connection device could provide a smart solution for easy installation and disconnection. SMA rings can have two sizes: a smaller, contracted version when heated, and a larger one when cooled down. "After certain thermo-mechanical treatments, when heated up, the SMA rings currently being studied (about 45 mm internal diameter and 8 mm thickness) contract, with a diameter variation of several millimeters!"

(Continued on page 2)

A WORD FROM CHARLOTTE WARAKAULLE

THE IR SECTOR – OPENING NEW HORIZONS FOR CERN

Last week saw the CERN family grow by one, as we welcomed Cyprus as an Associate Member in the pre-stage to Membership. This gives me a good opportunity, three months into the job, to share the vision for the new International Relations (IR) Sector. CERN is and always has been an incredible example of successful, inclusive international collaboration and exchange in the pursuit of common goals. The IR Sector continues and builds on that tradition and spirit.

(Continued on page 2)

In this issue

NEWS

"Shape memory" material provides a solution for the HL-LHC 1
The IR Sector – Opening new horizons for CERN 1
LHC Report: machine commissioning - looking good 3
Prototype HL-LHC magnet undergoes testing 3
Lighting the way: how emergency lights survive radiation 4

Computer Security 5
Ombud's Corner 6
Sylvestre Catin (1969 – 2016) 6

Official news 7
Take note 8
Seminars 10

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A WORD FROM CHARLOTTE WARAKAULLE

(Continued from page 1)

THE IR SECTOR – OPENING NEW HORIZONS FOR CERN

In the 60-plus years of CERN's existence, our world has been transformed at all levels. And over the last decade or so, the world of particle physics has evolved beyond recognition. CERN is now a global lab, with a European core, and particle physics is a field that is increasingly planned and coordinated around the world.

It is for these reasons that CERN needs to develop its International Relations so we can respond to and navigate these changes. The establishment by the Director-General of the IR Sector is a sign of her commitment to doing just that. The IR Sector will enable CERN to promote our discipline and to serve society on a global level now and in the future. It will strengthen CERN's position as a global centre of excellence, help shape the global science policy agenda and connect CERN with people across the world to inspire curiosity and understanding.

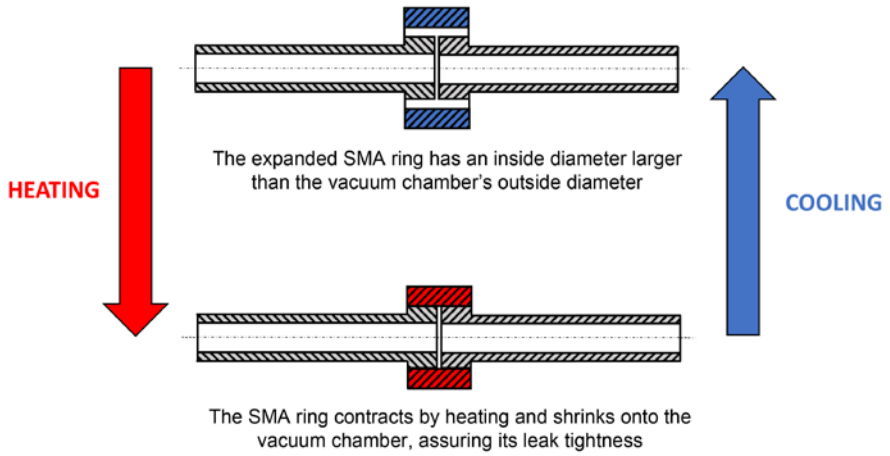
The immediate priorities for the Sector include reinforcing dialogue with our Member States, setting future directions for geographical enlargement and strengthening CERN's voice in global policy debates. These are early days, but we've already made a start. We have expanded our interaction with Member States with the creation or consolidation of Thematic Forums, and we have begun a reflection on ensuring that enlargement supports and reinforces our long-term scientific aspirations and is not merely an aim in itself.

It is a tremendous honour for me to head the IR Sector and I feel very privileged to be able to serve this remarkable organisation. I look forward to sharing developments in CERN's International Relations with you over the coming years. In the meantime, I invite you to discover more about the new Sector here: http://ir-sector.web.cern.ch.

Charlotte Warakaulle, Director for International Relations

"SHAPE MEMORY" MATERIAL PROVIDES A SOLUTION FOR THE HL-LHC

(Continued from page 1)



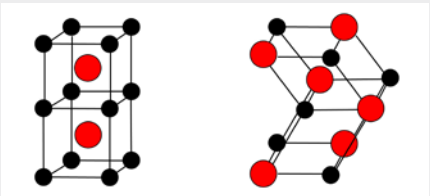
The horizontal structures represent the vacuum chambers. Up: the SMA ring in its martensitic enlarged shape (see box). Down: the SMA ring in its austenitic contracted shape (see box). (Image: Fabrizio Niccoli)

explains Fabrizio Niccoli, of the University of Calabria, who is currently doing his PhD on this topic. "They could easily be installed at room temperature around the extremities of the chamber when they are slightly larger, and then heated up to get the contracted shape, clamping the vacuum chambers and assuring vacuum leak tightness. Tests at CERN have shown that a reproducible tightness below 10^{-10} mbar l s^{-1} is achieved. The SMA ring is removed by cooling it below room temperature, re-inducing its enlarged configuration so that it becomes loose enough to allow the technicians to open the pipes easily."

This technology is being developed for the future HL-LHC, which will be operational in 2026. The luminosity of the HL-LHC will be a factor of 10 higher than that of the current LHC. The increased luminosity means that radioactivity will be higher at some points of the accelerator. The time spent in some parts of the tunnels will then need to be minimised as much as possible.

Anaïs Schaeffer & Stefania Pandolfi

A change in crystallography



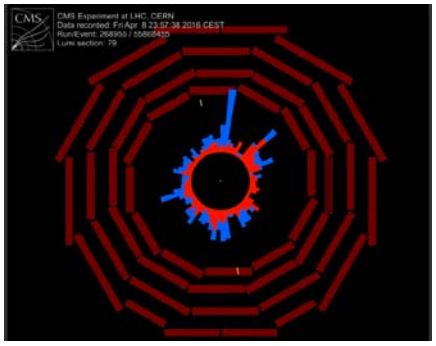
Left: the austenitic structure. Right: the martensitic structure. (Image: Fabrizio Niccoli)

Under certain thermo-mechanical conditions, SMAs take on particular microscopic crystallographic configurations known as the martensitic and austenitic phases. The presence of either phase depends mainly on the temperature and/or the stresses applied. The austenitic phase is stable at high temperatures and low applied stresses and is characterised by a body-centered cubic cell, while the martensitic phase is stable at low temperatures and high applied stresses and has a distorted monoclinic cell.

The peculiar properties of SMAs are arousing great interest in both the biomedical and industrial sectors. SMAs are proving particularly useful for aerospace applications, which are often subject to high reliability and geometric space constraints. SMAs are being used for actuators, structural connectors, vibration dampers, seals and manipulators.

LHC REPORT: MACHINE COMMISSIONING - LOOKING GOOD

Since first beam was injected on Friday, 25 March, the recommissioning of the LHC has made good progress.



An event display showing the first collisions after the 2015 year-end technical stop as seen by the CMS experiment.

At present, work is being performed with either probe bunches (around 10^{10} protons per bunch) or single nominal bunches (1.1 x 10^{11} protons per bunch). This procedure is intended to ensure safe operation before full qualification of the machine protection set-up.

Beam has been taken up the ramp to 6.5 TeV and through the squeeze to the planned 2016 operating scenario. The optics (i.e. the global focusing properties of the whole ring) have been measured and corrected to an unprecedented level: there is now excellent agreement between the machine model and the actual LHC. Some preliminary measurements of the global aperture have been performed and there are no apparent bottlenecks. The position of the ULO (Unidentified Lying Object) had been probed and it is in a similar position to where it was measured at the end of last year.

One major activity is the set-up of the extensive collimation system for all phases of the machine cycle. A number innovative developments have greatly reduced the time required for this critical activity. These measures include a fast set-up based on the use of beam loss monitors, and the use of collimators with built-in beam position monitors. The collimators are now set-up at injection, at the top of the ramp and through the squeeze. A critical point is also the set-up and verification of the injection and beam dump system and the associated protection devices, but so far everything is going according to plan.

The various system specialists are also performing beam-based commissioning of the many beam instrumentation systems, the transverse damper system and the radio-frequency system.

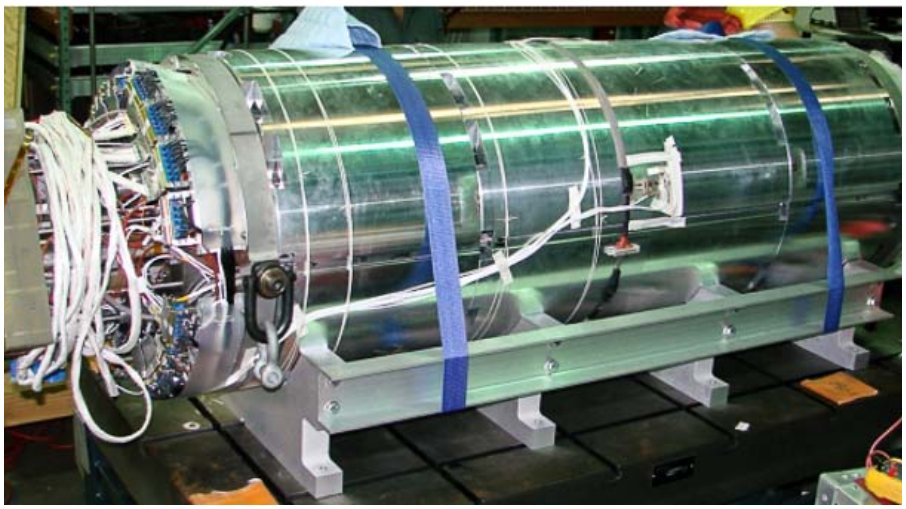
First collisions of a small number of nominal bunches took place last Friday, 8 April. These collisions were not for the experiments but to establish the interaction points and open the way for collimator set-up under normal physics conditions.

The next couple of weeks will see the set-up of the collimation and protection devices finalised. This will then be qualified by a series of loss maps, in which beam loss is deliberately induced. Careful checks will be made that the losses have ended up where they should and that the cold aperture of the machine is fully protected. A number of other tests will fully qualify the machine protection system and set-up in order to proceed with the injection of high-intensity 25 ns beam and finally with the preparations for the scrubbing run.

CERN Bulletin

PROTOTYPE HL-LHC MAGNET UNDERGOES TESTING

A preliminary short prototype of the quadrupole magnets for the High-Luminosity LHC has passed its first tests.



The first short prototype of the quadrupole magnet for the High Luminosity LHC. (Photo: G. Ambrosio (US-LARP and Fermilab), P. Ferracin and E. Todesco (CERN TE-MSC))

Momentum is gathering behind the High-Luminosity LHC (HL-LHC) project. In laboratories on either side of the Atlantic, a host of tests are being carried out on the various magnet models.

In mid-March, a short prototype of the quadrupole magnet underwent its first testing phase at the Fermilab laboratory in the United States. This magnet is a pre-prototype of the quadrupole magnets that will be installed near to the ATLAS and CMS detectors to squeeze the beams before collisions. Six quadrupole magnets will be installed on each side of each experiment, giving a total of 24 magnets, and will replace the LHC's triplet magnets. Made of superconducting niobium-tin, the magnets will be more powerful than their predecessors, which will result in an increase in the LHC's luminosity, or in other words the probability of collisions. The HL-LHC will produce a luminosity level ten times greater than at the LHC today.

The magnet tested at Fermilab consists of two coils manufactured at CERN and two others manufactured by the LARP (LHC Accelerator Research Program) consortium, which comprises four US laboratories. "The construction of this prototype is the product of a real international effort," emphasises Lucio Rossi, the HL-LHC project leader.

The prototype is 1.5 metres long, whereas the final magnets will be 4.2 or 7 metres long. During the tests, a peak in the magnetic field of 12.5 tesla was measured on the coils, compared to 8 tesla for the LHC's current quadrupole magnets, an impressive achievement. The tests will continue, while in parallel a second short prototype is being built and will be tested later in the year.

"We will also start manufacturing actual-size prototypes, i.e. 7 metres for the CERN design and 4.2 metres for the LARP design," explains Ezio Todesco, who is in charge of the insertion region magnets for the HL-LHC project. These prototypes will be ready for testing in 2017.

Corinne Pralavorio

LIGHTING THE WAY: HOW EMERGENCY LIGHTS SURVIVE RADIATION

LHC tunnel are emergency lights are part of an essential safety system if you ever need to evacuate.

Just like a fridge, you only need the lights on in the LHC tunnel when you are in there; but the emergency lights are part of an essential safety system if you ever need to evacuate.

Fortunately, tunnel evacuations are very rare, but if you work there, you need to know that you can rely on the emergency lighting to guide you to safety.

When the LHC machine is operating, it is a harsh environment – people are most definitely not allowed access – and the lighting systems need to withstand the effects of radiation to ensure that they will still work when the LHC is switched off and people are allowed back in the tunnel to carry out routine maintenance.

Changes to lighting regulations mean that the current low pressure sodium lighting system which was installed for LEP, the LHC's predecessor, is becoming obsolete; replacement parts are difficult to find because manufacturers are no longer producing them. CERN needed to find a solution, not just for the 27 km LHC tunnel, but for the whole of the accelerator complex.

"We need a mass market solution that is cheap and available from multiple sources," explains project engineer, James Devine.

Initially, 10 different products based on LED lamps were tested in a radiation environment; most lasted less than five minutes. The sole survivor was dissected to see how it was made.

"We looked at the way the power converter was made – most LED products use switch mode power supplies which are very sensitive to radiation – but this one used a bridge rectifier," says James. "That is basic technology from the early days of electrical engineering."

Since then, James has been working with two companies (one British, one French) to incorporate this design for a radiation hard power supply into their products. Both companies are specialist suppliers of tunnel lighting, and both manufacture emergency lighting systems. However, neither had produced a product especially for radiation environments.

The new lighting system has been installed at LHC point 7 – radiation-wise, the hottest access point of the accelerator. After two years it is still working well and has been so successful that as the LEP-era lighting fails, it is being replaced with the new system.

James' design for the power supply has recently been granted funding from CERN's Knowledge Transfer Fund to enable further development to increase the energy efficiency and extend the lifetime.

The design is now available under the CERN Open Hardware Licence a licence devised at CERN aiming specifically at facilitating the dissemination of hardware designs. "This means that any manufacturer can use and modify OHL designs freely," explains Myriam Ayass, legal advisor in the CERN Knowledge Transfer Group and author of the CERN Open Hardware Licence, "and if his modifications are distributed, this must be under the same OHL conditions, thereby fostering competition and innovation in the market place."

This article was originally published in UK news from CERN and the Knowledge Transfer groups annual report, which gives an overview of all knowledge transfer projects in 2015.

Stephanie Hills

MAC SECURITY – NOTHING FOR OLD VERSIONS

A fundamental pillar of computer security is the regular maintenance of your code, operating system and application software – or, in computer lingo: patching, patching, patching.

Only software which is up-to-date should be free from any known vulnerabilities and thus provide you with a basic level of computer security. Neglecting regular updates is putting your computer at risk – and consequently your account, your password, your data, your photos, your videos and your money. Therefore, prompt and automatic patching is paramount. But the Microsofts, Googles and Apples of this world do not always help…

Software vendors handle their update policy in different ways. While Android is a disaster – not because of Google, but due to the slow adaptation of many smartphone vendors (see "Android's Armageddon") – Microsoft provides updates for their Windows 7, Windows 8 and Windows 10 operating systems through their "Patch Tuesday" rollouts. All you need to do is have the automatic "Windows Update" feature enabled (it is by default!). While automatic updates are also provided to Apple Macs by default, they have a more restrictive (but undocumented) policy for their Mac OS: Apple provides security fixes mainly for the latest version of OS X (also dubbed "El Capitan"). Any older versions of MacOS either receive no security updates at all, or do so for only a few of the known vulnerabilities!

Thus, don't just "feel" secure, even if Apple are still providing some security updates for OS X 10.9 and 10.10. They are not resolving many other known security issues for those versions. And worse, the fact that Apple still provides some software updates – but no security updates – for even older versions of the OS does not mean that these OS versions are still supported. They are not. Hence, any versions of OS X other than 10.11.3 are vulnerable today to any kind of cyber-attack (e.g. when browsing malicious webpages, when installing malicious software or reading malicious e-mails, etc.). If your Mac happens to run another version than the latest, "El Capitan", (you can check under the Apple Menu and choose "About This Mac"), we strongly recommend that you upgrade it as soon as possible. Just visit this page: **http://cern.ch/go/Vff8**. However, please note that "El Capitan" might be incompatible with certain, mainly older, software packages. You can find known issues here: **http://cern.ch/go/7VXH**. Still, upgrading is always the best course of action.

For further information, questions or help, check: ***https://security.web.cern.ch*** *or contact us at* ***Computer.Security@cern.ch****.*

Do you want to learn more about computer security incidents and issues at CERN? Follow our Monthly Report: ***https://security.web.cern.ch/security/reports/en/monthly_reports.shtml***

Stefan Lueders, Computer Security Team

Ombud's Corner

DEFEATING UNCONSCIOUS BIAS

Do you have a tendency to switch off at meetings every time a particular colleague starts to speak? Is it obvious to you that your colleagues will never accept a peer as a project leader? And doesn't that candidate from your own alma mater clearly have a definite edge over the others?

How do we come to these conclusions and what can we do to ensure that our decisions are based on objective criteria alone? Can we always be sure that we are not influenced by pre-conceived notions or prejudices that may unconsciously bias our thinking?

Unconscious bias is a part of everyday life – it refers to the insidious influences that our backgrounds, cultural environments or personal experiences exert on the way in which we judge or assess people or situations. In the workplace, it has a negative impact on our goals and interactions when it causes us to make decisions based on generalisations or mental associations that we are not even aware of, and that have little or no bearing on the objective facts at hand.

Bias comes in many different forms, the most familiar of which is the 'affinity bias', which refers to the tendency we have to warm to people who are like ourselves, which of course also implies its corollary in that we find it more difficult to appreciate or understand those who appear to hold opinions or values that are very different to our own. There is also a well-known 'horns and halo' effect, where we may make negative – or even positive – assumptions about people based on our prior knowledge or experience of them, without paying full attention to the objective facts at hand. A third type of bias stems from the fact that we tend to seek information that confirms our pre-existing beliefs and this may cause blind spots that lead us to listen selectively or filter out factors that do not correspond to our expectations.

These biases cause us to make decisions in favour of one individual or group, often to the exclusion or detriment of others. At work, they can be extremely damaging when decisions to select, promote or develop staff are unwittingly affected by elements such as the physical attributes or appearance of individuals, as well as factors like regional accents, educational background or cultural and gender related behaviours, to which we attribute our own subjective associations.

Even at times when we are convinced of our own objectivity, we cannot escape the risk that we may have fallen prey to prejudice or discriminatory behaviour, and we need to be constantly vigilant and aware of our own biases in order to consciously prevent them from exerting undue influence on our considerations.

However, if we are willing to acknowledge that our thinking may be biased, we may be able to counteract the effect and take three simple steps to identify, weaken and eventually defeat the unconscious biases that may otherwise undermine our decisions. If we are so inclined, a slim volume in the CERN Library, "3 Keys to Defeating Unconscious Bias" by S. Thiederman, could provide us with valuable insights and a few practical steps in that direction.

All previous Ombud's Corners can be accessed in the Ombud's blog: ***http://cern.ch/go/p9ZS.***

Sudeshna Datta-Cockerill

SYLVESTRE CATIN (1969 – 2016)

Our dear colleague and friend, Sylvestre, has gone suddenly from our lives leaving us in great sadness and disbelief.

His kindness has touched us all in different ways. Sylvestre was always there for us, sorting out our informatics issues in his usual calm, friendly and professional manner. His laugh and smile will always be with us and he will remain in our hearts.

His colleagues and friends

We deeply regret to announce the death of Sylvestre Catin on 2 April 2016. Sylvestre Catin, who was born on 12 August 1969, worked in the BE department and had been at CERN since 13 March 2000.

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

Social Affairs
Human Resources department

COMPOSITION OF THE JOINT ADVISORY DISCIPLINARY BOARD (JADB) - 2016 EXERCISE

Appointed by the Director-General

Member	John PYM / DG
1st deputy	Gianluigi ARDUINI/ BE
2nd deputy	Dante GREGORIO / FP

Appointed by the Staff Association

Member	Sigrid KNOOPS / TE
1st deputy	Lynda LEROUX / HR
2nd deputy	Ghislain ROY / BE

Mr Pym and Ms Knoops have drawn up the following list of staff members from among whom the Chairperson of the Board may be chosen when required:

Ronny BILLEN / BE
Ignacio REGUERO / IT
Sylvain CHAPELAND / EP
Laurent TAVIAN / ATS
Doris FORKEL-WIRTH / HSE
Gabriele THIEDE / FAP
Alberto PACE / IT
Pierre VANDE VYVRE / PH
Stephan PETIT / EN
Andreas WAGNER / IT

The composition of CERN official bodies for 2015 is available in the document you can find here: **http://cern.ch/go/ZDt6**.

HR Department
HR/DHO

COMPOSITION OF THE JOINT ADVISORY APPEALS BOARD (JAAB) - 2016 EXERCISE

Appointed by the Director-General

Member	Nicole POLIVKA / HSE
1st deputy	Raymond VENESS / BE
2nd deputy	Ramon FOLCH / EN

Appointed by the Staff Association

Member	Rosario PRINCIPE / TE
1st deputy	Nicolas SALOMON / PF
2nd deputy	Almudena SOLERO / FAP

Ms Polivka and Mr Principe have drawn up the following list of staff members from among whom the Chairperson of the Board may be chosen when required:

Sandrine BAUDAT / FP
Arash KHODABANDEH / IT
François BRIARD / DG
Joel CLOSIER / PH
François BUTIN / EN
Isabelle LAUGIER / BE
Etienne CARLIER / TE
Pedro MARTEL / GS
Philippe CHARPENTIER / PH
Malika MEDDAHI / TE

Mediators [see Administrative Circular N° 6 (Rev. 1) entitled "Review procedure"] will also be selected from this list of ten staff members.

The composition of CERN official bodies for 2016 is available in the document you can find here: **http://cern.ch/go/hWm7**.

HR Department
HR/DHO

TAXATION IN FRANCE - MEMORANDUM CONCERNING THE ANNUAL INTERNAL TAXATION CERTIFICATE AND THE DECLARATION OF INCOME FOR 2015

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 national taxation on salaries and emoluments paid by CERN.

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

I - Annual internal taxation certificate for 2015

The annual certificate of internal taxation for 2015, issued by the Finance and Administration Processes Department, is available since 19 February 2016. **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: **http://cern.ch/go/7KlS**.

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

II - 2015 income tax declaration form in France

The 2015 income tax declaration form must be completed following the general indications available at the following address: **https://admin-eguide.web.cern.ch/en/procedure/income-tax-declaration-france.**

IF YOU HAVE ANY SPECIFIC QUESTIONS, PLEASE CONTACT YOUR LOCAL *SERVICE DES IMPÔTS DES PARTICULIERS* (SIP, private citizens' tax office) DIRECTLY.

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

HR Department
Contact: 73903

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

Exchange rate for 2015

For 2015, the average annual exchange rate is EUR 0.87 for CHF 1.

HR Department

Take note

REGISTRATION SUMMER CAMP 2016

Reminder: registration for the CERN Staff Association Summer Camp is now open for children from 4 to 6 years old.

Jardin d'enfants et Ecole de l'Association du personnel du CERN

More information on the website: **http://nurseryschool.web.cern.ch/.**

The summer camp is open to all children.

The proposed cost is 480.-CHF/week, lunch included.

The camp will be open weeks 27, 28, 29 and 30, from 8:30 a.m. to 5:30 p.m.

For further questions, you are welcome to contact us by email at **Summer.Camp@cern.ch.**

CERN Staff Association

THE GLOBE REOPENS ITS DOORS

After a year of work, the newly renovated Globe of Science and Innovation will open its doors again at 10 a.m. on Tuesday, 19 April.

The "Universe of Particles" exhibition has been updated and will be open to the public, free of charge, from 10 a.m. to 5 p.m., Monday to Saturday (except during official CERN closures).

The Globe's programme of lectures and events for the general public will restart at the end of April.

What's on at the Globe in April and May:

- **28 April at 6.30 p.m.**: Theatre – **"Curie_Meitner_Lamarr_indivisible"**, a play that pays tribute to the lives of three exceptional women in the field of science and technology (in English).
Reservations: **http://indico.cern.ch/e/cmli**.

- **10 May at 8.30 p.m.**: Lecture – ***"Le modèle du CERN et les grands défis mondiaux"*** ("The CERN model and the key global challenges") by Michel Spiro (in French with simultaneous interpreting into English).
Reservations: **http://indico.cern.ch/e/conference_spiro**.

- **23 May at 7 p.m.**: Theatre – **"Being Leonardo da Vinci: an impossible interview"**, a play presented in collaboration with the Italian Permanent Mission in Geneva (in Italian with English surtitles).
Reservations available soon.

- **24 May at 8.30 p.m.**: Lecture – ***"Bientôt une sculpture sur la Lune, un défi scientifique, artistique et humain"*** ("Soon, a sculpture on the moon: a scientific, artistic and human challenge") by Anilore Banon (in French).
Reservations available soon.

Reservations are required for all plays and lectures.

CERN Bulletin

DEVELOPERS@CERN FORUM | PYTHON AT CERN | 30 – 31 MAY

The Developers@CERN Forum is an event by developers for developers aimed at promoting knowledge- and experience-sharing. The second forum will take place in the IT auditorium in the afternoons of 30 and 31 May.

With the topic "Python at CERN", it will consist of a series of talks regarding the Python language, frameworks and tools used at CERN.

Are you a Python guru or would you like to learn?

Come and share your Python experiences with other developers!

Submissions for presentations and workshops are open until 9 May at: **http://cern.ch/dev-forum**.

If you would like to stay informed about this or future events, please subscribe to the announcement e-group (just a few e-mails per year) on: **http://cern.ch/go/8n8G**.

SECTION DE PHYSIQUE

COLLOQUE DE PHYSIQUE

24, QUAI ERNEST-ANSERMET, CH-1211 GENÈVE 4

Lundi 18 avril 2016, 17h00
Ecole de Physique, Auditoire Stueckelberg

"Between Localization and Ergodicity in Quantum Systems"

Prof. Boris Altshuler
Columbia University, New York

Résumé

Strictly speaking the laws of the conventional Statistical Physics, in particular the Equipartition Postulate, apply only in the presence of a thermostat. For a long time this restriction did not look crucial for realistic systems. Recently there appeared two classes of quantum many-body systems with the coupling to the outside world that is (or is hoped to be) negligible: (1) cold quantum gases and (2) systems of qubits, which enjoy a continuous progress in their disentanglement from the environment. To describe such systems properly one should revisit the very foundations of the Statistical Mechanics. The first step in this direction was the development of the concept of Many-Body Localization: states of a many-body system can be localized in the Hilbert space resembling the celebrated Anderson Localization of single particle states in a random potential.
Localization implies that the state of the system decoupled from the thermostat depends on the initial conditions: the time averaging does not result in equipartition distribution, the entropy never reaches its thermodynamic value i.e. the ergodicity is violated. We will discuss evidences for the realization of delocalized non-ergodic systems and speculate about their properties, which can't be described in the conventional way.

Une verrée en compagnie du conférencier sera offerte après le colloque.

Prof. Ruth Durrer

Genève, 11 avril 2016/RD/nc

Secrétariat de la Section de Physique - N. Chaduiron – 022 - 379.63.83

Seminars

THURSDAY, 14 APRIL 2016

11:00 **Academic Training Lecture Regular Programme** Advances in Astroparticle Physics (4/5) **TH Conference Room**

FRIDAY, 15 APRIL 2016

11:00 **Academic Training Lecture Regular Programme** Advances in Astroparticle Physics (5/5) **TH Conference Room**

11:00 **Detector Seminar** Photonic crystals, graphene, and new effects in Čerenkov radiation **Salle Bohr**

MONDAY, 18 APRIL 2016

07:15 **CERN Spring Campus** 2016 CERN Spring Campus **SRA-I03**

11:00 **Academic Training Lecture Regular Programme** Energy Efficiency in Computing (1/2) - Postponed **IT Amphitheatre**

14:00 **CERN Computing Seminar** Trends in HPC and Data Center Power, Packaging, and Cooling **IT Amphitheatre**

14:00 **Workshop** Experimental Particle and Astroparticle Seminar Zurich **42-R-407**

TUESDAY, 19 APRIL 2016

11:00 **Academic Training Lecture Regular Programme** Energy Efficiency in Computing (2/2) - Postponed **IT Amphitheatre**

11:00 **LHC Seminar** ALICE seminar **Council Chamber**

MONDAY, 25 APRIL 2016

14:00 **Workshop** Experimental Particle and Astroparticle Seminar Zurich **42-R-407**

TUESDAY, 26 APRIL 2016

11:00 **LHC Seminar** ATLAS seminar **Main Auditorium**